

Introduction

Presentación

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Article 26 of the Universal Declaration of Human Rights states that everyone has the right to education. One opportunity to guarantee this right in the field of higher education might be Massive Open Online Courses, known by the initials MOOC. These courses reflect a growing trend massive, open, online education. They are an opportunity for comprehensive academic training as well as being an opportunity to give the international research community a pathway to expand knowledge and provide sustainable life-long education.

The various academic articles in this thematic issue of the **revista española de pedagogía** —«MOOCs and their impact in the European Higher Education Area: Challenges and proposals from a critical perspective»— offer analysis, reflection, and critique of MOOCs, specifically through the prism of university teaching and praxis in such important fields as the research that has been carried out in the field of MOOCs, the pedagogical quality of MOOC environments, accreditation and certification systems, the impact of MOOCs on social networks, integration of the courses in formal education, and their academic and social impact in different countries, among other topics.

To this end, lecturers and researchers from Spain and other countries have lent their valuable academic expertise to carry out a critical analysis of relevant questions surrounding this social and educational phenomenon; of great interest to the academic community.

This thematic issue opens with an article called «Research contributions on the educational use of MOOCs», by Julio Cabero, Professor of Educational Technology at the University of Seville, and Verónica Marín and Begoña Sampedro from the University of Córdoba. In it they provide an exhaustive meta-analysis of the research carried out over the last five years relating to the educational possibilities of MOOCs.

The next article, by Josep M. Duart, of the Universidad Oberta de Catalunya, Rosabel Roig and Miguel Ángel, of the University of Alicante, and Santiago Mengual, of the University of Valencia, provides a descriptive and systematic review of JCR and SCOPUS publications in recent years with the objective of evaluating the aspects linked with the pedagogical quality of MOOCs.

In the third article, «The impact of the MOOC movement on social networks. A

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computational and statistical study on Twitter», Esteban Vázquez, María Luisa Sevillano, of the National Distance Education University (UNED), and Eloy López, of the Universidad Pablo de Olavide (UPO), offer an overview of the presence of the MOOC movement on social networks. Specifically, the impact of this educational phenomenon on the Twitter platform and its profile on it are analysed, as are the patterns of use and geolocation of tweets by continent through computational and statistical techniques.

Next in this thematic issue, Carlos Castaño, Urtza Garay, and Inmaculada Maiz, from the University of the Basque Country, in their article «Factors for academic success in the integration of MOOCs in the university classroom», examine university praxis by setting out the results obtained from a longitudinal study on the integration of a MOOC in face-to-face university classes and their influence on academic performance.

After this, the article «Certification of MOOCs. Advantages, Challenges and Practical Experiences», prepared by Michael Kopp and Martin Ebner from Graz University invite us to reflect on the area of certification relating to MOOCs, their motivational aspects, impact on success rates, and challenges, among other significant questions.

Following on from this, with the article called «Analysis of the pedagogical perspective of the MOOCs available in Portuguese», written by Giovanni Lemos, Manuela Raposo, and José Antonio Sarmiento, from the University of Vigo, and Manuel Cebrián, from the University of Málaga,

a study is presented that is based around analysing which pedagogical designs dominate in the current range of MOOCs in Portuguese. To do so, a quantitative, non-experimental, transversal piece of research was designed and implemented.

This thematic issue closes with an article from Africa: «MOOCs for in-service teachers: The case of Uganda and lessons for Africa», by Benedict Oyo and John Byabazaire, from Gulu University and Billy Mathias, from Tshwane University of Technology. A MOOC platform known as TEP (Teachers' E-Learning Portal) is presented that focuses on digital competency and lifelong learning for in-service teachers in Uganda. It is coordinated by accredited local universities in collaboration with secondary schools and functions using the resources available in the schools (technical staff, computers, and internet). They then present an analysis of the impact of the TEP in Africa.

Our intention in coordinating this thematic issue is to offer the academic community a new window for didactic research and innovation with the use of MOOCs as an ever-more sustainable university curricular option for the expansion of academic knowledge and the university praxis in the new massive democratic settings for learning.

To draw this introduction to a close, we would like to state publically our thanks to the Editor and the prestigious Editorial Board of the **revista española de pedagogía**, to the authors and reviewers of the academic manuscripts for their excellent professional efforts in the preparation of this thematic issue.

Research contributions on the educational use of MOOCs

Aportaciones desde la investigación para la utilización educativa de los MOOC

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Abstract:

In recent years, online teaching and training with MOOCs has become increasingly important. This is demonstrated by the number of publications about them. Here we present a meta-analysis of the research that has been performed, focusing on the educational opportunities provided by MOOCs. This study was conducted using Social Sciences peer review open journal publications from the last five years (2011-2016). These indexed publications can be found in the following databases: JCR, Scimago Journal-SCOPUS, and Sello Fecyt. The main result obtained was quantitative data gathered from questionnaires referring to the most worked area of materials and content design. As an initial conclusion, it identifies a need to broaden the scope of study to include more general educational journals.

Keywords: Online teaching and training, MOOC, Meta-analysis, Open journal publication.

Resumen:

La formación *online* a través de los MOOC ha cobrado una gran relevancia en los últimos años, como demuestran las publicaciones que se han realizado en torno a ellos. En las líneas siguientes presentamos un meta-análisis de las investigaciones realizadas respecto a las posibilidades educativas de los mismos. Este se ha realizado en torno a las revistas publicadas en el área de Ciencias Sociales vinculadas al área de tecnología educativa y que, además, se publican de manera abierta y que se encuentran indexadas en JCR, Scimago Journal-SCOPUS y Sello Fecyt en los últimos cinco años (2011-2016). El principal resultado alcanzado es el que se refiere al diseño de materiales y contenidos, siendo el método más empleado de investigación el de corte cuantitativo, empleando mayoritariamente el cuestionario para la recogida de los datos. Como conclusión inicial se puede indicar la necesidad de ampliar el horizonte de estudio a revistas educativas de corte generalista.

Descriptores: Enseñanza y formación *online*, MOOC, meta-análisis, revistas en abierto.

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1. Introduction

When discussing MOOCs (Massive Open Online Courses), we are concerned with a very interesting educational technology or strategy that is still seen as emerging and has, at the same time, inspired high expectations and considerable criticism. With regards to these expectations, several editions of the Horizon Report have described it as a technology that will quickly be incorporated into the educational system on a massive scale (Durall, Gros, Maina, Johnson, and Adams, 2012; Johnson, Adams, Cummins, Freeman, Ifenthaler, and Vardaxis, 2013; Johnson, Adams Becker, Cummins, Estrada, Freeman, and Ludgate, 2013). Similarly, other people have described MOOCs as a disruptive technology that will transform the student-teacher relations that are traditionally found in teaching and will take education to all corners of the world (Conole, 2013; Marauri, 2014; Bonk, Lee, Reeves, and Reynolds, 2015). At the same time we find authors (Popenici, 2014; Cabero, 2015; Valverde, 2015) who have criticised the more romantic and extreme viewpoints that they have inspired.

Their importance can also be seen in the efforts various journals have made to publish special issues on this topic, for example: *Apertura. Revista de Innovación educativa* (2014, 6, 1, «Aprovechamiento y efectividad del uso de las TIC y los MOOC»; *Comunicar* (2015, 22, 44, «MOOC en la educación»); *RIED. Revista Iberoamericana de Educación a Distancia* (2015, 18, 2, «La filosofía educativa de los MOOC y la

educación universitaria»); *Profesorado. Revista de currículum y formación del profesorado* (2014, 18, 1, «Los MOOC y la Educación Superior: La expansión del conocimiento»); and *Educación XXI* (2015, 18, 2, «MOOC. De la teoría a la evidencia»).

One area that we believe is significant is determining whether or not MOOCs are a technology. From our point of view they are not in themselves a technology, but instead should be seen as a medium and resource that is supported by different technologies, such as websites, video clips, on-line learning platforms or audio podcasts.

With regards to their major features and in line with the suggestions made by various authors (Castaño and Cabe-ro, 2013; Vázquez, López, and Barroso, 2015), we can classify them as follows: they are an educational resource that has some similarity to a class; they have start and end dates; they have evaluation mechanisms; they take place on-line; access to them is free; they are open on-line and do not have admissions criteria; and, finally, they allow interactive participation by a massive group of students.

We should also not forget that when discussing MOOCs we can find different conceptions of them, or rather implementations or typologies (Cabero, Llorente, and Vázquez, 2014; Vázquez, López, and Barroso, 2015). These basically fall into three categories: xMOOC, cMOOC and a hybrid model that has been called a tMOOC. However, some authors such as Clark (2013), expand this

to seven types: transferMOOCs, made-MOOCs, synchMOOCs, asynchMOOCs, adaptiveMOOCs, groupMOOCs, connectivistMOOCs and miniMOOCs. Furthermore, POOCs (Personalized Open Online Course) are started to be discussed.

Focussing on the three categories initially cited, we find that xMOOCs are clearly supported MOOC design models in which students acquire a series of contents; to some extent we could say that they are on-line versions of the traditional learning formats (reading, instruction, debate, etc.) that Universities use in their

elearning activities. In contrast cMOOCs do not so much focus on presenting content in a formalised way, but instead on discursive communities that jointly create the knowledge (Cabero and others, 2014, pp.17-18).

The last type, tMOOCs, focus on the student performing tasks and activities.

Moya (2013, p.167) has compared the basic types of MOOC with the basic pillars of the Delors Report (Table 1), thus providing an overview of their educational possibilities.

TABLE 1. Pillars of Education of the Delors Report and xMooc and cMOOC.

Pillars of Education	xMOOC	cMOOC
Learning to know	– Learning centred on the information that the teacher transmits. – Linear guided learning	– Learning based on sharing knowledge with others. – Active and participatory learning.
Learning to do	– The tasks proposed are more about evaluating whether or not the content has been absorbed based on self-evaluation. – The learning is passive.	– The tasks depend on the involvement of the participants and their relation with the others. – This is more active learning, emphasising «learning by doing».
Learning to live together	– From the standpoint of the model together xMOOCs do not contemplate this perspective of learning to coexist, as the learning process is totally individual.	– The connection established in this form of courses is a good example of shared collaborative co-operative learning and so involves relating with the rest of the course community.

Pillars of Education	xMOOC	cMOOC
Learning to be	– xMOOCs propose totally individualised learning, and so it will depend on the participant whether or not he or she develops. – Life-long learning character.	– The offer clearly reflects this learning, as it means at all times that the connection with the rest of the participants and the interactions make us grow and develop as people. – It maintains the essence of life-long learning»

Source: Moya, 2013, p. 67.

The criticisms identified by different authors (Zapata, 2013; Popenici, 2014; Cabero, 2015; Valverde, 2015) follow different line, the most significant of these are: in some MOOC models the basic point on which all of the curriculum design and development is based is knowledge as a product; the unidirectional content transmission that gives the teacher the role of «expert» and the student a «banking» role; the future of education cannot be changed simply by incorporating technology; the existence of a strong cognitive distance between teacher and learner; and finally, that their mass character makes it impossible to establish meaningful interactions between students.

To complete these initial references we will cite the work by Hollands and Tirthali (2014), who performed 62 interviews with different agents from 29 institutions that included MOOCs in their educational practices, and eventually identified six main objectives for providing them:

- Extending the scope of the institution and access to education.
- Building and maintaining the brand.

- Improving economics by reducing costs or increasing income.
- Improving educational results, both for participants in MOOCs and students on campus.
- Innovation in learning and teaching.
- Carrying out research on learning and teaching.

It is on the last of these that our work focuses, on analysing what types of actions have been carried out based on this research.

2. Method

The main objective of this study is to analyse the various contributions about MOOCs that have been made to academic journals that focus on education in an international field in the 2011-2016 period.

Consequently, the work presented is based on a systematic review of various articles, that approach the subject of MOOCs with the aim of obtaining a common quantitative index (Sánchez-Meca,

2010), in other words a meta-analysis in which we have performed a methodical search in various databases from the field of social sciences, concentrating on open access education-technology journals; and, qualitatively identifying the various areas considered in these massive open on-line courses from the most scientific viewpoint.

To carry out this systematic review, we used the analysis performed by Liyanagunawardena, Adams, and Williams (2013) as a starting point. These authors analysed the articles published between 2008 and 2012 on MOOCs, specifically considering various academic contributions from a quantitative and qualitative perspective, classifying them by type of publication, year of publication and authors, and then defining eight topics or areas of interest. Likewise, the meta-analysis carried out by Sangrà, González-Sanmamed, and Anderson (2015) has been considered. This listed 228 pieces of research, from a position of identifying components they obtained eleven thematic categories and the number of articles in each of them by year and type of publication on MOOCs in the 2013-2014 period.

The proposed methodology for this study is primarily based on the previous analyses, using MOOC as a key word in various databases where the journals and the most relevant contributions on the topic of this systematic observation are hosted. Specifically *ISI Web of Knowledge* was searched for contributions with JCR impact factor, Scimago Journal & Country Rank, SCOPUS and Sello Fecyt, although with all of them we started from the premise that they would

be open-access and that they were journals from the field of Educational Technology.

As in the studies by Liyanagunawardena and others (2013) and Sangrà and others (2015), articles that did not fully correspond to the field of our analysis were discarded. This way we established as a relevance criterion all of the articles that had been submitted to journals with both JCR factor and SCOPUS, and JCR-SCOPUS-Sello Fecyt; and that were also research articles or theoretical ones.

Finally, 89 articles in total were compiled from the different journals consulted, from the period from 2011 up to the first two months of 2016.

To perform the quantitative analysis we considered some of the categories identified in the study by Cabero and others (2008) that concerned a meta-analysis of elearning and the proposals for the preparatory analyses, finally we considered: type of document (based on research or theoretical); the impact index of the journal; type of section in the journal; institution to which they refer; methodology and the research design proposed; type of instrument; etc. Using these categories we classified and categorised the articles considered. To identify the various topics or areas covered concerning MOOCs – the qualitative analysis – we examined the previous studies by Liyanagunawardena and others (2013), and Sangrà and others (2015), and the research by Hollands and Tirthali (2014) mentioned above that was directed at examining the cost-effectiveness ratio of the creation of these courses for

institutions. In total 21 areas concerning MOOCs were suggested:

1. Design of content and materials
2. Analysis and/or presentation of MOOC platforms
3. Institutional benefits
4. Problem of evaluation on MOOC courses
5. Economy in MOOCs: business model
6. Use of communication tools in MOOCs
7. Motivation and engagement of students
8. Comparison with other virtual educational strategies
9. Cultural and accessibility questions
10. Managing and administering MOOCs
11. Educational data mining: learning analyses
12. Designing activities
13. Different types of MOOC
14. Evaluation techniques and strategies
15. Problems with the application of MOOCs
16. Audiovisual resources in MOOCs
17. Abandonment rate-Failure rate
18. Pedagogical methodology and strategies
19. Learning theories and MOOCs
20. Problems in tutoring
21. Certification and accreditation with MOOCs

After the preparatory analysis, these were restructured into the following thematic areas concerning MOOCs:

- Design of content and materials
- Analysis and/or presentation of MOOC platforms
- Institutional benefits
- Problem of evaluation in MOOC courses: evaluation techniques and strategies
- Economy in MOOCs: business model
- Communication tools in MOOCs
- Motivation and engagement of students
- Comparison with other virtual educational strategies
- Problems with the application of MOOCs
- Methodology and pedagogical strategies
- Learning theories and MOOCs

Others (including various topics for each contribution that are not covered by the proposed areas).

3. Results

Based on the results obtained by year of publication over the period from 2011-2016 (the first two months only in the case of the last year), the articles analysed from educational technology journals show an increase in contributions, given that the greatest number of academic articles on the topic of MOOCs is found in 2015 (50.6%) and the smallest number in 2012 (3.4%). We can also see how in just two months examined from 2016 there are twice pieces as many as in 2013 (7.9%), while in 2011 there was 0%. This leads us to believe that 2015's total

of academic contributions will be exceeded in 2016.

With regards to the impact index of the journals where the selected articles are published, we find that just one of the articles is in a journal indexed in JCR (1.1%) while the majority are in journals that have a JCR impact factor and SCOPUS (57.3%). On the other hand, 32.6% of the academic contributions are in SCOPUS journals and 9% feature in all of the indexes.

When classifying the articles selected by the number of authors whose names appear on the articles, we found that the three-author option is most common (43.8%); in contrast there are fewer articles with more than three authors (13.5%). On the other hand, there is an equal frequency and percentage of publications

with one or two authors (21.3% each). This result differs from the study by Liyanagunawardena and others (2013), in which articles by a single author predominated.

The results of the analysis by gender are logical, given that most of the articles studied are mixed (47.2%); followed by those written by men (33.7%); in contrast, there is a smaller number written by just women (19.1%).

This can be seen more clearly when consulting the articles by number of authors and gender (Table 2), where it is apparent that there are more articles by one single male author (53.3%), while for women articles with two authors are more common (52.9%). Nonetheless, the majority (64.3%) of articles are by three authors of mixed gender.

TABLE 2. Distribution of articles by number and gender of authors.

	Male		Female		Mixed	
	F	(%)	F	(%)	F	(%)
One	16	53.3	3	17.6	0	0
Two	4	13.3	9	52.9	6	14.3
Three	8	26.7	4	23.5	27	64.3
Over 3	2	6.7	1	5.9	9	21.4
Total	30	100	17	100	42	100

Source: Prepared by the authors.

When analysing the articles by type, the type being theory or research, we find that the majority of those in journals from the field of technology are research-based (68.5%) and just 31.5% are theoretical.

With regards to the space where the documents appear, we can observe that the great majority are published in monographic issues (57.3%), followed by those published in editions with mixed content

(40.4%), while just 2.2% are published as an editorial.

When classifying the characteristic of the journal issue (section) by type of article, it can be seen that theoretical articles are mainly found in special or monographic issues of the journals (60.7%), whereas the research-based ones are divided between issues with mixed content (44.3%) and monographic issues (55.7%).

Taking into account the type of institution to which the articles analysed from technology journals (Table 3) refer, we found that in the majority of them it is difficult to specify this (66.3%); 31.5% refer to universities; and, both there is the same percentage for those that refer to non-university institutions and those written for various institutions (1.1%, each).

TABLE 3. Articles by institution to which they refer.

	Frequency	Percentage %
University	28	31.5
Non-University	1	1.1
Business	0	0
Institutional	0	0
Various	1	1.1
Not identified	59	66.3
Total	89	100

Source: Prepared by the authors.

The type of methodology used in the article is another variable that was taken into account in this analysis. To do so it was decided that the theoretical articles may be classified as qualitative on the basis that they consider the state of the question in a reflexive and discussion-based form (Álvarez and San Fabián, 2012; Dorio, Sabariego, and Massot, 2012). Articles using a quantitative methodology are the most numerous (48.3%), followed

by documentary ones (28.1%); qualitative ones represent 19.1% and mixed one represent 4.5%.

With regards to the design used in the research projects that led to the publication, the data show that there are more ethnographic (37.1%) and experimental (33.7%) ones; while the evaluation based ones are addressed least often (3.4%) (Figure 1).

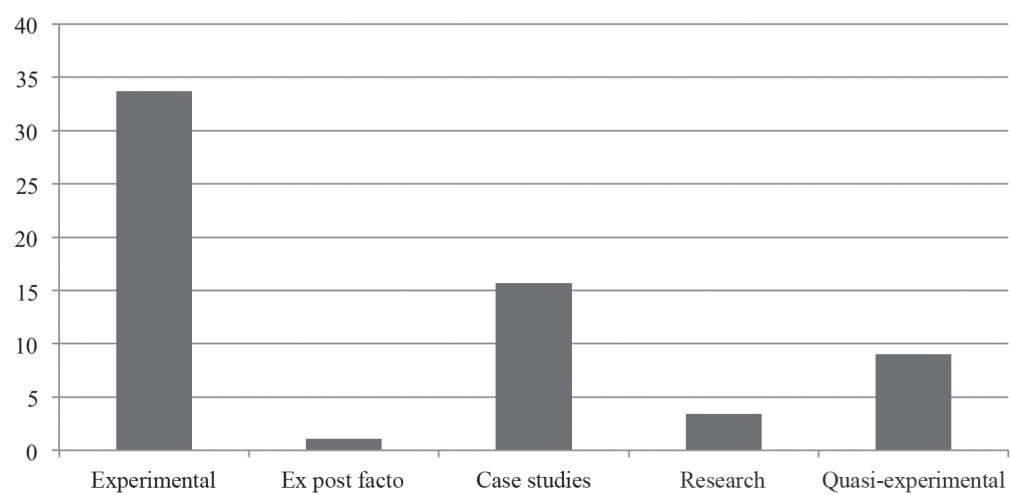


FIGURE 1. Articles by research design used.

If we take into account the instrument used to collect information in the articles analysed (Table 4), we find that the instrument used most often is questionnaires (50.6%), followed by analysis of

documents (38.2%); the Delphi technique is used least often (1.1%). We should also note that over half of the instruments proposed are not used in the articles analysed about MOOCs in technology journals.

TABLE 4. Articles by instrument used.

	Frequency	Percentage %
Questionnaires	45	50.6
Interviews	4	4.5
Narrative records	3	3.4
Rating scales	2	2.2
Delphi technique	1	1.1
Document analysis	34	38.2
Sociograms	0	0
Attitude scales	0	0
Participant observation	0	0
Anecdote records or diaries	0	0
Research groups	0	0

	Frequency	Percentage %
Checklists	0	0
Automatic procedures	0	0
Semantic differential	0	0
Total	89	100

Source: Prepared by the authors.

Considering the educational stage on which the analysed article focuses, we can see that that the «other» category occurs most frequently (60.7%), as it includes those articles focus on several educational levels. This category is followed by university (32.6%). Meanwhile, post-university represents 11.5% and the academic contributions studied focus the least on the pre-university and adult categories (1.1% each).

With regards to the categories or thematic areas that were restructured con-

cerning MOOCs (Figure 2), 33.7% of the 89 articles analysed refer to the design of content and materials; 22.5% to the category of others; 18% to the issue of the application of MOOCs; 7.9% to learning theories and MOOCs; 5.6% to motivation and involvement of students; 3.4% to institutional benefits; 2.2% to pedagogical methodologies and strategies and to economy in MOOCs; and 1.1% each to analysis and/or presentation of MOOC platforms; communication tools in MOOCs and comparison with other virtual educational strategies.

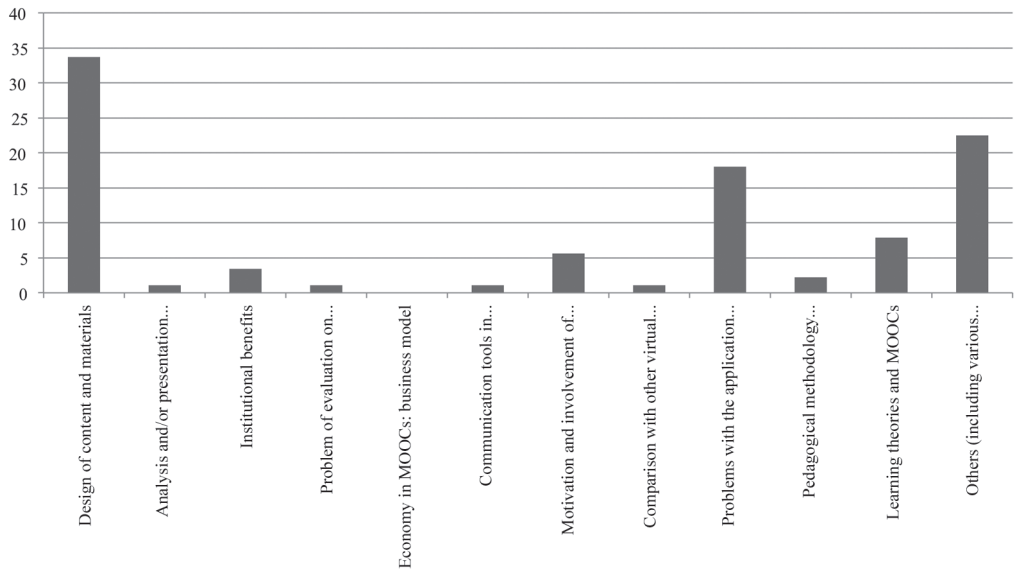


FIGURE 2. Articles on MOOCs by thematic area.

When analysing thematic areas by year, we can see how in 2013 in the articles analysed in the educational technology journals, «Problems with the application of MOOCs» is the most common topic (42.9%); followed by «Others, defined as the category that includes various topics for each contribution that are not covered by the proposed areas» (28.6%); likewise, in this year, we find the same number of articles on «Designing content and materials»; «Methodology and pedagogical strategies»; and, «Learning theories and MOOCs» (all with 14.3%).

On the other hand, «Designing content and materials» (52.4%) was the topic most frequently addressed in 2014; along with «Others» (14.3%); «Methodology and pedagogical strategies»; and, «Learning theories and MOOCs» with 9.5% each. The areas with the fewest contributions in this year are: «Analysis and/or presentation of MOOC platforms», «Institutional benefits», «Economy in MOOCs: business model», «Communication tools in MOOCs»,

and «Problems with the application of MOOCs» (all with 4.8%).

Likewise, in 2015, the year from which the greatest number of articles was found (Table 5), we can see that the topics that have the most contributions are: «Designing content and materials» (33.3%) and «Problems with the application of MOOCs» (26.7%); as well as the category of «Others» (20.0%). Meanwhile, only one publication was found for each of the following topics «Institutional benefits» and «Problem of evaluation in MOOC courses: evaluation techniques and strategies» (2.2% each).

Likewise, for the period analysed in 2016 (first two months), the contributions most often found fall under the category of «Others» (30.8%); this is followed by «Designing content and materials»; «Methodology and pedagogical strategies»; «Learning theories and MOOCs»; and, «Motivation and engagement of students» (all with 15.4%).

TABLE 5. Distribution of topics by year.

	2012		2013		2014		2015		2016	
	f	%	f	%	f	%	f	%	f	%
Designing content and materials	1	33.3	1	14.3	11	52.4	15	33.3	2	15.4
Analysis and/or presentation of MOOC platforms	0	0	0	0	1	4.8	0	0	0	0
Institutional benefits	0	0	0	0	1	4.8	1	2.2	1	7.7
Problem of evaluation in MOOC courses: evaluation techniques and strategies	0	0	0	0	0	0	1	2.2	0	0

	2012		2013		2014		2015		2016	
	f	%	f	%	f	%	f	%	f	%
Economy in MOOCs: business model	0	0	0	0	1	4.8	0	0	1	7.7
Communication tools in MOOCs	0	0	0	0	1	4.8	0	0	0	0
Motivation and engagement of students	0	0	0	0	0	0	3	6.7	2	15.4
Comparison with other virtual educational strategies	0	0	0	0	0	0	1	2.2	0	0
Problems with the application of MOOCs	0	0	3	42.9	1	4.8	12	26.7	0	0
Pedagogical methodology and strategies	0	0	1	14.3	2	9.5	2	4.4	2	15.4
Learning theories and MOOCs	0	0	1	14.3	2	9.5	2	4.4	2	15.4
Others (including various topics for each contribution that are not covered by the proposed areas).	2	66.7	2	28.6	3	14.3	9	20.0	4	30.8
Total	3	100	7	100	21	100	45	100	13	100

Source: Prepared by the authors.

With regards to the distribution of topics by type of research in the articles studied, we can see that quantitative methods are fundamentally used for the following topics: «Designing content and materials» (44.2%), «Others» (20.9%), «Motivation and engagement of students» (11.6%), «Institutional benefits» (4.7%), «Economy in MOOCs: business model» (4.7%), and «Problems with the application of MOOCs» (4.7%). The areas where this methodology is least used are the following: «Problem of evaluation in MOOC courses: evaluation techniques and strategies», «Communication tools in

MOOCs», and «Learning theories MOOC» (all 2.3%).

With regards to the qualitative methodology (Table 6), we find the greatest numbers of articles in «Problems with the application of MOOCs» (52.9%) and «Designing content and materials» (35.3%); the least covered areas are «Comparison with other virtual educational strategies» and «Pedagogical methodology and strategies» (both 5.9%).

The mixed methodology appears equally in two thematic areas relating to MOOCs, specifically «Designing content

and materials» and «Problems with the application of MOOCs» (both with 50%).

Finally, the documentary methodology is primarily present in the category of «Others», understood as the category that includes various themes in

each contribution that are not listed in the proposed areas (44%), and «Learning theories and MOOCs» (24%). These are followed by «Designing content and materials» and «Problems with the application of MOOCs» (12%).

TABLE 6. Distribution of topics by type of research.

	Quantitative		Qualitative		Mixed		Documentary	
	f	%	f	%	f	%	f	%
Designing content and materials	19	44.2	6	35.3	2	50	3	12
Analysis and/or presentation of MOOC platforms	1	2.3	0	0	0	0	0	0
Institutional benefits	2	4.7	0	0	0	0	1	4
Problem of evaluation in MOOC courses: evaluation techniques and strategies	1	2.3	0	0	0	0	0	0
Economy in MOOCs: business model	2	4.7	0	0	0	0	0	0
Communication tools in MOOCs	1	2.3	0	0	0	0	0	0
Motivation and engagement of students	5	11.6	0	0	0	0	0	0
Comparison with other virtual educational strategies	0	0	1	5.9	0	0	0	0
Problems with the application of MOOCs	2	4.7	9	52.9	2	50	3	12
Pedagogical methodology and strategies	0	0	1	5.9	0	0	1	4
Learning theories and MOOCs	1	2.3	0	0	0	0	6	24
Others (including various topics for each contribution that are not covered by the proposed areas).	9	20.9	0	0	0	0	11	44
Total	43	100	17	100	4	100	25	100

Source: Prepared by the authors.

When dividing the thematic areas (Figure 4) by the design used for compiling the information provided in the articles analysed, we find that the experimental design occurs most frequently in «Designing content and materials» (50%), while the areas where this process is least used are «Analysis and/or presentation of MOOC platforms», «Problem of evaluation in MOOC courses: evaluation techniques and strategies», «Economy in MOOCs: business model» and «Problems with the application of MOOCs» (3.3% each).

The only topic that uses the ex post facto design is «Economy in MOOCs: business model», specifically the article called *Comparing the effectiveness of digital contents for improving learning outcomes in computer programming for autodidact students in the Journal of E-Learning and Knowledge Society*.

The case study research design appears mainly in the «Designing content and materials» (50%) topic; in contrast, this process for carrying out information collection is least used in the areas of «Communication tools in MOOCs», «Pedagogical methodology and strategies» and «Others» (all 7.1%).

The «Designs of content and materials» topic is covered in 66.7% of the cases that use evaluative research and the category of «Others, defined as the category that includes various topics for each contribution that are not covered by the proposed areas» in 33.3% of them.

Likewise, the quasi-experimental design is used most often in the «Designing content and materials» (50%) topic, while it appears less frequently in «Comparison with other virtual educational strategies» and «Learning theories and MOOCs» (both 12.5%).

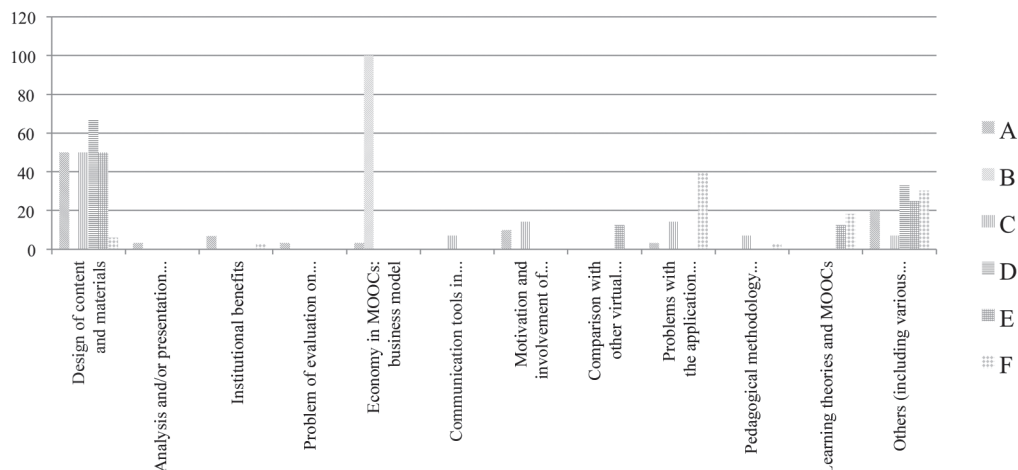


FIGURE 3. Distribution of topics by design.

Note: The categories established correspond to A: Experimental; B: Ex post facto; C: Case studies; D: Evaluative research; E: Quasi-experimental; and F: Ethnographic.

Finally, the ethnographic design is used most often in «Problems with the application of MOOCs» (39.4%); in contrast this type of data process is used least in the topics «Institutional benefits» and «Pedagogical methodology and strategies» (both 3.0%).

With regards to the instruments used in the articles from technology journals that were analysed according to the MOOC topics, we find that questionnaires are mainly used in «Designs of content and materials» (42.2%) and in «Others» (24.4%), while they are least common in «Analysis and/or presentation of MOOC platforms», «Problem of evaluation in MOOC courses: evaluation techniques and strategies», «Communication tools in MOOCs», «Problems with the application of MOOCs», and «Learning theories and MOOCs» (all 2.2%).

Interviews are used equally in four topics, namely: «Designing content and materials», «Comparison with other virtual educational strategies», «Pedagogical methodology and strategies» and «Others» (all 25%).

Narrative records and rating scales are only used in the topic of «Designing content and materials» (100% in both cases). In contrast, the Delphi technique is used in «Problems with the application of MOOCs».

The «Problems with the application of MOOCs» (Table 7) topic is mainly approached using instruments relating to document analysis (41.2%). This method is used least for «Pedagogical methodology and strategies» (2.9%).

TABLE 7. Distribution of topics by instrument.

	1		2		3		4		5		6	
	f	%	f	%	f	%	f	%	f	%	f	%
Designing content and materials	19	42.2	1	25.0	3	100	2	100	0	0	5	14.7
Analysis and/or presentation of MOOC platforms	1	2.2	0	0	0	0	0	0	0	0	0	0
Institutional benefits	3	6.7	0	0	0	0	0	0	0	0	0	0
Problem of evaluation in MOOC courses: evaluation techniques and strategies	1	2.2	0	0	0	0	0	0	0	0	0	0
Economy in MOOCs: business model	2	4.4	0	0	0	0	0	0	0	0	0	0
Communication tools in MOOCs	1	2.2	0	0	0	0	0	0	0	0	0	0

	1		2		3		4		5		6	
	f	%	f	%	f	%	f	%	f	%	f	%
Motivation and engagement of students	5	11.1	0	0	0	0	0	0	0	0	0	0
Comparison with other virtual educational strategies	0	0	1	25.0	0	0	0	0	0	0	0	0
Problems with the application of MOOCs	1	2.2	0	0	0	0	0	0	1	100	14	41.2
Pedagogical methodology and strategies	0	0	1	25	0	0	0	0	0	0	1	2.9
Learning theories and MOOCs	1	2.2	0	0	0	0	0	0	0	0	6	17.6
Others (including various topics for each contribution that are not covered by the proposed areas).	11	24.4	1	25	0	0	0	0	0	0	8	23.5
Total	45	100	4	100	3	100	2	100	1	100	34	100

Source: Prepared by the authors.

Note: The categories established correspond to 1: Questionnaires; 2: Interviews; 3: Narrative records; 4: Rating scales; 5: Delphi technique; and, 6: Document analysis.

Finally, we considered the distribution of topics by the stages on which the analysed articles focus (Figure 4). It can be seen that in the university stage the most commonly occurring area is «Designs of content and materials» (41.4%), followed by «Others, defined as the category that includes various topics for each contribution that are not covered by the proposed areas» (17.2%). Meanwhile, among articles that focus on the university stage, the least repeated areas are «Analysis and/or presentation of MOOC platforms», «Economy in MOOCs: business model», and «Communication tools in MOOCs» (all 3.4%).

The pre-university stage is only covered in «Designing content and materi-

als», specifically in the article «*Blending for student engagement: Lessons learned for MOOCs and beyond*» from the *Australasian Journal of Educational Technology*.

Likewise, the topic «Comparison with other virtual educational strategies» only covers the adult stage.

The post-university stage mainly appears in the category of «Others» (50%), while it appears least often in the topics of «Designing content and materials» and «Learning theories and MOOCs» (25% each).

Finally, the articles that focus on «Others», as an educational stage, appear most frequently in the topics of «Design-

ing content and materials» and «Problems with the application of MOOCs» (29.6% each). Meanwhile, the topics «Problem of evaluation in MOOC courses: evaluation

techniques and strategies», «Economy in MOOCs: business model» areas (1.9% each) appear least often for this stage.

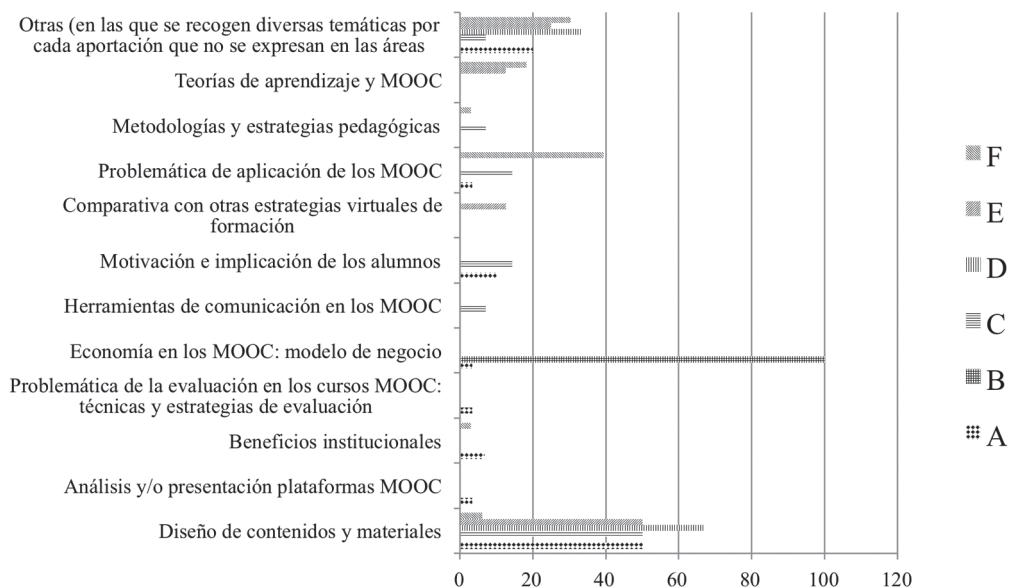


FIGURE 4. Distribution of topics by stage covered.

4. Conclusions and discussion of the results

The first thing we would like to note, is that the number of publications related to the topic of MOOCs has increased over the last five years, something that shows that it is a topic that is having a significant impact in the field of education, as noted by the Observatorio de Innovación Educativa del Instituto Tecnológico de Monterrey (Tecnológico de Monterrey, 2014). In this aspect of the work we agree with the conclusions reached by Zancarano and Souza (2017) who clearly identify this in their bibliometric study, where they also identify the strong presence of authors from An-

glophone countries who are interested in the analysis of MOOCs.

We should also recognise that MOOCs have gradually lost their strong initial momentum as a disruptive technology. Consequently, they no longer generally appear in the latest Horizon Reports as an impact technology in the near future in the field of education (Johnson, Adams, Cummins, Estrada, Freeman, and Hall, 2016) and articles are also now starting to appear concerning the disillusionment they have created, owing to the significant expectations they have awoken (Rohs and Ganz, 2015) and concerning the need to reflect on quality in these educational ac-

tivities (Aguaded and Medina, 2015; Mengual and Roig, 2015; Ramírez-Fernández, 2015).

We can also see this educational interest in the major research-problem lines that stand out from our work, such as: «Design of content and materials» and «Problems with the application of MOOCs»; topics that have been tackled by different recently published works on MOOCs (Vázquez and others, 2015; Zancarano and Souza, 2017), although voices are also starting to appear that call for an analysis of their possible impacts on students' academic performance (Castaño, Maíz, and Garay, 2015).

We would also like to note that not only has the volume of works increased, but more significantly, from our point of view, they have done so in the direction of increasing research on its application to the educational field. This leads us to state that the documentary and literary technological phase of MOOCs has now passed and a phase is starting that reconsiders how to incorporate them into educational practice, how to design them and what type of methodological strategies can be applied with them, in other words, what Vázquez and others (2015) referred to as the pedagogical and quality challenges that MOOCs must confront.

In this increase in publications we agree with the work of Zancarano and Souza (2017), who clearly set this out in their bibliometric study, where they also note the strong presence of Anglophone authors who are interested in the analysis of MOOCs.

Our study shows that the areas in which the application of MOOCs is becoming established are, on the one hand, universities, and on the other, educational activities intended for the further training of people who have already received an education, in other words improving it. Aspects of educational application that have been identified by the great majority of the authors who from a theoretical perspective have recently been analysing the educational possibilities of MOOCs (Bonk and others, 20015; Vázquez and others, 2015).

In these conclusion we would like to note that the type of research that stands out is the quantitative, and this would be consistent with the meta-analyses that have been performed on other technologies such as e-learning (Cabero and others, 2008), highlighting that this type of paradigm is progressively gaining importance in the field of research into educational technology.

With regards to the information collection instruments, the most commonly used one is questionnaires in the «Design of materials and content» topic. The least used ones are narrative records and rating scales, these only being used in the «Designing content and materials» topic (in both cases 100%). In contrast the Delphi technique is used in «Problems with the application of MOOCs». Although other problems are starting to appear, such as that regulating to finding theoretical enclaves with educational and psychological theories, an aspect that has started to be considered by a number of authors in recent times (Terras and Ramsay, 2015).

We must note that in a significant number of works falling within the qualitative methodology, interviews with key informants are used to collect information about the opinions that different groups (teachers, learners and administrators) have with about the educational possibilities of MOOCs and their limitations (Hollands and Tirthali, 2014; Cano, Fernández, and Crescenzi, 2015).

Finally, we would like to note that our work has the limitation of focussing on journals that can be classified as falling within the topic —educational technology— and are open access, and this leads us to note the possibility of replicating it in more general education journals that are not open access. This at the same time opens up new perspectives for the future continuation of the research, such as expanding the list of journals, taking into account the place of origin of the authors, discriminating between free and paid-for journals, or contrasting the results with those obtained in other meta-analyses that have been carried out (Liyanagunawardena and others, 2013; Sangrà, González-Sanmamed, and Anderson, 2015; Aguaded, Vázquez-Cano, and López-Meneses, 2016; Zancaran and Souza, 2017).

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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 ma-

nifiesto 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 ar-

ticle 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.

Quartiles	Scimago Journal & Country Rank (SJR)		Thomson Journal Citations Report (JCR)	
	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
<i>The Australasian Journal of Educational Technology</i>			1
<i>The British Journal of Educational Technology</i>			6
<i>Educational Technology & Society</i>	1		1
<i>The International Review of Research in Open and Distributed Learning</i>	2	1	
<i>Computers & Education</i>			3
<i>Comunicar</i>			3
<i>Digital Education Review</i>		3	
<i>Distance Education</i>			1
<i>Profesorado</i>		1	
<i>Educación XXI</i>			3
<i>RUSC. Universities and Knowledge Society Journal</i>			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)	– <i>Content, pedagogical focus</i> , tutorials, and <i>assessment</i> , suitability for and adaptation to users (of the content), <i>motivational capacity</i> and <i>resources</i> .
Roig, Mengual, & Suárez (2014)	– <i>Methodology, organisation</i> , quality of content, <i>resources, motivation</i> , multimedia, language, values, and distinctiveness.
Martín, González, & García (2013)	– <i>Planning</i> : name of the course, teachers, start and end dates, organisation of the content. – Programme: structure, objectives, materials (videos, texts, etc.), <i>activities</i> , social networks, <i>assessment</i> and certification. – <i>Resources</i> : staff, students registered, choice of tutors. – Development of the process: <i>activity by tutors, assessment techniques</i> . – Quality of the results: student and teacher satisfaction.
Gea (2015)	– Dimension 1 « <i>Planning/Management</i> » and the « <i>Administration/Management</i> » and « <i>Accreditation/Certification</i> » subfactors. – Dimension 2 « <i>Learning design</i> » and « <i>Didactic-instructional design</i> », « <i>Content</i> », « <i>Resources and activities</i> », and « <i>Assessment</i> » subfactors; – Dimension 3 « <i>Communication-Interaction</i> » and its « <i>Communication</i> » and « <i>Tutorials</i> » 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 pedagogi-

cal 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 Zermeno (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 method-

ology 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 re-

searched 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-Espinoza (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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The impact of the MOOC movement on social networks. A computational and statistical study on Twitter

La repercusión del movimiento MOOC en las redes sociales. Un estudio computacional y estadístico en Twitter

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Abstract:

This article analyses the impact of the MOOC movement on the Twitter social network. To do so the lexical-semantic impact of 55,511 tweets by ten of the world's leading platforms offering MOOC courses was analysed using a tf-idf calculation to represent documents in natural language processing. The Twitter profiles, patterns of use, and geolocation of tweets by continent were also analysed using computational and statistical techniques. The results show that there is no correlation between use of Twitter accounts by MOOC platforms and their number of followers. The tweets by participants are mainly grouped into two semantic blocks: alert/excited and calm/relaxed and tweet traffic is often concentrated in the United States and Europe; South America's percentage is moderate while Africa, Asia and Oceania have little impact. The most frequently occurring words in the tweets are: «learning», «skills», «course», «free» and «online».

Keywords: MOOC, Twitter, social networks, platforms, tweets, impact.

Resumen:

Este artículo analiza el impacto del movimiento MOOC en la plataforma Twitter y, para ello, se procesan 55511 tuits según su repercusión léxico-semántica mediante el cálculo de tf-idf para la representación de documentos en Procesamiento de Lenguaje Natural en diez de las principales plataformas mundiales que ofrecen cursos MOOC. Asimismo, se analiza el perfil en Twitter, los patrones de uso y la geolocalización de los tuits por continentes mediante técnicas computacionales y estadísticas. Los resultados muestran que el empleo de las cuentas de Twitter por parte de las plataformas no guarda correlación con el número de seguidores de las mismas. Los tuits de los participantes suelen agruparse en dos bloques semánticos: alerta/

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animado vs calmado/relajado y el tráfico de tuits se suele concentrar en Estados Unidos y Europa; el porcentaje en Suramérica es moderado, mientras que en África, Asia y Oceanía es muy poco representativo. Las palabras

más recurrentes en los tuits son: «learning», «skills», «course», «free» y «online».

Descriptor: MOOC, Twitter, redes sociales, plataformas, tuits, impacto.

1. Introduction

MOOC platforms use the available social media to disseminate their activity and they participate in social networks as do universities (Cataldi and Cabero, 2010; Chamberlin and Lehmann, 2011; Túñez and García, 2012; Castaño, Maiz, and Garay, 2015; Raposo, Martínez, and Sarmiento, 2015), to maintain an up-to-date profile, promote their courses and their platform and interact with users, thus obtaining fast and direct feedback. This helps improve their corporate image (Kierkegaard, 2010), optimise their service strategies, and develop their academic and professional activities.

Most research on the influence of Twitter on users has been in terms of social mobilisation (Bacallao, 2014; Rodríguez-Polo, 2013) or political participation (Baek, 2015; Kruikemeier, 2014). Other researchers have studied the participation of citizens in charitable or community activities (Boulianne, 2009; Gil-de-Zúñiga, Jung and Valenzuela, 2012). Studies have also been carried out on the impact of Twitter on education, through statistical analysis of activity on this social network by educational institutions such as universities (Guzmán Duque, et al 2013) or in rela-

tion to its application in academic contexts for improving skills (Vázquez-Cano, 2012).

To date, there has been no research analysing the impact of the MOOC movement on Twitter or the activity by the main platforms on this social network with regards to dissemination, providing information on their courses and marketing their courses. Consequently, the objective of this research project is to analyse the Twitter profile of ten of the most important platforms in the provision and promotion of MOOC courses using a statistical and computational focus that makes it possible to understand how and for what purpose these platforms use their Twitter accounts.

2. Twitter, microblogging and MOOCs

The current virtual communication ecosystem (social networks, blogs, digital video platforms, microblogging, gamification, etc.) helps on-line educational provision to go viral, and the strategies used are more typical of business marketing processes, from models that focus on relationships (the client first philosophy), creation of social branding, segmentation and personalisation of messages, and

brand evangelisation through to influencing and virality, and the implementation of experiential marketing that creates customer engagement (Castelló, 2010a). MOOC course platforms have started copying these business strategies in their efforts to attract students (clients) to their «free» courses and nurture loyalty in a type of student that might subsequently lead to them needing to pay for extra services apart from education (certificates, recognition of credits, more personalised treatment, etc.).

The use of Twitter as a social microblogging network for disseminating MOOC courses is a global trend among platforms and developers. MOOCs are disseminated all over the world using social networks, principally Facebook and Twitter. It is also important to note that these platforms are not only used for dissemination, but also for supporting the delivery of units during the courses and after their end (van Treeck and Ebner, 2013: 414). The business and educational strategy that MOOCs espouse, based on open and free learning, is particularly important on social networks, and especially in the short messages with hyperlinks to other content and topics (hashtags) that comprise tweets. In fact, this trend is moving towards a symbiotic integration of the two models (Microblogging & MOOCs), and between April and June 2016 the first scientific MOOC course on Twitter took place using the hashtag: #microMOOCSEM.

Consequently, the use of microblogging in higher education and in academic dissemination processes is generally focussed on sharing and notification of a range of news and information (Mateik,

2010; Ruonan, Xiangxiang, and Xin, 2011). More specifically, Twitter facilitates the dissemination of information about conferences, courses, grants, and such like, keeping users up-to-date and encouraging their participation (Curioso and others, 2011; Fields, 2010; Milstein, 2009) in forums, conferences, and seminars (Holotescu and Grosseck, 2010). It is used to invite the educational community to participate in activities of social interest (Atkinson, 2009). It is also used for disseminating promotional campaigns relating to MOOC platforms, attracting students, or disseminating the cultural programming and topics related to the services provided (Curioso and others, 2011; Fields, 2010; Milstein, 2009; Mistry, 2011; Vázquez-Cano, 2013; López Meneses, Vázquez-Cano, and Román, 2015; Aguaded, Vázquez-Cano, and López Meneses, 2016).

Similarly, the use of Twitter by MOOC platforms is moving towards three types of activity: creating brand identity, launching courses, and collecting analytics for segmented marketing studies.

Twitter has also become a communications resource for many MOOC courses that offer thematic hashtags to support students who are studying them. In fact, it has already been noted in academic literature that MOOCs can be understood as virtual environments for social connectivity in a field of study that have an open teaching approach (McAuley and others 2010; Vázquez-Cano, López-Meneses, and Sarasola, 2013; Vázquez-Cano, López Meneses, and Barroso Osuna, 2015; Daniel, Vázquez-Cano, and Gisbert, 2015; Hernández, Romero, and Ramírez,

2015; Aguaded, Vázquez-Cano, and López Meneses, 2016). The use of Twitter in massive open learning processes can be directed towards six principal activities (Treeck and Ebner, 2013): encouraging interaction in mass education through the use of Twitter feeds; conversations outside class through thematic hashtags; exchanging academic content through links posted in thematic hashtags; compiling documentation and information with the help of automated tools for collecting tweets; promoting the organisation of seminars through Twitter; and contacting researchers, lecturers, and students with similar interests.

These uses and the possibility of being able to contact other users in communities and interact with them through the feed and hashtags make Twitter a very useful companion for massive open educational environments. The results of these experiences show that 70% of the hashtags used had a direct relationship with the course and 39% of them referred to specific topics contained in the delivery of the courses (Treeck and Ebner, 2013). Emily Purser, Angela Towndrow, and Ary Aranguiz (2013) have explored the relationship between peer tutoring and options for interacting in MOOCs through on-line learning-support tools, such as the hashtags used in *#edcmooc*. Peter Tiernan (2012) has also examined the role of Twitter in increasing interaction by students in academic conversations. His study concluded that Twitter has great potential for encouraging the development of virtual conversations outside the university once face-to-face classes have ended. He also showed that

it gave students who participated less in face-to-face classes a setting and tool that boosted their participation. These results confirm the ones obtained by Martin Ebner and others (2010) when they analysed the tweets with the hashtag *#edmedia10* after an e-learning seminar, results that show that relevant information is obtained through the contributions by the participants. It is clear that Twitter has a variety of potential uses and that the purpose to which users put it can vary depending on their intentions. Indeed, some contributions, such as those by Crawford (2009), have suggested listing the different forms of participation on Twitter, giving three categories: «background listening» (p. 528), «reciprocal listening» (p. 529), and «corporations 'listening in'» p. (531). Twitter as an object of study and a tool for communication has gone through three stages: the first analysed the banality of messages by examining their content; in a second phase from 2009 researchers regarded it as a powerful social communication tool that was valuable for sociological analysis of social events; and we are currently in a third phase in which Twitter has established itself as a great worldwide sociocultural database, a diachronic fingerprint by which human behaviour and events can be analysed. For example, we can locate hashtags that enable us to evaluate the importance or impact of social events such as Spain's 15M anti-austerity movement or the Arab Spring and evaluate the sociocommunicative behaviour of a society when faced with an event of social importance. This sociohistorical component was also underlined by the fact that the USA's Li-

brary of Congress is archiving the tweets posted in the United States to preserve their content and offer them as information to the American people.

Consequently, Twitter has become a social communication and representation tool of undoubted worldwide importance for the academic world and research. However, we cannot neglect fundamental concepts that shape the social reality of microblogging such as how ephemeral its influence is (Back, Lury, and Zimmer, 2013; Elmer 2013; Vázquez-Cano, Fombona, and Bernal, 2016) and the difficulty of comprehension and interpretation for those individuals who are not part of the social network. The structural dynamic of Twitter enables researchers in the field of educational communication to obtain relevant data using big data analytics techniques relating to the activity of microblogging in synchronic and diachronic analyses of activity in the social network (Rogers, 2013, p. 363; Marres and Weltevrede 2013).

Applying big data analytics techniques to the MOOC movement enables us to analyse the influence and patterns of use on-line, providing us with valuable information about how leading platforms go about providing information, interacting and marketing, and how these education communication strategies might affect the dissemination and penetration of the MOOC movement in society and the academic world.

3. Methodology

To perform this research we decided to analyse 10 Twitter accounts of MOOC

platforms that are seen as reference points in the open education movement and that have a Twitter account to provide information about and disseminate their activity. These are the following ten platforms: edX (@edXOnline), Coursera (@coursera), Udacity (@udacity), Udemy (@udemy), Khan Academy (@khanacademy), Canvas network (@canvasnet), Future learn (@FutureLearn), Open2study (@Open2Study), Miriada (@miriadax), and MIT OpenCourseware (@MITOCW). A total of 55,511 tweets were analysed from the period between 1 January 2015 and 31 December 2015.

The method for achieving the two core objectives of the research was organised into three phases:

Phase one: using the Twitonomy tool to determine the most important variables of the profiles of the MOOC course platforms in accordance with Key Performance Indicators (KPI); this makes it possible to perform a comprehensive analysis of each Twitter account. This first phase was complemented by analysis of the sentiment of the tweets. This analysis was performed using the Meaning Cloud API that makes it possible to establish the polarity of the terms extracted from the tweets. All of the tweets were then geo-located to ascertain which continents had the largest traffic in tweets about MOOCs according to the tweet traffic of the ten platforms analysed.

Phase two: analysing the thematic and content characteristics of the tweets posted by the ten platforms analysed by using a tf-idf calculation and applying the inverse document frequency technique.

To do this we used the Bag of Words tool that is one of the most widely-used methods for representing documents in natural language processing (Baeza-Yates and Ribeiro-Neto, 1999). This method models the documents using a histogram of relevant terms. In other words, it represents each document by the frequency of appearance or number of times that the words with a higher weighting appear, without taking into account the order in which they appear. A matrix of «m» documents and «n» terms is produced to represent them where each document represents a row in the matrix and each column corresponds to a term, giving an m-n. matrix where each row in the matrix represents a document and the frequencies of the terms that appear in it.

Phase three: performing an inferential statistical analysis of the most significant

tweets according to possible correlations between the number of followers variable and the other variables that comprise the profile of a Twitter account. To do so we will export the principal numerical data of the Twitter accounts to the SPSS programme.

4. Results

Firstly, we present the results of the analysis of the Twitter profiles of the 10 platforms analysed according to the total number of tweets posted during 2015, the number of followers, the accounts the platforms follow, the number of tweets retweeted, mentions of followers (@), and the links and hashtags used in each tweet. To show this, Table 1 is arranged in descending order from the most followers to the fewest.

TABLE 1. Twitter profiles of MOOC platforms.

Platforms	Tweets	Followers	Following	Retweets	@	Links	#
Khan Academy @khanacademy Opened account Oct. 2008	14.991.990,55	495.062	139	48 24%	74 0.37%	141 0.71%	45 0.23%
Coursera @coursera Opened account Aug. 2011	21.911.820,50	310.771	313	23 13%	65 0.36%	136 0.75%	33 0.18%
edX @edxOnline Opened account Apr. 2012	584.228.127,70	189.697	147	530 19%	2123 0.75%	1933 0.69%	1600 0.57%
MIT OpenCourseWare @MITOCW Opened account Jan. 2009	796.313.073,58	155.939	536	880 67.3%	624 0.48%	886 0.68%	188 0.14%

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Platforms	Tweets	Followers	Following	Retweets	@	Links	#
Udacity @udacity Opened account Jun. 2011	319.918.575,09	124.744	790	340 18%	835 0.45%	1053 0.57%	603 0.32%
Udemy @udemy Opened account Aug. 2009	1.054.026.417,24	97.503	7.764	158 6%	1926 0.73%	2237 0.85%	400 0.15%
FutureLearn @FutureLearn Opened account Dec. 2012	1.075.724.446,70	50.894	1.298	448 18%	1450 0.59%	1130 0.46%	1191 0.49%
Miríada X @miriadax Opened account Nov. 2012	958.729.908,19	45.799	271	708 24%	3120 1.04%	375 0.13%	331 0.11%
Open2Study @Open2Study Opened account Feb. 2013	28.634.491,23	9.855	380	35 8%	242 0.54%	218 0.49%	304 0.68%
Canvas Network @canvasnet Opened account Oct. 2012	10.702.580,71	9.559	330	44 17%	130 0.25%	189 0.73%	189 0.73%

Source: prepared by the authors.

As can be seen, the platform with the most followers is Khan Academy ($n = 495,062$), which started its activity on Twitter in 2008. However, it has posted a relatively low number of tweets since creating its profile ($n = 1,499$) with an average of 0.55 tweets a day. The platform that has posted the most tweets since its creation is FutureLearn ($n = 10,757$) with an average of 6.70 tweets a day. Likewise, Udemy is the platform that follows the most accounts of third parties or institutions ($n = 7,764$). The platform that has retweeted the most tweets is MIT OpenCourseWare ($n = 880$). On the other hand, the platform that most often men-

tions other users is the Spanish platform Miríada X ($n = 3,120$). The platform that inserts the most links in its tweets is Udemy ($n = 2,237$) and the one that uses the most hashtags is edX ($n = 1,600$). The data for Coursera are significant; this is the most important platform in the world of MOOCs but on average only posts half a tweet a day, something that does not prevent it from being the platform with the second largest number of followers ($n = 310,771$). The two platforms with the least activity are Open2Study and Canvas Network.

After analysing the account profiles, we then defined the pattern of use by

each platform to establish the days of the week on which it is most used and the in-

terfaces from which the tweets are posted (Figure 1).

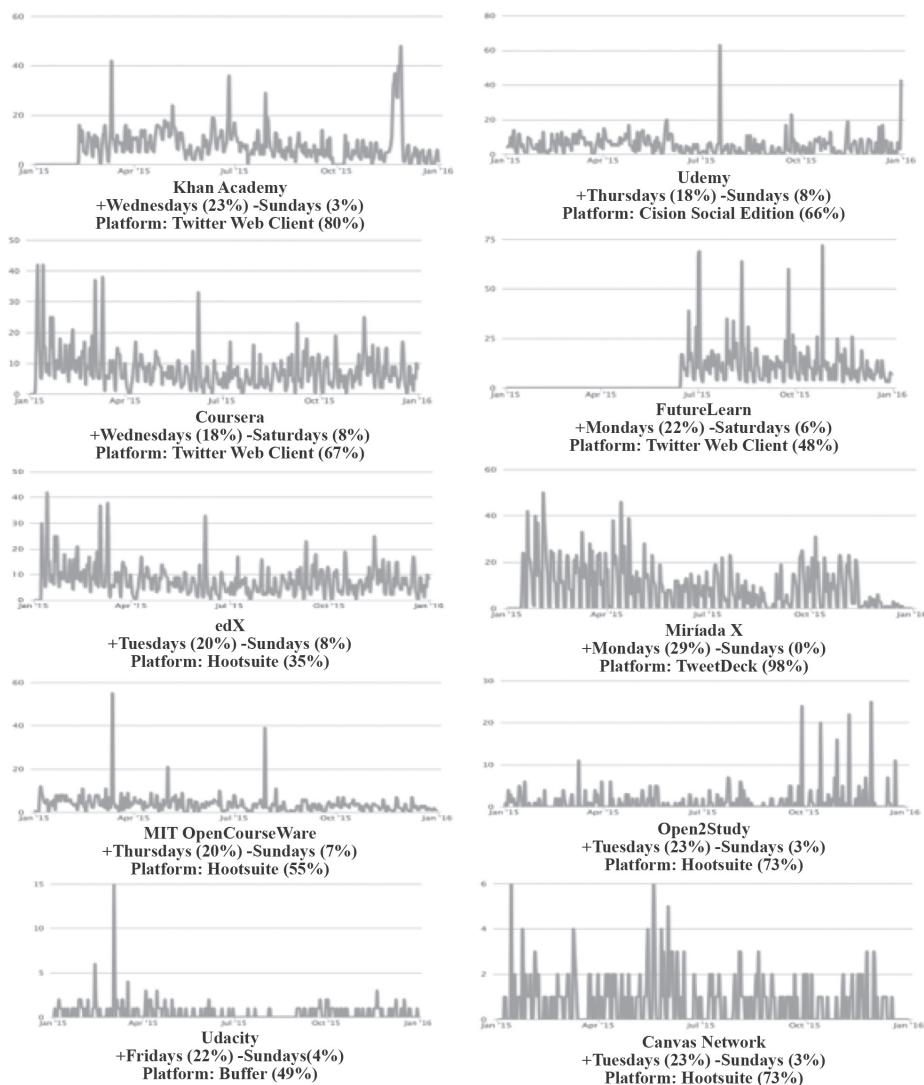


FIGURE 1. Patterns of posting tweets.

We can see that the large Coursera and Khan Academy platforms are generally most active on Wednesdays, followed by MIT OpenCourseWare and Udemy whose most intensive activity is on Thurs-

days. All of the platforms show a reduction in their Twitter activity during week-ends. The client platform from which they post their tweets varies depending on the MOOC platform; Coursera, FutureLearn,

Khan Academy, and Open2Study use the Twitter web client platform. The second most used platform is Hootsuite (Canvas Network, MIT OpenCourseWare and edX).

We performed a general sentiment analysis for the ten platforms analysed using the meaning cloud application and

the sentiment viz on-line application (https://www.csc.ncsu.edu/faculty/healey/tweet_viz/tweet_app/).

The analysis of the sentiment pattern for the ten platforms shows a positive sentiment with a majority of blocks of tweets among the alert/excited v. calm/relaxed semantic blocks (Figure 2).

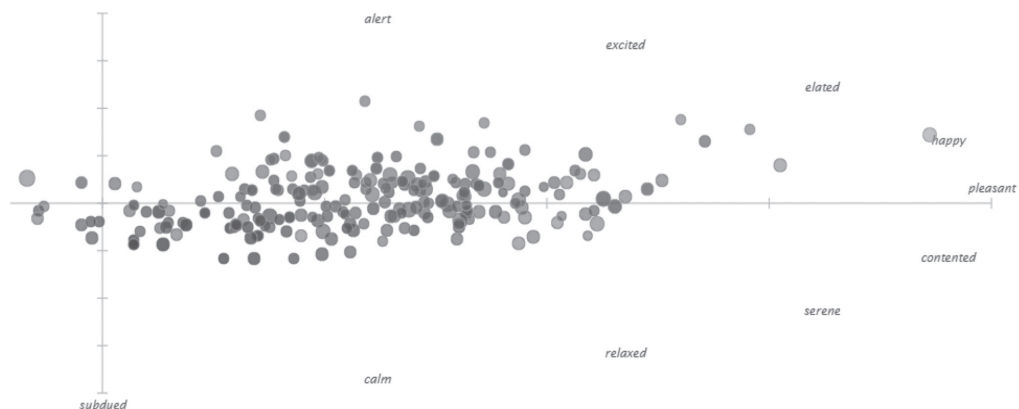


FIGURE 2. Sentiment analysis for the tweets posted.

The geolocation of the tweets from each platform also allows us to observe in which areas of the planet they are most

frequent (Figure 3). To do this, we geolocated the traffic in tweets from each platform using a KPI of the Twitonomy tool.

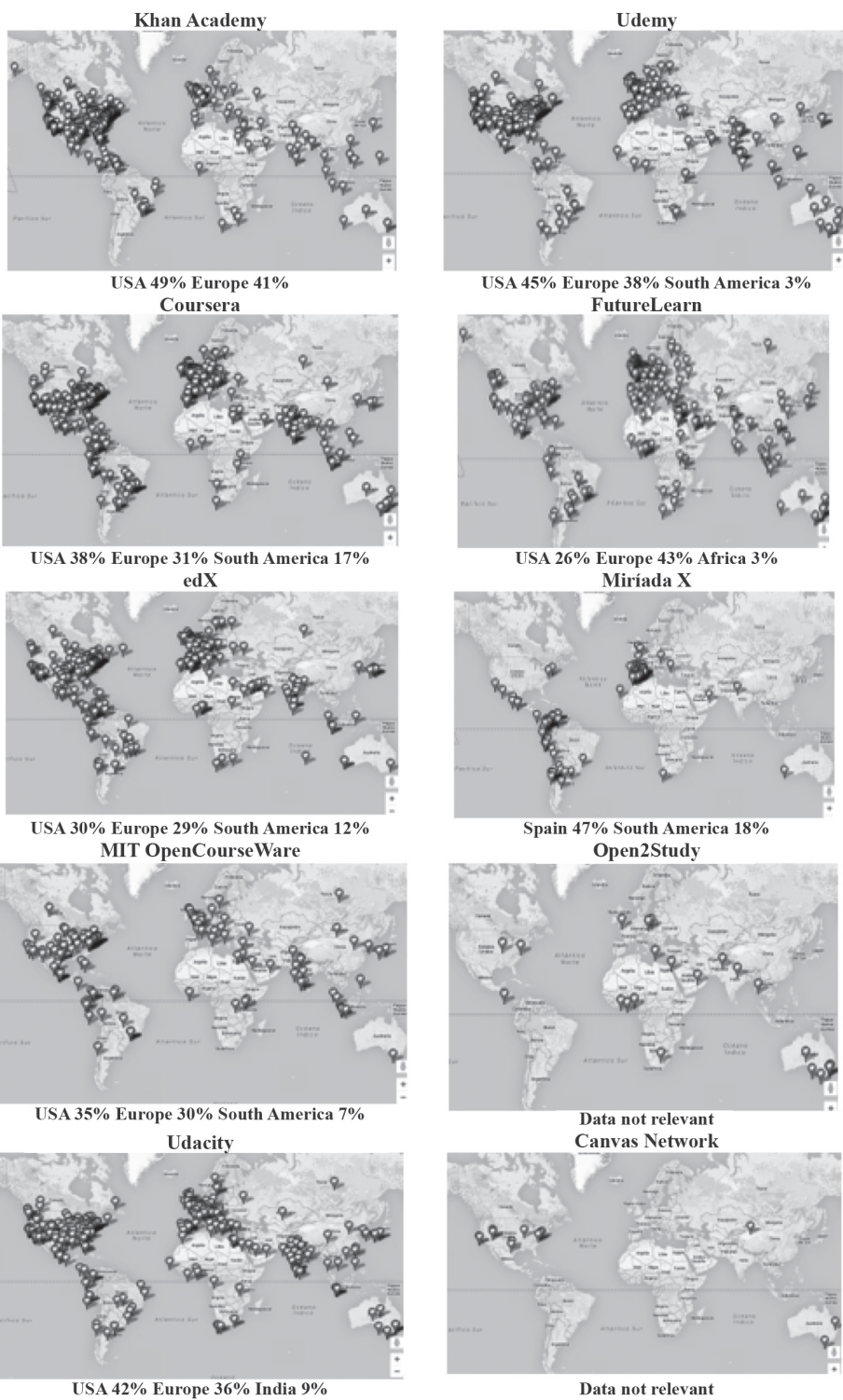


FIGURE 3. Geolocation of the percentage of tweets by the MOOC platforms.

As shown by Figure 2, traffic in tweets from the platforms is mainly concentrated in the USA and Europe; for the principal platforms these areas represent around 40%. Likewise, the platforms with the greatest presence in South America are Coursera, eDX, MIT OpenCourseWare, and the Spanish platform Miríada X. Africa, Asia and Oceania have limited participation.

We then analysed the weighting of the most relevant terms from the accounts according to the number of appearances of each term in each of the tweets from the platforms. This measurement means that the importance of each term is disproportionate and so it is often represented using a logarithmic scale.

$$Wt, = \{1 + \log tft, , tft,d > 0 \\ 0, tft, \leq 0 \quad (1)$$

In long documents the frequencies of the tf terms can easily be higher than in much shorter documents, thus distorting the real importance of the words. For this reason the frequency of the term is usually normalised according to the total number of documents N. Although the frequencies of the terms are normalised and scaled, the importance of each word increases in proportion with the number of times that it appears in a document and so an effort is made to compensate for this effect by taking into account the frequency with which the word appears in the total number of documents, thus making this technique highly suitable for processing tweets. The procedure involves giving greater importance to terms that appear in fewer documents, ahead of

those that appear in virtually all of them, given that the latter terms have little or no representativity when representing the whole. This factor is known as «term frequency-inverse document frequency». Consequently, for the tf-idf calculation we have applied the inverse document frequency. This is obtained by dividing the total number of documents by the number of documents that contain the term and applying the logarithm:

$$idf_t = \log N / df_t \quad (2)$$

where N is the total number of documents and df_t is the frequency of documents that contain the term t. Finally, the calculation of the tf-idf weighting gives a combination of both factors: $W_{t,d} = tft_{t,d} \cdot idf_t$. The calculation of the idf is shown from which the tf-idf weightings of the key words for each platform are calculated (Table 2).

A total of 55,511 tweets were processed and, as can be seen in Table 2 from the results obtained, the words with the highest weightings and, therefore, the ones with the highest representativity are: «learning» (0.602 / fq = 260), «skills» (0.592 / fq = 251), «course», (0.498 / fq = 201), «free» (0.401 / fq = 167), and «online» (0.382 / fq = 110).

Finally, we analysed whether there is a significant correlation between the «number of followers» variable for each of the Twitter accounts of the ten platforms and the other variables that describe the profile: number of tweets retweeted, profiles that the platforms follow, links, and hashtags. In Table 3 we show the descriptive statistics for these variables.

TABLE 2. tf-idf weightings.

Platforms/Words					
Khan Academy (1490 tweets)	<i>learning</i> (0.611) [μ : 6.28, σ : 1.83], a = [μ : 5.12, σ : 2.46 <i>f q</i> = 260]	<i>Growth</i> (0.601) [μ : 6.11, σ : 1.74], a = [μ : 4.99, σ : 2.40 <i>f q</i> = 202]	<i>School</i> (0.411) [μ : 3.71, σ : 1.10], a = [μ : 3.32, σ : 1.86 <i>f q</i> = 114]	<i>Students</i> (0.301) [μ : 3.11, σ : 0.71], a = [μ : 2.81, σ : 1.22 <i>f q</i> = 84]	<i>Videos</i> (0.296) [μ : 2.99, σ : 0.50], a = [μ : 1.95, σ : 1.01 <i>f q</i> = 72]
Coursera (2188 tweets)	<i>Skills</i> (0.601) [μ : 6.04, σ : 1.65], a = [μ : 4.99, σ : 2.25 <i>f q</i> = 199]	<i>Course</i> (0.585) [μ : 4.99, σ : 1.33], a = [μ : 4.22, σ : 2.01 <i>f q</i> = 166]	<i>Free</i> (0.299) [μ : 3.25, σ : 1.01], a = [μ : 3.02, σ : 1.01 <i>f q</i> = 110]	<i>Learning</i> (0.201) [μ : 2.45, σ : 0.60], a = [μ : 2.11, σ : 1.22 <i>f q</i> = 80]	<i>Taking</i> (0.171) [μ : 1.98, σ : 0.55], a = [μ : 1.80, σ : 1.10 <i>f q</i> = 69]
edX (5842 tweets)	<i>Mooc</i> (0.598) [μ : 5.00, σ : 1.63], a = [μ : 4.82, σ : 2.10 <i>f q</i> = 202]	<i>Course</i> (0.560) [μ : 4.78, σ : 1.50], a = [μ : 4.10, σ : 1.98 <i>f q</i> = 184]	<i>Learning</i> (0.399) [μ : 3.71, σ : 1.09], a = [μ : 3.51, σ : 1.75 <i>f q</i> = 101]	<i>Skills</i> (0.320) [μ : 3.40, σ : 0.79], a = [μ : 2.60, σ : 1.20 <i>f q</i> = 81]	<i>World</i> (0.298) [μ : 2.49, σ : 0.60], a = [μ : 2.10, σ : 1.01 <i>f q</i> = 71]
MIT OpenCourseWare (7963 tweets)	<i>Experience</i> (0.602) [μ : 6.01, σ : 1.75], a = [μ : 5.00, σ : 2.30 <i>f q</i> = 255]	<i>Digital</i> (0.600) [μ : 6.00, σ : 1.60], a = [μ : 4.90, σ : 2.20 <i>f q</i> = 240]	<i>Mitocw</i> (0.401) [μ : 3.50, σ : 1.00], a = [μ : 3.30, σ : 1.80 <i>f q</i> = 101]	<i>Videos</i> (0.300) [μ : 3.30, σ : 0.60], a = [μ : 2.75, σ : 1.20 <i>f q</i> = 81]	<i>Data</i> (0.295) [μ : 3.10, σ : 0.55], a = [μ : 2.10, σ : 1.01 <i>f q</i> = 64]
Udacity (3199 tweets)	<i>Sebastianthrun</i> (0.580) [μ : 6.28, σ : 1.83], a = [μ : 5.12, σ : 2.46 <i>f q</i> = 254]	<i>Education</i> (0.560) [μ : 6.20, σ : 1.83], a = [μ : 5.12, σ : 2.46 <i>f q</i> = 222]	<i>Learning</i> (0.411) [μ : 3.51, σ : 1.10], a = [μ : 3.32, σ : 1.86 <i>f q</i> = 115]	<i>Check</i> (0.300) [μ : 3.20, σ : 0.063], a = [μ : 2.81, σ : 1.22 <i>f q</i> = 85]	<i>Exciting</i> (0.300) [μ : 3.18, σ : 0.60], a = [μ : 2.71, σ : 1.22 <i>f q</i> = 83]

Platforms/Words					
Udemy (10540 tweets)	Course (0.602) [μ : 6.25, σ : 1.80], a = [μ : 5.15, σ : 2.45 $f q$ = 267]	Learning (0.601) [μ : 6.20, σ : 1.76], a = [μ : 5.10, σ : 2.40 $f q$ = 232]	Skills (0.410) [μ : 3.70, σ : 1.15], a = [μ : 3.30, σ : 1.80 $f q$ = 103]	Free (0.300) [μ : 3.45, σ : 0.75], a = [μ : 2.80, σ : 1.25 $f q$ = 80]	Check (0.300) [μ : 3.40, σ : 0.70], a = [μ : 2.75, σ : 1.20 $f q$ = 81]
FutureLearn (10757 tweets)	Learn (0.603) [μ : 6.38, σ : 5.83], a = [μ : 5.53, σ : 3.46 $f q$ = 360]	Course (0.598) [μ : 6.38, σ : 5.83], a = [μ : 5.53, σ : 3.46 $f q$ = 360]	Free (0.400) [μ : 3.75, σ : 5.50], a = [μ : 3.33, σ : 5.86 $f q$ = 554]	Social (0.305) [μ : 3.45, σ : 0.75], a = [μ : 3.85, σ : 5.33 $f q$ = 84]	Online (0.305) [μ : 3.45, σ : 0.75], a = [μ : 3.85, σ : 5.33 $f q$ = 84]
Miriada X (9587 tweets)	Curso (0.601) [μ : 5.98, σ : 4.83], a = [μ : 5.50, σ : 2.78 $f q$ = 360]	Mooc (0.555) [μ : 5.30, σ : 4.80], a = [μ : 4.90, σ : 2.45 $f q$ = 360]	Inscribite (0.411) [μ : 3.75, σ : 3.51], a = [μ : 3.33, σ : 1.96 $f q$ = 554]	Nuevo (0.302) [μ : 3.45, σ : 2.75], a = [μ : 3.15, σ : 1.33 $f q$ = 84]	Empieza (0.300) [μ : 3.40, σ : 1.71], a = [μ : 2.80, σ : 1.30 $f q$ = 84]
Open2Study (2863 tweets)	Open2study (0.601) [μ : 6.38, σ : 5.50], a = [μ : 5.53, σ : 3.46 $f q$ = 120]	Course (0.569) [μ : 6.30, σ : 5.53], a = [μ : 5.50, σ : 3.46 $f q$ = 101]	Online (0.422) [μ : 3.75, σ : 3.50], a = [μ : 3.30, σ : 2.86 $f q$ = 554]	Clases (0.285) [μ : 3.45, σ : 2.75], a = [μ : 3.00, σ : 2.33 $f q$ = 55]	Free (0.205) [μ : 3.45, σ : 1.75], a = [μ : 1.99, σ : 1.00 $f q$ = 62]
Canvas Network (1070 tweets)	Canvasnet (0.600) [μ : 4.38, σ : 4.83], a = [μ : 4.50, σ : 3.46 $f q$ = 111]	Free (0.595) [μ : 3.30, σ : 3.99], a = [μ : 3.50, σ : 3.46 $f q$ = 99]	Courses (0.421) [μ : 3.00, σ : 5.50], a = [μ : 3.30, σ : 2.86 $f q$ = 85]	Mooc (0.295) [μ : 2.12, σ : 0.75], a = [μ : 2.80, σ : 2.33 $f q$ = 76]	Experience (0.235) [μ : 1.45, σ : 0.60], a = [μ : 2.05, σ : 2.11 $f q$ = 34]

TABLE 3. Statistical description of the variables defining the Twitter profiles.

	Mean	Standard deviation
Followers	148982.30	152735.723
Tweets	5551.10	3869.097
Following	1196.80	2333.767
Tweets ret.	321.40	311.064
@	1058.90	1054.755
Links	829.80	766.517
#	488.40	515.633

We then performed a Pearson correlation to establish potential relationships between the different variables and the number of followers of the different plat-

forms. In this way, we can define whether or not the presence or alteration of these elements with regards to the formal structure of the tweet is significant (Table 4).

TABLE 4. Correlation between defining variables of Twitter profiles.

		Followers	Tweets	Following	Retweets	@	Links	#
Pearson correlation	Followers	1.000	-.385	-.176	-.225	-.351	-.181	-.236
	Tweets	-.385	1.000	.516	.636	.767	.611	.394
	Following	-.176	.516	1.000	-.151	.292	.671	-.009
	Retweets	-.225	.636	-.151	1.000	.588	.301	.348
	@	-.351	.767	.292	.588	1.000	.545	.507
	Links	-.181	.611	.671	.301	.545	1.000	.652
	#	-.236	.394	-.009	.348	.507	.652	1.000
Sig. (unilateral)	Followers	.	.136	.313	.266	.160	.308	.256
	Tweets	.136	.	.063	.024	.005	.030	.130
	Following	.313	.063	.	.339	.206	.017	.490
	Retweets	.266	.024	.339	.	.037	.199	.163
	@	.160	.005	.206	.037	.	.052	.068
	Links	.308	.030	.017	.199	.052	.	.021
	#	.256	.130	.490	.163	.068	.021	.

Source: prepared by the authors.

We can see that there is no significance between any of the coded variables and the number of followers that the platform has on Twitter. Therefore, we

can infer that the communication, information and marketing strategies that the MOOC platforms might follow on Twitter do not have a direct relationship with the number of followers it has on that social network.

5. Conclusions

The aim of this research project was to analyse the Twitter profiles of ten of the most important platforms in the provision and promotion of MOOC courses, using a statistical and computational focus that would allow us to understand how and for what purposes these platforms use their Twitter accounts. The descriptive analysis of the ten platforms analysed enables us to confirm that the platform with the most followers is Khan Academy ($n = 495,062$) even though its level of activity is relatively low with a total of 1,499 tweets posted, an average of 0.55 tweets a day. The platform that has posted the most tweets since its creation is FutureLearn ($n = 10,757$) with an average of 6.70 tweets a day. Likewise, Udemy is the platform that follows the most third persons or institutions ($n = 7,764$). The platform whose tweets have been retweeted the most is MIT OpenCourseWare ($n = 880$). On the other hand, the platform that mentions other users the most is the Spanish Miriada X platform ($n = 3,120$). The platform that puts the most links in its tweets is Udemy ($n = 2,237$). The one that uses the most hashtags is edX ($n = 1,600$). Coursera is noteworthy because, despite being the most important platform in the world of MOOCs, it only posts an average of half a tweet a day, something that does not prevent it from

being the platform with the second most followers ($n = 310,771$). The two platforms with the lowest activity levels are Open2Study and Canvas Network.

The major Coursera and Khan Academy platforms are generally most active on Wednesdays and primarily post their tweets from two platforms: Twitter Web Client and Hootsuite. On the other hand, analysis of the sentiment pattern shows positive sentiment with a majority of blocks of tweets in the alert/excited v. calm/relaxed semantic blocks. With regards to the geolocation of the tweets, the platforms generally have the greatest presence in the USA and Europe. For the principal platforms the percentage is around 40%. Likewise, the platforms that have the greatest impact in South America are Coursera, eDX, MIT OpenCourseWare, and the Spanish platform Miriada X. Africa, Asia and Oceania have limited participation.

Regarding the lexical-semantic description of all of the tweets posted in the ten platforms, using the tf-idf calculation and the «inverse document frequency» technique the results show that five terms are prevalent: «learning» ($0.602 / fq = 260$), «skills» ($0.592 / fq = 251$), «course» ($0.498 / fq = 201$), «free» ($0.401 / fq = 167$), and «online» ($0,382 / fq = 110$). Finally, the correlational analysis to verify whether there is a significant relationship between any variable of use of the platform and the number of followers shows that there is no significance between any of the coded variables and the number of followers of that platform on Twitter. Consequently, we can infer that communication, information, and marketing strategies that

the MOOC platforms implement through Twitter do not have a direct relationship with the number of followers that they have on this social network.

Finally, the semantic description of the words used most by the platforms enables us to show that the use of Twitter centres on commercial promotion of courses and dissemination of information at the start of them.

Identifying communicative patterns on Twitter by the principal MOOC platforms at a global level enables us to visualise how a global social network with a high level of penetration is used to disseminate education on a massive scale. Likewise, the analysis of these patterns can be used in subsequent research to carry out comparative studies on how this social network is used in other sectors, educational institutions, universities, etc.

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Factors for academic success in the integration of MOOCs in the university classroom

Factores de éxito académico en la integración de los MOOC en el aula universitaria

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Abstract:

This paper shows the results of a longitudinal study on the integration of MOOCs in university classrooms and their influence on academic performance. The relationship between performance and course design and the type of student participation is discussed. Performance has been assessed through evidence of learning, while the design and influence of the type of participation have been examined using standard instruments: TAM (Technology Acceptance Model) and IMMS (Instructional Materials Motivation Survey). Evidence obtained shows that participation in a MOOC improves learning results, and that both the type of course design (defined by an intensive use of social networks and e-activities) and active participation have an influence on academic success.

Keywords: Research, higher education, MOOC, performance, student participation.

Resumen:

El presente trabajo muestra los resultados de un estudio longitudinal de integración de un MOOC en aulas universitarias presenciales y su influencia en el rendimiento académico. Se discute la relación del rendimiento con el diseño del curso y con el tipo de participación de los estudiantes. El rendimiento se ha evaluado a través de evidencias de aprendizaje, mientras que el diseño y la influencia del tipo de participación se han controlado a través de instrumentos estandarizados (TAM, Technology Acceptance Model, e IMMS, Instructional Materials Motivation Survey). Se obtiene evidencia de que la participación en un curso MOOC mejora los resultados de aprendizaje, y que tanto el tipo de diseño del curso (definido por una utilización intensiva de redes sociales y realización de e-actividades), como una participación activa influyen en el éxito académico.

Descriptores: Investigación, enseñanza superior, MOOC, rendimiento, participación de los estudiantes.

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1. Introduction

Since they first appeared, Massive Open Online Courses (MOOCs) have aroused great interest in the academic community and higher education, and not just because of the astonishing number of students from all around the world who take these courses for free, but also because of their great potential for defining new learning models and teaching methods that might change how traditional universities conceive education. Indeed, the extent of this is such that Brooks (2012) described them as the campus tsunami, the phenomenon that will change the university suddenly and for ever (García Aretio, 2015).

This interest that MOOCs have awoken in the academic community has resulted in the existence of a large number of works that have moved to the information and academic worlds (Aguaded, Vázquez-Cano, & López-Meneses, 2016). Research that cannot, however, hide the criticisms made by many researchers who note that high-impact academic production is in a nascent and little-developed phase, and pays more attention to a theoretical approach than to empirical accounts (López-Meneses, Vázquez-Cano, & Román, 2015). This position is shared by Cabero (2015) who advocates expanding research into the real educational possibilities of MOOCs, beyond favourable or unfavourable opinions that are not evidence-based.

This starts by reviewing the trends in research on MOOCs as well as the academic studies relating to the integration of MOOCs into the curriculum. Secondly, the research carried out is presented with

its objectives, methodology, results, and discussion.

2. Trends in research on MOOCs

The body of work published since 2012 has, in Breslow's opinion (2016), gone through two different stages: the initial research completed between 2012 and 2013, and the rapid increase in academic publications from that moment, which has expanded both the agenda of research topics and the study methodologies used.

Accepting this viewpoint, although expanding the initial research stage to the years 2010 and 2011, early studies revolve around the very concept of the MOOC; despite its youth this is a concept with many meanings that is undergoing constant transformation. So, despite MOOCs using a flexible teaching style with little standardisation, different authors suggest distinguishing between «connectivist» c-MOOCs and more «traditional» x-MOOCs. This difference directs the earliest research along three different lines: a) comparative studies between representative Artificial Intelligence (AI) courses at Stanford (Udacity, Coursera) and the c-MOOC formats (Rodriguez, 2012); b) studies related to connectivist courses (Kop & Fournier, 2011; Kop and others, 2011), more focussed on the transformative effects on the conventional structures for generating knowledge than on the rigorous measurement of learning outcomes; and c) initial studies on the first xMOOCs by MIT and Harvard, relating to the management of the resources and the learning models of different types of student (Breslow and others, 2013).

At the end of this initial stage we can find noteworthy works that present different categories with which to analyse earlier research. Liyanagunawardena, Adams and Williams (2013) review the literature on MOOCs from 2008 to 2012, although several of the studies they select do not focus on empirical research. They identify four main topics as the most important: (1) the need to explore the perspectives of all parties interested in MOOCs (students, creators, teachers, institutions, etc.), taking into account the advantages and disadvantages of each viewpoint; (2) the cultural tensions within MOOC pedagogies, resources, and learning environments; (3) the ethical aspects of the use of the data generated by MOOCs; and (4) analysis of students' effective strategies for handling information overload and self-paced learning.

Kennedy (2014), in a review of literature from 2009 to 2012, recommends focussing on three main areas in future research into MOOCs: 1) a better understanding of students, their types of behaviour, and the social nature of the learning; 2) the major differences in pedagogical approach between the two classical MOOC models; 3) the implications of MOOC courses being included in formal education institutions.

The amount of research created since 2013, which in just one year exceeded what was published over the previous four years, means it is advisable to organise the information into clear categories. In this vein, Jordan (2014a) presents an online sketch of the research literature on MOOCs including over 250 entries, to which she associates keywords and tags.

Participation by students in a MOOC course stands out from the tag cloud, followed by measurement and evaluation (advances in automatic evaluation, peer evaluation, etc.), dropout rates, and demographic characteristics of the students.

A different work is presented by Gasevic, Kovanovic, Joksimovic, and Siemens (2014), whose results reveal the principal topics that comprise the framework for future MOOC research: 1) participation by students and academic performance; 2) MOOC and curriculum design; 3) self-paced learning and social learning; 4) analysis of social networks and online learning; and 5) motivation, attitude, and academic success.

Following the methodology proposed by Liyanagunawardena and others (2013), Sangrà González-Sanmamed, and Anderson (2015) perform a meta-analysis of the research on MOOCs carried out in the 2013-14 period, focussing on the publications that present results of research into the subject of MOOCs. They identify a total of 228 pieces of research in the period of the two years studied. They conclude that the topics researched most often in this period were those relating to the evaluation of pedagogical strategies and, especially, students' motivation and engagement.

In their research review, Castaño, Maiz, & Garay (2015a) understand that the pedagogical design of MOOCs, the interactions between students and the learning perspectives and their associated variables (motivation, attitudes) appear as the major research lines (Barak,

Watted, and Haick, 2016; Littlejohn, Hood, Milligan, & Mustain, 2016; Alario-Hoyos, Muñoz-Merino, Pérez-Sanagustín, Delgado Kloos, & Parada, 2016). The areas that stand out alongside this perspective focussed on learning, include questions relating to cost, universal access to higher education (Karsenti, 2013; Hollands & Tirthali, 2014; Sangrà and others, 2015), the problem of student retention rates (Jordan, 2014b), and the problem of integrating MOOCs into formal university studies (Kennedy, 2014; Hollands & Tirthali, 2014; Sangrà and others, 2015).

Finally, Veletsianos & Shepherdson (2016) perform an analysis of experimental research into MOOCs, and after reviewing the source of the academic works and the most cited references, they conclude that the main lines studied are the following:

1) Research focussing on students (83.6% of studies). Topics relating to course completion and student retention stand out.

2) Research focussing on questions of design (46.4%). Topics relating to the design, creation, and implementation of MOOC courses stand out.

3) Research on the context and impact of MOOCs (10.9%). This includes research on perceptions, the usefulness of MOOCs as an educational medium and economic impact.

4) Research focussed on the figure of the instructor (8.2%). This line has had very little development and has generally been linked to the perspectives and experiences of the instructor.

3. The integration of MOOCs into face-to-face university teaching

Perhaps because the very emergence of MOOCs (Fini, 2009) was linked to university teaching, or maybe because it is something that raises questions the institutions (their structure, their pedagogical, management, and business model) as well as the teachers and their roles and competencies (Sangrà and others, 2015), the interest of universities and institutions in incorporating them is undeniable.

A good example of this interest is the report prepared by the European Commission (European Commission, 2014) which, after recognising that the debate surrounding digital learning is dominated by MOOCs, states that the impact of technology will be even greater in future and that governments must stimulate and support greater integration of new technologies and of the pedagogical approaches associated with it in the conventional offer.

The Conferencia de Rectores de las Universidades Españolas (Spanish University Rectors' Association – CRUE, Gea, 2015) also underscored the involvement of MOOCs in the teaching provided in universities and in the accreditation processes for the knowledge acquired in the course and their validity for academic purposes. It proposes two ways of considering them as a type of teaching: as another type of online course (with similarities in implementation and evaluation) and as teaching resources. The student can follow them autonomously and they can be used in face-to-face classes.

As we have seen, the research community too, has been interested in incorpo-

rating MOOCs within the formal education institutions since they first appeared. Yuan and Powell (2013) note that it is possibly an error to consider MOOCs to be a new isolated development about which strategic decisions must be taken, given that they form part of a broader landscape of changes in higher education, underlining their potential for improving teaching and encouraging innovation and new pedagogical practices. On the other hand, Hollands & Tirthali (2014) believe that MOOCs should be understood in formal formative settings more as educational resources to complement teaching in the classroom than as independent courses in themselves, and that they should possibly be aimed at specific audiences. Along the same lines, Dillenbourg, Fox, Kirchner, Mitchell, & Wirsing (2014) identify the question of integrating MOOCs into university education as the main challenge to confront in these moments.

The uses to which MOOCs are being put in universities differ notably from their original design, and bring them closer to classical trends in traditional higher education (Haywood, 2016). They are being used as online courses for face-to-face students (MIT News, 2014), as credits for university students, or as educational content that is worked on using «flipped classroom» methodology (Karlsson & Janson, 2016), etc. In this sense, research points to the use of hybrid and blended MOOCs as a method for using MOOCs in formal teaching settings (Castaño, Maiz, & Garay, 2015b; Delgado-Kloos, Muñoz-Merino, Alario-Hoyos, Estevez-Ayres, & Fernández-Panadero, 2015; Israel, 2015).

Israel (2015) reviewed the different methodologies for using blended MOOCs in face-to-face teaching in higher education, addressing their effectiveness in students' learning. This focus on students' learning is interesting, and in Reich' opinion (2015) is a neglected variable in research on MOOCs. We agree with Reich (2015) that, beyond the factors that affect the completion rates for students and student retention on the courses, future studies must pay more attention to what students learn rather than simply what they do.

Israel (2015) distinguishes between five different integration models that, in all cases, lead to the following conclusions: 1) a positive but modest impact on the students' learning outcomes; 2) no evidence of a negative effect on any of the subpopulations studied; and 3) a low level of student satisfaction with the experience of introducing a MOOC course in face-to-face teaching.

On the other hand, and taking into account Holotescu, Grossek, Cretu, & Naaji's differentiation (2014), the integration models studied suffer from a lack of synchronisation between the MOOC courses and the face-to-face teaching itself. That is to say, the academic content of the MOOC course is basically used as a digital resource. The students access these resources but the tasks, discussions, and evaluations are part of the university course itself, not the MOOC course. This is, therefore, a lax integration of MOOCs into university teaching, given that the social activity of the MOOC is lost from view. In other words, not just studying the material, but also participating actively participating in the social part of the learning: solving

tasks, discussion forums, peer evaluations, additional materials, participation in the learning community, and so on.

It is, however, significant that various pieces of research identify the social effects of participating in a MOOC as one of the influential factors in both improving learning outcomes and course completion and student retention on it (Rosé et al, 2014; Yang, Wen, Kumar, Xing, & Rosé, 2014; Brooks, Stalburg, Dillahunt, & Robert, 2015).

In this work we have opted to integrate a cooperative open MOOC with face-to-face teaching that is synchronised with the course (Holotescu and others, 2014) and we consider the following variables: academic performance, design of the MOOC course, and type of participation by the students.

4. Methodology

The objective of this work is to analyse the impact on academic performance of integrating a cooperative MOOC into university classes. With this aim the following research questions were formulated:

1. Is a MOOC integrated into a university degree module effective for students' learning?
2. Do social factors contribute to academic success in a MOOC?
3. What type of participation in the MOOC results in the highest level of academic performance?

A longitudinal study was performed, based on the experience of integrating a MOOC over three academic years. The MOOC course on which this work is based was designed placing the emphasis on co-

operation because this factor was the most highly valued by experts, consulted using an two round Delphi study with the objective of defining the design of the MOOC, in relation to learning on massive open online courses (Castaño and others, 2015a). Consequently, the tasks set throughout the course, called e-activities, had to be shared on social networks so that the rest of the participants could be aware of them and make other contributions about them.

This course can therefore be classified as a cooperative MOOC. From this perspective, cooperative MOOC courses are an attempt to react to the heterogeneity of the participants in a MOOC by delivering an x-type course while integrating some of the advantages of connectivist courses (Fidalgo, Sein-Echaluce, & García Peñalvo, 2013): intensive use of social networks, creation of learning communities (Delgado-Kloos and others, 2015), and use of personal learning environments (Castaño & Cabero, 2013; Torres & Gago, 2014).

The MOOC was designed for the students from the fourth year of the Degree in Primary Education at the University of the Basque Country, although because of its very definition it was opened online to anyone who was interested in the subject, as can be the case in other MOOC experiences (Siemens, 2012; Knox, Bayne, Macleod, Ross, & Sinclair, 2012).

Synchronised integration of the MOOC course into the module, was therefore, chosen (Holotescu and others, 2014). In other words, the students not only access and study the materials, but they also participate actively in the social element of learning: solving tasks, discussion forums, peer

evaluations, additional materials, participation in the learning community, and so on.

This was a course lasting five weeks that comprised five modules on topics relating to e-learning, web 2.0, PLEs, MOOCs, digital content, and educational experiences based on m-learning. In all of the cases the original cooperative design of MOOC courses was respected, but the means of communication and for creating networks of cooperation between the participants were adapted to the characteristics of the platforms that hosted it. The MOOC was published each academic year on a different platform: on the first occasion Metauniversidad was used based on Chamilo, a free software solution for managing e-learning distributed under the GNU/GPLx3 licence; the second edition was on MetaMOOC on the free code EdX platform, and thirdly on MiriadaX.

The number of people registered on the MOOCs was 2,358 (744 in the first edition, 481 in the second, and 1,133 on the third). The research sample comprised one sub-population defined by fourth year students taking the university courses intended for training primary school teachers over three successive academic years. This comprises 150 subjects, 53 students from the first edition, 43 who took part in the second, and 54 in the third.

As for academic performance, the teaching team ranked each of the e-activities performed by the students, obtaining average grades, independently of the results that each platform offers. As well as the evaluations performed by the teaching team to classify the students' academic performance in each of the three editions

of the MOOC, the overall grade for the module was also taken into account.

For collecting the data the IMMS (Instructional Materials Motivation Survey) scale was also used, adapted the MOOC context. This questionnaire, which uses a Likert scale, consists of 36 items from four categories (attention, confidence, satisfaction, and relevance) and is based on Keller's ARCS model of motivation (1987). Specifically, the proposal by Di Serio, Ibáñez, & Delgado (2013) was used, with a documented reliability coefficient of 0.96, adapting it slightly to the field of MOOCs. Four questions about the type of design were added, taken from the TAM (Technology Acceptance Model) questionnaire (Wojciechowski & Cellary, 2013) and the type of participation by students, according to their own perception, based on the proposal by De Waard (2013): lurking, moderately lurking, active, individualist, and collaborative.

5. Results

Having performed the data analysis, the results are presented below following the order of the defined research questions. With regards to the first question (1. Is a MOOC integrated into a university degree module effective for students' learning?), the answer is affirmative. It can be stated that participating in a MOOC integrated into a module in a synchronised way improves students' academic performance, especially for those students who obtain lower grades.

To perform this analysis the students were divided into four blocks in relation to the grade received through a k-means clustering analysis. The first block comprises those with the highest average grade, 8.995

on the MOOC and 8.6967 on the module; those in the second block average 8.3281 on the MOOC and 7.8290 on the module; those in the third block average 8.085 on the MOOC and 7.1074 on the module; and those in the fourth block 7.443 and 5.9743 respectively. In contrast with these results, it was found that the overall average grades are 8.460 on the MOOC compared with 7.8613 on the module. Therefore, the average grade obtained on the MOOC course exceeds that from the module for all four groups of students by half a point (0.5). The greatest difference is found between the students from the fourth group whose average on the MOOC exceeds by almost one and a half points (1.4687) the grade ob-

tained on the face-to-face degree course. In contrast, the students with the narrowest gap are those from group 1 (0.2983), followed by those from group 2 (0.4991), and finally those from group 3 (0.9776). Therefore the difference in grades between those obtained on the MOOC and those from the module increases as the average mark for the module becomes lower.

After performing the ANOVA analysis to confirm this result it is possible to verify that each group scores significantly higher than the next one. In other words, group 1 significantly higher than group 2, this group scores more than group 3, and so on successively (see Table 1).

TABLE 1. Cluster analysis and multiple comparisons.

(I) Cluster case number	(J) Cluster case number	Mean difference (I-J)	Standard error	Sig.	95% confidence interval	
					Lower limit	Upper limit
1	2	.7411*	.04900	.000	.6105	.8717
	3	1.2498*	.06259	.000	1.0829	1.4166
	4	2.1375*	.10389	.000	1.8605	2.4144
2	1	-.7411*	.04900	.000	-.8717	-.6105
	3	.5086*	.05742	.000	.3556	.6617
	4	1.3964*	.10086	.000	1.1275	1.6652
3	1	-1.2498*	.06259	.000	-1.4166	-1.0829
	2	-.5086*	.05742	.000	-.6617	-.3556
	4	.8877*	.10812	.000	.5995	1.1759
4	1	-2.1375*	.10389	.000	-2.4144	-1.8605
	2	-1.3964*	.10086	.000	-1.6652	-1.1275
	3	-.8877*	.10812	.000	-1.1759	-.5995

Based on observed means

The error term is the root mean square (Error) = .065

*. The mean difference is significant at .05

Source: prepared by the authors

Figure 1 shows the correlation established between the performance groups (k-means cluster) and their average grades on the MOOC and on the module. Group 1, the one with the highest grades, has the smallest difference between the mark for the MOOC course and the grade for the module. However group 4, that is defined as the group with the worst grades, is the one that shows the greatest difference

between the mark for the MOOC and the overall mark for the course. Therefore it is shown that an effect occurs between the groups where the higher scoring groups lift the lower scoring ones. So, while group 1 does not have anyone to lift it, group 4 has three groups ahead of it who help it, something that has a positive influence on their results, which improve when they take the MOOC.

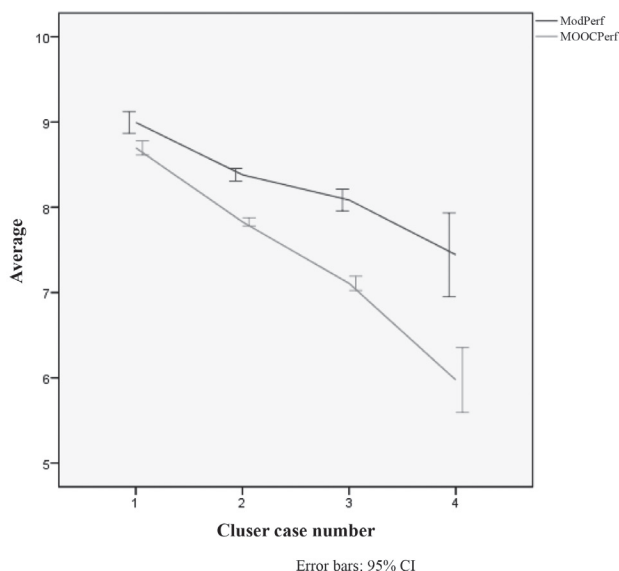


FIGURE 1. K-means cluster performance on MOOC and module.

It is shown that taking a MOOC that is integrated into the degree module has a positive influence on improvement in academic results, especially, with those students who obtain lower scores.

The second research question (2. Do social factors contribute to academic success in a MOOC?) proposes examining the social group of participation, the basic characteristic of a cooperative MOOC. To answer this question, three editions of a

massive open online course were analysed in a longitudinal study. In this analysis it has been noted that there are significant differences in the academic performance of the students between the first two editions and the third edition of the MOOC (0.047 and 0.001 respectively). We should recall that the first and second edition were designed with a more collaborative style, in contrast, the third edition was more focussed on activities that promoted less interaction between the participants.

With regards to the average marks obtained it can be seen that there is little difference between the first two editions, the mean result being almost the same: 7.88873 in the first one and 8.0849 in the second. In contrast, both of them differ considerably from the average result obtained in the third (7.5452) where the design focussed less on collaboration. The overall average that is obtained for academic performance taking into account all three editions is 7.8613, and students obtain the best results in the second edition (8.0849).

Following the analysis of the results from the four variables of the IMMS

questionnaire (confidence, attention, satisfaction, and relevance), students from the first edition of the MOOC have the best opinion of the characteristics of the course. In the analysis of the data from this first edition (see Table 2) and in relation to the other two editions, significant results are obtained for three of the four IMMS variables: attention (0.000 and 0.039), relevance (0.002 and 0.008), and satisfaction (0.001 and 0.023). Likewise, participants in the first edition rate the general design of the course significantly more positively in comparison to the second (0.03) and the third editions (0.029).

TABLE 2. Multiple comparisons. Tukey's HSD.

Dependent variable	(I) Year	(J) Year	Means difference (I-J)	Standard error	Sig.	95% confidence interval	
						Lower limit	Upper limit
Design	1.00	2.00	2.248*	.671	.003	.66	3.84
		3.00	1.862*	.722	.029	.15	3.57
	2.00	1.00	-2.248*	.671	.003	-3.84	-.66
		3.00	-.386	.734	.859	-2.12	1.35
	3.00	1.00	-1.862*	.722	.029	-3.57	-.15
		2.00	.386	.734	.859	-1.35	2.12
Attention	1.00	2.00	4.047*	1.046	.000	1.57	6.52
		3.00	2.690*	1.091	.039	.10	5.27
	2.00	1.00	-4.047*	1.046	.000	-6.52	-1.57
		3.00	-1.357	1.120	.448	-4.01	1.30
	3.00	1.00	-2.690*	1.091	.039	-5.27	-.10
		2.00	1.357	1.120	.448	-1.30	4.01
Confidence	1.00	2.00	2.065*	.749	.018	.29	3.84
		3.00	-.029	.787	.999	-1.89	1.83
	2.00	1.00	-2.065*	.749	.018	-3.84	-.29
		3.00	-2.095*	.807	.028	-4.01	-.18
	3.00	1.00	.029	.787	.999	-1.83	1.89
		2.00	2.095*	.807	.028	.18	4.01

Dependent variable	(I) Year	(J) Year	Means difference (I-J)	Standard error	Sig.	95% confidence interval	
						Lower limit	Upper limit
Satisfaction	1.00	2.00	3.784*	1.051	.001	1.29	6.27
		3.00	2.969*	1.110	.023	.34	5.60
	2.00	1.00	-3.784*	1.051	.001	-6.27	-1.29
		3.00	-.815	1.133	.753	-3.50	1.87
	3.00	1.00	-2.969*	1.110	.023	-5.60	-.34
		2.00	.815	1.133	.753	-1.87	3.50
Relevance	1.00	2.00	3.895*	1.127	.002	1.22	6.56
		3.00	3.655*	1.199	.008	.81	6.49
	2.00	1.00	-3.895*	1.127	.002	-6.56	-1.22
		3.00	-.240	1.224	.979	-3.14	2.66
	3.00	1.00	-3.655*	1.199	.008	-6.49	-.81
		2.00	.240	1.224	.979	-2.66	3.14

*. The means difference is significant at 0.05.
Source: prepared by the authors.

In contrast, for the confidence variable the best results are found among students from the second edition who value this aspect significantly better than students from the first and third editions of this MOOC (0.018 and 0.028 respectively).

In summary, students who participated in the first editions of the more collaborative MOOC had a more positive view of its design and the outcomes of participating in it. According to their perspective, the collaborative design of the MOOC contributed to improving their confidence in themselves, it was more relevant, and their satisfaction with the learning task performed was greater.

With regards to the third question (3. What type of participation in the MOOC results in the highest level of academic

performance?) there is a significant relationship (0.010) between the type of participation and the academic performance obtained in the case of participants who describe themselves as «active and collaborative», these are also the students who show the best academic performance. Significant results are also obtained for the continuous variables of relevance (0.004), design (0.039), and satisfaction (0.039).

Taking the analysis a step further, a multiple regression was performed to see which of the variables studied is the most relevant for predicting academic results. By isolating the variables it becomes clear that the type of participation is less important in relation to academic performance and, as can be seen in Table 3, the only variable that directly and significantly influences performance is relevance (0.028).

TABLA 3. Relación entre rendimiento académico y variables.

Model	Non-standardised coefficients		Standardised coefficients	T	Sig.
	B	Standard error	Beta		
1 (Constant)	6.338	.434		14.606	.000
Design	.007	.025	.032	.276	.783
Satisfaction	-.025	.022	-.188	-1.157	.249
Relevance	.044	.020	.348	2.218	.028
Type Participation	.084	.047	.157	1.775	.078

a. Dependent variable: MOOCPerf

Source: prepared by the authors.

As a result, it is shown that academic performance is conditioned because the students perceive that the design of the MOOC is relevant in itself, and not so much because of the type of participation that the student displays on the MOOC course.

6. Discussion

The state of the art in research on MOOCs can be described as fragmentary, taking into account the various epistemological and ontological conceptions of the different authors regarding what should be studied. As an overview, Veletsianos and Shepherdson (2016) classify experimental research on MOOCs by four trends focussing on students, on design, on the context and social and educational impact, and on the figure of the instructor.

The research presented covers three of these major categories, as it focusses on the educational impact of a cooperative MOOC design, considering variables re-

lating to the students: type of participation, and their academic performance.

The MOOC concept, despite being relatively new, has a range of meanings and is undergoing continuous transformation. New ideas have been added to the classical distinction between «connectivist» c-MOOCs and more «traditional» x-MOOCs, such as cooperative MOOCs (Fidalgo et al, 2013; Castaño et al, 2015a; Delgado Klos and others 2015; Israel, 2015). In this vein, the search for new pedagogical formats in university education with new digital education environments deriving from MOOCs is an emerging research topic. This, in turn, provides an opportunity to position the students' learning in these formats as one of the key variables to consider (Reich, 2015).

The efficacy of a formative proposal for a MOOC in university classrooms will depend on both the integration proposed and on the pedagogical design of the course itself. Different ways of integrating MOOC courses in university teaching have been

researched (Israel, 2015), with positive albeit modest results with regards to the students' learning. The research presented corroborates these results, and shows that participation in a cooperative MOOC integrated into a module is a factor that encourages students' learning, not only in the results from the MOOC course itself, but also in the face-to-face university module as a whole. This positive influence is especially apparent with those students who display a lower academic performance. This is because of the effect that occurs among the students on the MOOC, as the students with lower marks are lifted by the higher scoring ones. Therefore collaboration between participants on the MOOC helps those students who receive lower grades to improve on the module.

The type of MOOC integration that has been carried out in the research is an example of what Holotescu and others (2014) call a synchronization perspective, where students not only access the study materials, but also actively participate in their social group as another component in the development of the module. This is the most complex and effective way of integrating a MOOC into a face-to-face module. The results of the research confirm the efficacy of this form of integration.

The cooperative MOOC course design was maintained across the three editions, although their forms of communication and of creating social networks among participants had to be modified in accordance with the characteristics of the different platforms that hosted it. In this vein, it should be noted that participants on the more cooperative editions of the massive open online course obtained

better academic results. Furthermore, these students gave significantly positive responses regarding their opinion on the design of the cooperative MOOC that promotes scenarios for creating learning networks, and that in turn can have an influence on the student's academic success in the face-to-face module that she takes.

The third variable analysed relates to the type of participation by students. The rates of completion of studies (Jordan, 2014b), retention, and the behaviour of different subpopulations of students (Reich, 2014) are variables that are studied in the literature. The latter author shows that the certifications obtained by the students vary substantially according to their intentions. This research is interested in the subpopulation of the students enrolled on a face-to-face university module who take a MOOC in which they participate along with the community interested in the subject matter.

In this study it has been found that the students who achieve the greatest academic success are those who see themselves as active and collaborative within the dynamic of the MOOC. This seems to be a logical result taking into account that in a MOOC with these design characteristics the social group is especially relevant. These results confirm the power of social factors in academic success, along the lines of what Rosé and others (2014) or Brooks and others (2015) proposed.

Taking a further step, it has been shown that even though this type of active and collaborative participation is the one that obtains the best results, the type of participation in itself is not the key factor

for predicting the student's academic success. In fact the conditioning factor for attaining high academic performance is that the participating students believe that the design of the course is relevant to the development of their learning within the MOOC and that it is also positive for their work on the module.

7. Conclusions

The integration of MOOCs in conventional classrooms offers new opportunities for searching for innovative pedagogical formats in university teaching, in both its online and face-to-face aspects. A series of factors stand out in this work that affect the academic success of this integration.

Firstly, it identifies hybrid and blended MOOCs as the priority option for improving the learning of university students. These promote the attainment of positive academic results, not only on the MOOC itself but also in the modules that include it. It also stands out that the MOOC must be integrated into the module in a synchronised way and not just as a mere complementary educational resource. Thirdly, the importance of social participation in the learning process must be emphasised, as this contributes to collaboration between the participants and the students who obtain the best results value this characteristic very positively. These students lift those who have lower results, contributing to an improvement in their learning. It is also shown that the type of participation by the students is a weak predictor variable of academic success, insofar as it is conditioned by the students perceiving that the design of

the MOOC is relevant in itself. It is accordingly confirmed that relevance is the variable that has a direct and significant influence on performance.

In future studies, analysing whether studying the MOOC at the start of the module would improve students' results even further could be examined, as the effect whereby better performing students lift the results of worse performing ones would increase over time. On the other hand, different platforms were used in the different editions of the course, and so this limitation should be overcome using other more refined systems in future studies to allow for a more comprehensive comparison of results.

The future of research into MOOCs will, to a great extent, depend on new hybrid designs, in both their technological and pedagogical aspects, and on making learning and students' academic results the focal point of the research. On the other hand, this will require more sophisticated and broader methodological designs that pay more attention to the causal factors that promote learning.

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Certification of MOOCs. Advantages, Challenges and Practical Experiences

La certificación de los MOOC. Ventajas, desafíos y experiencias prácticas

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Abstract:

In general, participants use MOOCs for individual learning purposes by selecting certain contents of a MOOC in which they are interested. Simultaneously, MOOCs are used in the context of online-lectures offered to students who must or may enroll for a specific course to earn credits. However, many participants do not successfully complete all units of a MOOC. Therefore, completion rates – in general – are rather low.

Certificates like PDF-documents or electronic badges can be an adequate stimulation to complete a course. This research raises the questions, how the certification of MOOC-participants can be managed and if certificates have an impact on completion rates. Firstly, general aspects of certification are discussed. This is followed by a practical insight into the certification practice based on experiences of the Austrian MOOC-platform iMooX operators. As a conclusion, results are summarized and related challenges and further research questions are addressed.

Keywords: MOOC, iMooX, badges, challenges, practical experiences.

Resumen:

De forma general, los participantes de los cursos MOOC acuden a ellos por deseos personales de aprender, por lo que seleccionan ciertos contenidos del MOOC en el que están interesados. A su vez, los MOOC también se emplean en el contexto de clases en línea que se ofrecen al alumnado que necesita alcanzar créditos académicos en su formación. Sin embargo, muchos participantes no finalizan todo el curso MOOC y las tasas de éxito son, en general, relativamente bajas.

Los certificados en forma de documentos PDF, o distintivos en forma de credencial (*badges*), pueden resultar de estímulo para finalizar estos cursos. Esta investigación analiza cómo se puede afrontar la certificación de los participantes en un curso MOOC y si la certificación tiene, de alguna manera, incidencia en las tasas de éxito. En primer lugar, se discuten aspectos generales de la certificación y,

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a continuación, se realiza un análisis práctico con base en la plataforma MOOC austriaca iMooX. Las conclusiones muestran los principales retos e investigaciones derivadas del estudio y su desarrollo futuro.

Descriptores: MOOC, iMooX, distintivos en forma de credencial s retos, experiencias prácticas, certificados.

1. Introduction

Massive Open Online Courses, shortly MOOCs, are a trending phenomenon in online education. Thus, MOOCs reached quite a high popularity in the field of higher education as well as in the field of continuing education. But after the initial hype nowadays the exploration is less enthusiastic but more reflected. Academics have become aware of the fact that they have to overcome several challenges and obstacles if they want to use MOOCs as an efficient technique for teaching and learning.

Focusing on the situation of higher education in continental Europe the widely missing obligation for lecturers and the lack of motivation to produce MOOC-materials, the fact that MOOCs are hardly considered to be integrated into curricula, the frequent absence of special training programs where lecturers can improve their MOOC-focused teaching competences as well as copyright and financial issues can be mentioned as such obstacles (Kopp, Ebner, and Dorfer-Novak, 2014).

Apart from these obstructing conditions rather low completion rates and the accomplishment of certification processes are salient challenges of MOOCs. This

research work raises the questions, how the certification of MOOC-participants can be managed and if certificates have an impact on completion rates. In order to answer these questions, firstly general aspects of certification in the context of MOOCs will be discussed. In doing so, PDF-documents and badges will be in the focus. Afterwards the authors will give a practical insight into their certification practice including technical issues as well as their findings concerning the relation between certification and completion rates. As a conclusion, results will be summarized and related challenges as well as further research questions will be addressed.

2. General aspects of certification in the context of MOOCs

As already mentioned above, completion rates in MOOCs are rather low. This is due to the following reasons: MOOC-participants choose the content they want to learn via MOOCs very carefully. The time invested has to be in a well-adjusted balance with the intended learning success. Therefore, learners pick just that parts of information that is of interest for them which means that they usually do not follow (and complete) all units of a MOOC. This is especially true

for those cases where learners enroll in a MOOC for professional or private purposes. In these cases, participants want to enhance their knowledge in a specific subject area. They seek for intellectual stimulation and/or entertainment. Additionally, they might just be interested to experience or to explore online education (Khalil and Ebner, 2014). So, not completing a whole MOOC does not necessarily mean that participants did not learn what they intended to learn. It might rather mean that they are just not interested in all subjects of the specific MOOC.

Though this is true for participants who enroll in a MOOC for private or professional reasons (in the sense of life long learning), the situation is different when it comes to students. If MOOCs are offered as (obligatory or facultative) lectures (additionally to or as a replacement of classroom teaching) then students usually should have a strong interest in completing the MOOC. This is –most of all– when credits are linked with the successful completion or when the completion is at least a prerequisite to take the exam. If students do not complete a MOOC offered as a lecture (or part of a lecture) this may be up to the following reasons: The instructional design of the MOOC is not good enough so that students cannot follow the online lectures properly or they just lose interest. It is also possible that students are not familiar enough with online learning so that they cannot handle the MOOC-platform and/or cannot fulfill the required tasks, which might be different to classroom teaching. Moreover, it can be that students would not complete

the course even if it is offered as classroom teaching due to their lack of time or interest.

From this, it follows that motivation plays a key role for the (non-)completion of MOOCs. Motivations depends on the reason, why one enrolls for a MOOC. In general, there exist two different target groups: those who want to enhance their knowledge in a specific subject field (which means the general public) and those who need to participate for reasons of study (which means regular students). Although motivations to participate in a MOOC differ between the target groups it can be assumed that there is one motivation they have in common. Both of them are interested in a certificate that confirms the completion of a MOOC.

In this context, talking about certificates means that participants can use them to proof that they passed content-related online-quizzes or mastered MOOC-immanent communication and/or collaboration tasks (e.g. writing postings within the MOOC-forum) successfully. But it does not mean the confirmation of earning credits. Since MOOCs naturally have a rather huge amount of participants certificates preferably should be issued automatically. Computer-generated PDF-documents as well as electronic badges (which become more and more popular) seem to be a good solution. In general MOOC-platforms offer two types of digital certificates (Witthaus, and others, 2014): Certificates that confirm participation in / completion of a course and certificates that verify the learners identity and confirm attainment of learning outcomes.

As they refer to the first type of certificates, the functionality of PDF-documents is rather obvious. However, the suitability of digital badges as certificates in the context of MOOCs needs a closer examination.

Badges have their origins in the world of computer games. Collecting badges is very popular among their players. Badges increase the willingness to be engaged in a game longer and more intensively. This is for several reasons: Badges reward the accomplishment of (optional) tasks, they allow players to compete with each other and unlocking a new badge is an additional challenge within the computer game. Generally, a badge consists of a signifying element (the visual and textual cues of the badge), rewards (the earned badge), and the fulfillment conditions which determine how the badge can be earned (Hamari, 2015). Thus, it can be concluded that badges are an important factor for the enhancement of the motivation of computer game players.

Since motivation is an established predictor of educational outcomes (Dörnyei and Ushioda, 2013), the above mentioned effects of badges are worth to be transferred to educational contexts, but not only in the sense of gamification. As Abramovich and Wardrip (2016) point out, there exist a number of learning motivation theories that can inform positive interactions between badges and learners' motivation. The achievement goal theory suggests that the motivation to earn badges can be described on two interacting scales of learning goals: approach to avoidance (i.e. to avoid the appearance of underperforming) and

mastery of to performance (i.e. to achieve mastery based on one's own interest and to perform better than others). The expectancy-value theory suggests that earning a badge could motivate learners if the badge increases the expectation for learning the targeted material and if earning the badge increases how much they value the learning. The cognitive evaluation theory countersinks the concerns that earning badges will distract learners from learning itself, meaning that learners see badges disconnected from the learning. Following this theory, badges act as a motivator because it is considered that learners are able to connect their badges to their learning.

Gibson and others (2015) summarize that badges in education are emerging to incentivize learners to engage in positive learning behaviors, to identify progress in learning and content trajectories and to signify and credential engagement, learning and achievement. They identify three major educational affordances of digital badges: motivation, status recognition and evidence of achievement. Analog to computer games acquiring badges motivates learners to engage with provided online learning material continuously and more intensively. Concerning status recognition, badges in education can provide a direct link to an assessable artifact or an indirect link to a collection of evidence needed to pass a unit, graduate from a program or even get a job. Moreover, badges may assist users in building and formalizing identity in social media networks. Additionally, badges can be displayed e.g. in an e-portfolio or on (personal) web-

sites. Therefore, they are an evidence of achievement that has even the potential to become an alternative credentialing system.

However, the efficiency of badges is closely linked to their character. Abramovich and others (2013) distinguish between two types of badges: skill badges (measuring acquired skills) and participation badges (measuring the grade of participation). In their findings they point out, that different badge types affect different learner's motivation, classifying their target groups into low and high performing students. Low performing students seem to be motivated only by participation badges and only these students have a high desire to outperform others by earning badges. On the other hand, concerning the learning outcome skill badges seem to be more efficiently. Most of all because they are considered to be intrinsic motivators while participation badges are perceived as external motivators.

Here a parallel can be drawn to the two main target groups of MOOCs. Students need to focus on skill badges. Collecting these badges helps them to gain knowledge and to prepare for their exams. On the other hand, lifelong learners may rather seek for the exchange of experience when attending a MOOC. Thus, they will be more interested in participation badges and it will be easier for them to earn these badges. That means that the motivation factor to enroll in a MOOC is an important reason for which type of badge is of higher interest. Thus, selecting the right balance between skill badges and participation badges depends

on the primary defined target group of a MOOC.

As illustrated above, different types of certification (especially in the form of badges but also as PDF-documents) have different influence on learning behavior and thus on completion rates. However, the question if there exists a correlation between awarding certificates and completion rates remains open. Thus, the next chapter is devoted to the practical experience in the certification of MOOC-participants.

3. Practical insight into certification practice

In March 2014 the Austrian MOOC-platform «iMooX» was founded by the University of Graz and Graz University of Technology. At the beginning the platform offered three MOOCs which were attended by a total of 1,300 participants. One year later the number of MOOCs was extended to eight and in May 2016 iMooX had more than 10,000 registered users who were able to choose between 21 offered courses, all offered in German language.

Right from the start iMooX-participants had the possibility to receive a certificate in the form of a PDF-document. To earn this certificate, they had to pass the offered online-quizzes which mainly served as self-assessments. Answering more than 75 percent of the questions of each quiz correctly was required to get the computer-generated certificate. In summer 2015 iMooX has started to award badges in addition to PDF-certificates.

To begin with the iMooX-platform itself as well as technical aspects concerning the issuance of certificates will be described. This is followed by the representation and interpretation of first data collected in the context of certification.

3.1. The Austrian MOOC-platform «iMooX»

The courses offered on iMooX are typical xMOOCs. Thus, they consist predominately of video lectures, self-assessments (provided as multiple-choice-quizzes) and forums where participants can discuss among each other and/or with the particular course instructors. The platform was developed as part of a project which was supported by public funding. Since this was (and still is) the first and only Austrian MOOC-platform the project not only aimed on the development of online courses. In fact, the formulation of a pedagogical guideline for practitioners (Lackner, Kopp, and Ebner, 2014) and the discussion of business models for MOOCs (Fischer, and others, 2014) were also central, completed tasks.

Especially the pedagogical guideline was of high importance. It ensured that all instructors who were responsible for the development and the execution of the MOOCs were familiar with the respective instructional design and knew how to design their courses in a didactically successful manner. Based on the guideline iMooX courses are characterized by

- a clear course structure with respective educational objectives and

- a typical run-time of four to eight weeks;

- short video lectures, each of them not longer than 15 minutes;
- additional learning material;
- the possibility to interact asynchronously (with the help of discussion forums);
- self-assessments and
- a concluding certificate.

Concerning the financing aspect, it has to be mentioned that –aside from the initial funding by the regional government– all courses of iMooX have to be financed independently. Since there is no central financing by the universities that run the platform it is necessary to find financial backers for each course separately. This makes it rather difficult to extend the number of courses as well as the functionality of the platform as quickly as the participants would like to have it.

In contrast to well-known MOOC-platforms like Coursera or Udacity iMOOX offers all learning materials as Open Educational Resources (OER). The use of creative commons licenses not only creates a clear legal framework concerning the free use of the provided material. Moreover, it makes it possible for third parties to reuse and adopt the materials for their own purposes. Thus, all content provided via iMooX can be used in various teaching scenarios which greatly expands the dissemination of the materials.

3.2. Technical aspects

There are two possibilities to become awarded on the iMooX-platform. The first

one is simply by getting a PDF serving as a confirmation of participation in a particular MOOC. The participant has to pass each weekly self-assessment with a score beyond 75% and to fill in a final evaluation. Afterwards the confirmation is automatically computed with the name of the learner on it. Nevertheless, the strength of automatization is also the most weakness, because it is otherwise not an official certification from an educational institution like a university —so there is no guaranteed validation.

Awarding badges is a bigger challenge. In 2011, Mozilla developed an open technical standard, which allows everyone to issue, earn and display standardized digital badges (Mozilla, 2012). Those badges are following the idea, that each of them contains embedded meta-data (that link back to the issuer), the badge description, the moment the badge was awarded and finally also the earner identity. Therefore, everyone can anytime verify the receipt of those badges by taking the data from the badge and check their originality on the issuer's web server. Also digitally signing the badges ensures authentication, non-repudiation and integrity. With other words, on the one side those digital artifacts will foster learners' motivation as described above and on the other side the award process is strongly related to a validation process. If those badges are put online on an eportfolio or even a badge platform anyone is able to see its validity.

In summer 2015 a first service-oriented web-application named badgeit has been installed on the iMooX-platform (Wüster and Ebner, 2016). It has been realized as a Java web application using Java Servlets (3.1) as a controlling technology and Java Servlet Pages (JSP) as presentation technology. It has been deployed on the iMooX's Tomcat 7.0 web server. For storing badge and assertion data, a MySQL 5.1 database has been used. Signed badges are represented as Java Web Signatures (JWS), secured by a 2048-bit RSA key. To increase data privacy, the earner identity is always salted and SHA-256 hashed before it is added to the badge assertion. To be file and URL-safe, image data as well as the JWS header and payload is Base64url encoded.

Fig. 1 points out the badge awarding process at the iMooX-platform. It can be simplified to just one sentence: *«Take a user, identify potential awards as well as assertable badges and if you find any, award it.»* This must be done of course for any user and any course by looping the process again and again. It must be also pointed out that this badge application only awards two types of badges, so called Quiz-Mastery-Badges and Certificate-of-Participations-Badges. The first one will be awarded if a certain amount of quizzes within one particular MOOC has been passed successfully. The second one will only be issued if the whole course (= all quizzes) has been completed as well as a final feedback formula has been filled out.

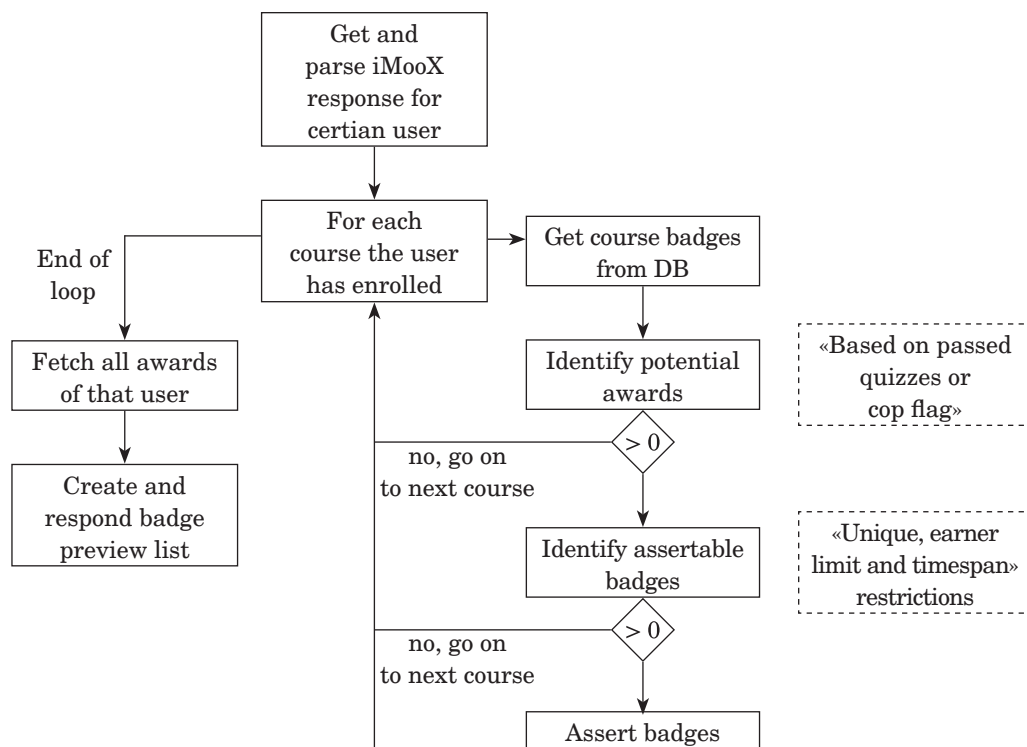


FIGURE 1. Badge awarding process.

Each awarded badge will be delivered through a personal collection web page. Fig. 2 shows a screenshot of the site «My badges» issued to a single user after computing the process described in Fig. 1. The badges displayed are sorted by the course name and the mouse overlay displays the badge-description. Each badge can be downloaded by the learner and uploaded to any third-party application for further reasons. Due to the embedded

meta-data the badge holds also its description, the issuer as well as the learner identity. The identity is ensured by an email-validation. With other words the learner has to use his/her email-address as authentication property. Any user who is interested if the badge is valid has just to click on it and will be automatically redirected to the iMooX-Server, where a small notification confirms its validation immediately.

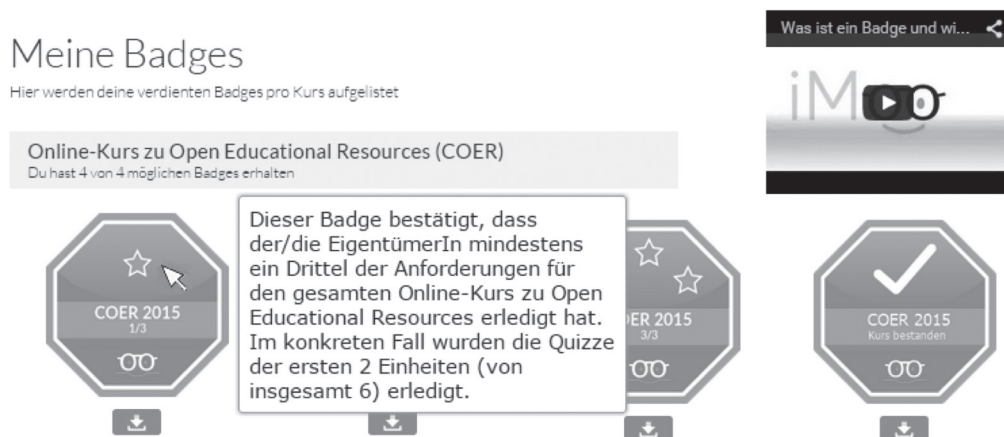


FIGURE 2. Personal collection of issued badges for each single learner.

3.3. First experiences with awarding certificates in MOOCs

As mentioned above iMooX-participants may earn PDF-certificates as well as badges. In the last two years of operating the platform the authors could gain first experiences in awarding certificates in MOOCs. In the following these experiences as well as related findings will be described by addressing three research questions:

1. How many learners are interested in certificates?
2. How many certificates are issued?
3. Is there a difference between the certificate-collecting-learners in order to the non-collecting ones with respect to completion rates?

We base our answers on a case study approach, by carrying out examples of awarding PDF-certificates as well as badges.

3.4. Case Study: Awarding PDF-certificates

In the field of PDF-certificates the analysis concentrates on two iMooX-courses, which were simultaneously offered as free courses for the whole public and as online-lectures for regular students during winter semester 2014/15 and summer semester 2015. The course «Lernen im Netz» (Learning online, winter semester 2014/15) was one of the first pure online-lectures offered by a university in Austria. Thus, the primary target group were regular students but everybody else was also invited to enroll in the course. On the whole 1,111 persons registered for the MOOC, 547 were active users (i.e. they at least watched some videos and/or wrote a forum-post) but only 288 earned a PDF-certificate. On the other hand, 909 participants (which in this case means students) registered for the exam, 887 of them passed the exam.

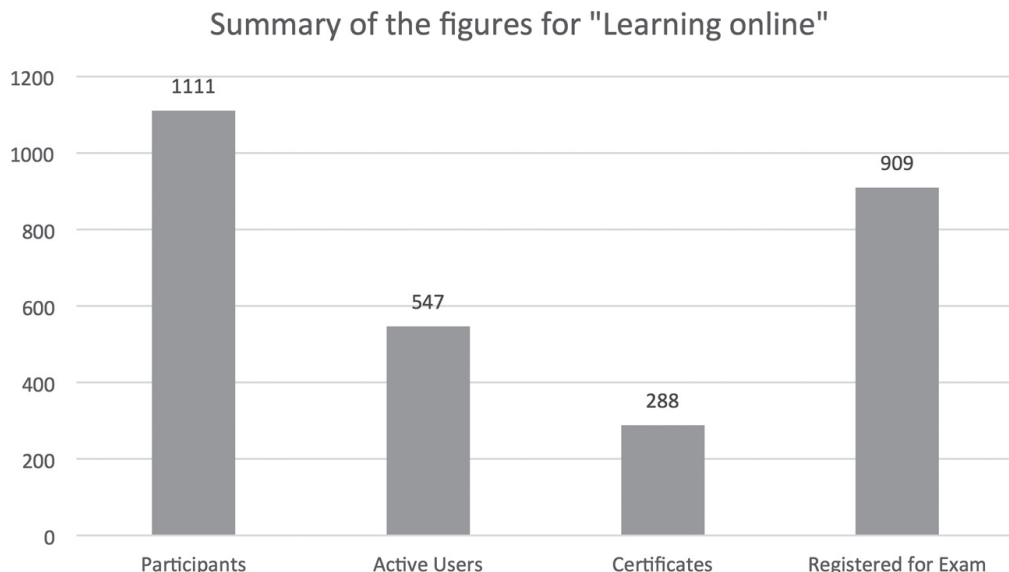


FIGURE 3. Figures for the MOOC «Learning online».

It appears that only 26 percent of the participants earned a certificate. This seems little, but is easy to explain: Due to study regulations students were not obliged to complete (or even to enroll for) the MOOC to register for the exam. Considering the number of registrations for the exam it can be assumed that the majority of the participants were students (which cannot really be proofed because students cannot be filtered out among registered users and students needed not to be enrolled in the course). Completing the course as well as earning a certificate was no obligation for them.

Moreover, executing the MOOC as an online-lecture means that students can register for the course even after it has

officially ended. Therefore «active users» could enroll for the course anytime before they took the exam. Thus, the number of active users cannot be compared with other MOOCs where users are considered as active only during the runtime of the course. Anyway, 49 percent of the participants can be considered as active users, but only 52 percent of them earned a certificate.

Analyzing the numbers, it can be concluded that participants of that MOOC were not interested in earning certificates. The reason is clear: The vast majority were students who were interested only in passing the exam. Since the certification was no requirement they had no motivation to gain a certificate.

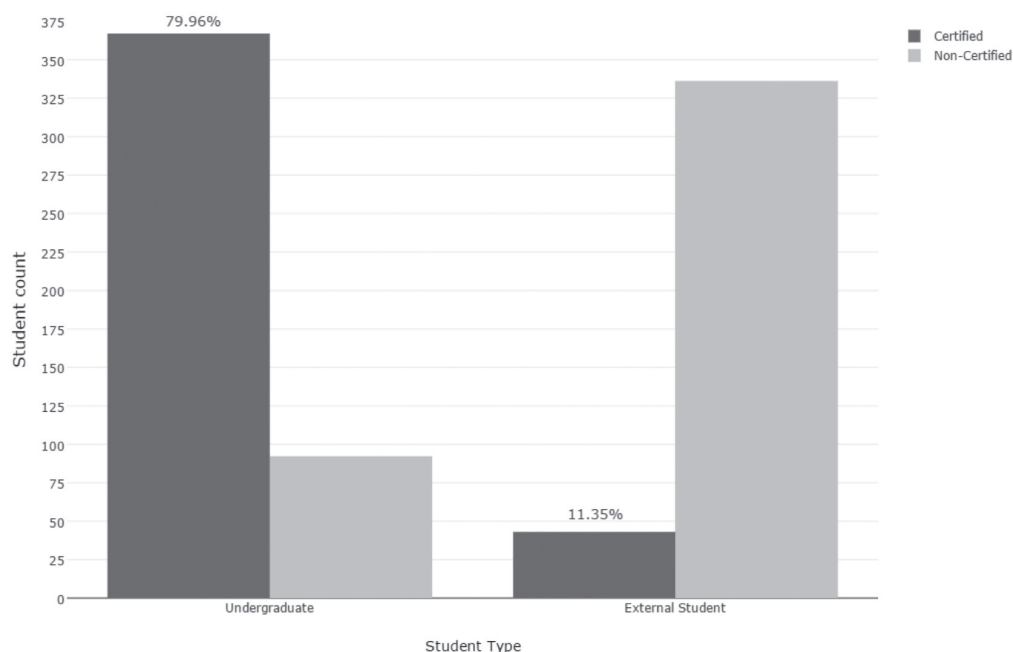


FIGURE 4. Certification of MOOC «Social Aspect of Information technology».

In the second course, the case is completely different. In the MOOC «Gesellschaftliche Aspekte der Informationstechnologie» (Social Aspects of Information Technology, summer semester 2015) the generation of the final PDF-certificate was mandatory for the successful completion of the lecture. Additionally, four short reports were written by the students to get the final mark. In total 838 learners enrolled in the MOOC. 410 were classified as students who need to get the final mark («undergraduate»), 428 were classified as external learners who followed the course voluntarily («external students»). Fig 4 points out that about 80 percent of the undergraduate students computed the final certificate, completely different to the external ones. Only about 11 percent showed an interest to get the final

certificate. This result is not really surprising. It only proves, that obligation is a strong motivation to complete a MOOC and to earn a certificate.

3.5. Case Study: Awarding badges

In the context of badges the authors like to describe their first experiences made in winter semester 2015/2016. Therefore, data from 1st of June 2015 until 31st of December 2016 was collected. In summary seven different MOOCs were monitored which offered 44 different badges to learners (37 Quiz-Mastery-Badges, 7 Certificate-of-Participations-Badges). Both badges must be seen as participations badges as mentioned by Abramovich and others (2013).

The small research project noticed the exact date (day) of issuing of each single badge. In order to see how the issuing of badges is working and how learners are motivated to get them, the issuing of badges was *not* obligatory. Each learner

had to press the site «My badges» by him/herself and only then the described issuing process would be computed. With other words getting a single badge was a fully aware process.

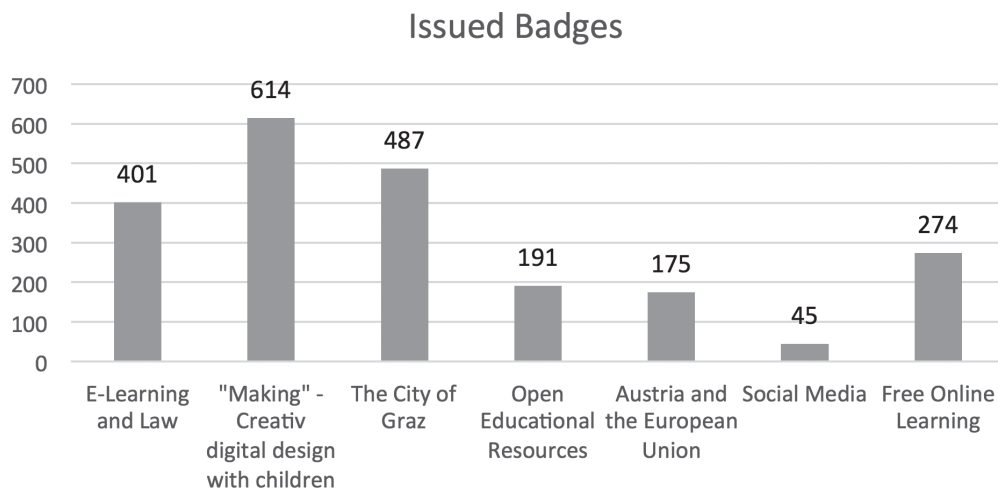


FIGURE 5. Issued Badges from June to December.

Fig. 5 points out the final result. In summary 2,187 badges were issued during the researched time period. The number between the courses differs arbitrarily, due to the huge difference of participants as well as due to the respective topics of the MOOCs.

Remarkable is the difference of issuing badges concerning the weekdays. Beforehand it must be stated that Mon-

day was always the starting day of a new lecture. On Monday 576 (26%), Tuesday 300 (14%), Wednesday (17%), Thursday (12%), Friday 239 (11%), Saturday 184 (8%) and Sunday 246 (11%) badges were awarded. This result is in strong relation to the users' activity on the platform, with Monday as most active day and Saturday as most non-active one.

TABLE 1. Percentage of issued learners.

Course name	Subscribed user	Issued user	[%]
E-Learning and Law	645	93	14%
Making-Creative digital design with children	657	125	19%
The City of Graz	1109	83	7%
Open Educational Resources	544	56	10%
Austria and the European Union	264	28	11%
Social Media	362	18	5%
Free Online Learning	465	85	18%

Source: prepared by the authors.

Table 1 points that only between 5 and 19 percent of the learners generated at least one badge of one single course. Due to issuing was not obligatory this num-

bers show that more than 80 percent of learners were not interested in badges or even did not noticed it.

TABLE 2. Drop-Out Rate of issued learners.

Course name	Issued first lecture	Issued all badges	[%]	Drop-Out
E-Learning and Law	93	40	43%	57%
Making - Creative digital design with children	125	39	31%	69%
The City of Graz	83	30	36%	64%
Open Educational Resources	56	44	79%	21%
Austria and the European Union	28	7	25%	75%
Social Media	18	11	61%	39%
Free Online Learning	85	30	35%	65%

Source: prepared by the authors.

Table 2 points out the drop out rate of issued learners, which is rather low in comparison to the general drop out rate within MOOCs.

TABLE 3. Certified learnes vs. additionally issued one.

Course name	Certified users	Issued all badges	[%]
E-Learning and Law	180	40	22%
Making - Creative digital design with children	119	39	33%
The City of Graz	209	30	14%
Open Educational Resources	52	44	85%
Austria and the European Union	24	7	29%
Social Media	61	11	18%
Free Online Learning	117	30	26%

Source: prepared by the authors.

Table 3 points out that about a sixth to a third of the finally certified users are computing their badges. Only the course «Open Educational Resources» is an exception, but in this particular case we gave the learners an explicit hint to the possibility to get also badges before they downloaded the pdf-certificate.

Finally, we also took a look to those learners who are maybe only interested in special parts of the MOOC –lateral entrants. So we took a look if the number of issued badges increases from one week to another, because this would mean that learners just make the quiz of a particular topic. In all seven MOOCs there was no increase from one week to

another, the number of issued badges was decreasing constantly. So it can be concluded that if there are lateral entrants, those students are not interested in awarding badges.

4. Discussion

In this chapter the results of the case studies are summarized and crucial aspects concerning the certification are discussed. This is done by answering the postulated research questions.

4.1. How many learners are interested in certificates?

Obviously, motivation plays a very important role for earning certificates.

Focusing on the mentioned PDF-certifications makes clear, that participants only run for a certificate if they are forced to do so. While students do not care about certificates if they are not obliged to register for an exam, almost all of them earn the certificate if this is a requirement to receive credits. Thus, the obligation to gain the certificate is the main reason to be interested in certification—at least when it comes to students (which were the main target group of the discussed courses).

Learners who enroll for a MOOC for professional reasons are interested in PDF-certificates to proof their learning outcomes. They use their certificates in the context of job applications and as evidence of completed further education. Thus, an official document is important for them even though this document is just a certification of participation. Requests from some iMooX-users who did not pass the quizzes successfully to get the possibility to repeat the quizzes show the high importance of certificates in those cases where attending (and completing) the MOOC is job relevant. Professional users may prefer PDF-certificates because they are more common and better accepted among employers and supervisors.

However, only a very small part of users are generating badges in a voluntarily way. 5 to 19 percent of the subscribed users were computing at least one. If the comparison is done between those who downloaded the PDF-certificate and those who generated badges too, the percentage

increases to one third at maximum. So it can be concluded that badges in general seems to be interesting to a particular target group of our learners—to about one third of those who are finally finishing the course.

4.2. How many certificates are issued?

The number of issued PDF-certificates varies greatly. As mentioned above it depends strongly if students are forced to generate one or not. In our second case study we awarded badges completely on a voluntarily bases and recognized that only about one fifth of the learners like to gather it. Nevertheless, on average each of the 44 badges was issued about 50 times, which is a quite satisfying number. Of course the first badges are computed more often than the last or final badges. From a technical perspective the generating of badges seems to cause no real problems. Only few discussion posts in different forums popped up about how these digital artifacts can be imported to third-party application or if the generating won't work. All these minor problems were solved at the beginning of the course and also a short movie was created to point out the general handling of the badges.

4.3. Is there a difference between the certificate-collecting-learners in order to the non-collecting ones with respect to completion rates?

Naturally, all participants who collect a certificate are considered to have com-

pleted the course. But this conclusion is true only if completion means nothing else but passing the self-assessments successfully. This does not proof that participants watched all videos or adopted all provided learning material. Hence, a unified understanding of what is meant by «completion» is necessary to avoid misunderstandings.

Nevertheless, certificate-collecting-learners have a higher motivation to complete a MOOC, especially when it comes to badges. This can be of course not directly measured, but it is interesting to see, that the drop out rate of those who are generating badges are significant lower compared to the non-badges-learners. On average the success rate of learners with badges are about 44 percent, never lower than 25 percent and never higher than 79 percent. With other words collecting badges seems to have a clear impact to learners' motivation to move further, but as seen above only for a specific target group. Furthermore, from personal emails and blog posts the authors can confirm this result, due to learners asked immediately for their badges even in weeks where none has been made available.

However, concerning the conducted investigation status recognition and evidence of achievement play a subordinate role. Using the iMooX-platform, users do not have the opportunity to place their badges on the platform. Therefore, they cannot display their achievements publicly which means that they cannot compete with others and the principle of gamification is largely overridden. Although badges are suitable to confirm evidence of achievement they are hardly

used for it. This is, because badges currently are not well known among learners as well as among those (e.g. employers) who are interested in qualification-proofs.

Based on our outcomes we like to conclude with two theses:

Traditional certification strongly bases on extrinsic motivational factors. Students' engagement on awarding those PDF-certificates is directly related to grading specifications. Is the certificate mandatory they will generate it, if not it is simply from minor interest. The behavior of external students seems to be similar —only few of them are completing the course with a valid certificate.

Participation badges are motivating, but only for a smaller sub-group. The case study pointed out that only a smaller sub-group of the learners is generating the issued badges. That sub-group has also a significant lower drop out rate. Consequently, this leads to following conclusion: If a voluntarily learner generates a badge in the first week it is much more likely that he/she will finish the course in comparison to a none-generating-learner.

5. Conclusion

Summarizing the findings, it can be stated that awarding certificates does have an impact to MOOC-learners. But this impact varies widely depending on several parameters including intended target groups, obligation and usability. Therefore, it is hardly possible to make

general statements about the impact of certificates to the MOOC participants. Rather, it must be assessed individually for each course. Nevertheless, the authors are confident, that badge-certification will play an important role in the future. To support the successful use of badges, the discussion of the following research questions would be helpful for further research:

- How can MOOC-certificates be included in curricula?
- What is needed to enhance the gamification factor in the context of MOOCs?
- How can partly certification with badges be managed?
- How can the value of the badges as evidence of qualification be increased?

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Analysis of the pedagogical perspective of the MOOCs available in Portuguese

Análisis de la perspectiva pedagógica de los MOOC ofertados en lengua portuguesa

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Abstract:

After an initial stage of exponential growth in MOOCs, a need has arisen of to address several different aspects of these innovations in order to understand and develop them from different perspectives, such as this one, with the analysis of pedagogical dimensions aimed at improving course design. This paper presents an updated review of the literature and proposes five research lines for an in-depth approach. This study is part of a broader research project¹ and here analyses 356 MOOCs delivered in Portuguese by 16 different platforms. The research design is quantitative, non-experimental and transversal. An adaptation of the MOOC Educational and Interactive Indicators Instrument –INdiMOOC-EdI– was used in the data collection process. The reliability and internal consistency analysis of that adaptation for the whole sample resulted in a Cronbach alpha score of 0.731. The data obtained enable us to classify the

existing MOOCs in Portuguese according to descriptive, formative, and interactive components. These different types correlate with the quality indices, being negative in the first dimension (descriptive) and positive in the second and third ones (formative and interactive).

Keywords: Massive Open Online Courses, platforms, pedagogical design, instructional design, content analysis.

Resumen:

Después de una primera etapa de desarrollo exponencial de los MOOC surge la necesidad de abordar estas innovaciones desde diversos aspectos que permitan comprender y evolucionar desde diferentes perspectivas, como el caso que nos ocupa aquí, con el análisis de las dimensiones pedagógicas en los cursos con vista a mejorar su diseño. El artículo realiza una revisión actualizada de la

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literatura y propone cinco líneas de investigación para estudios en profundidad. El trabajo es parte de otra investigación más amplia¹, aquí se analizan 356 MOOC en lengua portuguesa y 16 plataformas. El diseño de la investigación fue de tipo cuantitativo, no experimental y transversal. Para la recolección de datos se utilizó el Instrumento de Indicadores Educativos e Interactivos en los MOOC – INdiMOOC-EdI—. El análisis de fiabilidad y consistencia interna de su adaptación para el total de la muestra obtuvo un coeficiente de Cronbach de 0.731. Los datos obtenidos

permiten clasificar los MOOC existentes en lengua portuguesa según componentes pedagógicos de tipo descriptivo, formativo e interactivo. Estos diferentes tipos correlacionan con los índices de calidad, siendo negativas con la primera dimensión (descriptivo) y positiva con la segunda y tercera (formativo e interactivo).

Descriptores: Cursos Online Masivos Abiertos, plataformas, diseño pedagógico, diseño instructivo, análisis de contenido.

1. Introduction

Few technological developments have inspired as many divided opinions and attracted as much attention and expectation in such a short period of time as have MOOCs, or Massive Open Online Courses (Chiappe-Laverde, Hine, & Martínez-Silva, 2015; López, Vázquez, & Román, 2015; Sangrà, González, & Anderson, 2015). The MOOC movement was started by Stephen Downes and George Siemens in 2008 whose work was followed by experiments performed at Stanford University in late 2011. The movement started to take off in 2012 with the creation of new platforms such as Udacity and Coursera and the EdX open platform created by the Massachusetts Institute of Technology and Harvard University, to mention just a few. Many other initiatives have subsequently arisen such as the pan-European initiative on MOOCs led by the European Association of Distance Teaching Universities, followed by FutureLearn, and, in early 2013, MiríadaX,

the first platform in Spanish, promoted by Banco Santander and Universia.

Producing open access content that offers certification obviously poses many questions that are yet to be answered: the homogenisation and globalisation of culture, free availability and new business focuses, new strategic approaches and positioning of companies, pedagogical design, new formats and content, and in particular the role of universities in the knowledge society. This is not a phenomenon to which we should be indifferent, nor should we approach it from a naïve position and implement MOOC services in every university without considering what Open Educational Resources —OER— in general and MOOCs in particular represent for the strategic lines of each institution.

Despite little time having passed in which lines of research can be shaped, there is a nascent state of the

art (Liyanagunawardena, Adams, & Williams, 2013; Yousef, et al, 2014; Sangrà, González-Sanmamed, & Anderson, 2015; Aguaded, Vázquez-Cano, & López-Meneses, 2016) based on questions that have arisen in light of other earlier technologies such as, firstly: the design of digital videos and their impact on learning (Guo, Kim, & Rubin, 2014); the meaning and interpretation of multimedia codes; learning performance; the different implicit models; users' interest profiles; orientation and motivation guidelines; usability and satisfaction; learning and self-regulation styles (Bartolome-Pina & Steffens, 2011). These are well-known commonplaces that in this case are becoming true. Secondly, and simultaneously, new research scenarios and requirements are appearing with the aid of emerging technologies (data mining and big data, ontologies, multimedia annotations, etc.). It is still too early to say whether MOOCs will drive new research methods but they undoubtedly favour the creation of lines of research such as the following ones:

a. *Self-regulation of learning and socialisation of learning.* The globalization and internationalization of content, approaches to open resources without entry requirements, understanding content with a high scientific-technical level require research and development from an inclusive education perspective but also examination of the active role of users in their learning process.

b. *New analysis methods and techniques for new processes.* The

importance of social learning and knowledge management in the mass communication settings involved in MOOCs require new analytical instruments and methodologies. It is worth asking whether it is also possible to move away from the methods typical of social research that are already known from mass communication, towards other new methodological formulas that make it possible to represent these processes so that they can subsequently be analysed and understood.

c. *New educational policies and legislation.* The appearance of MOOCs, based on the philosophy of open resources, inspired utopian ideas with regards to solving the problems of education in the world (Ehlers, 2011), an idea that was strengthened when prestigious universities offered their content. This belief still persists and might develop further in future; at least, this is something that education needs to happen. Criticisms started to appear when the transition from informal education to formal education occurred; a process that will require political, legislative, and regulatory decisions using best practices in the short term.

d. *New technologies and virtual environments for supporting learning.* Further research will be required about the functions of the platforms and personal learning environments, given that MOOC platforms are as different from each other as the learning possibilities they offer, in order to determine what new learning options and innovations they offer

(Bartolomé-Pina & Steffens, 2015). Areas that should be researched in greater depth include eAssessment, the application of techniques and tools such as eRubrics, self-evaluation guides and self-directed learning (Lip, Zimmaro, Strader, Bier, & Thille, 2014; Gallego Arrufat, Gámiz Sánchez, & Gutiérrez Santiuste, 2015), crowdsourcing, improving the conditions that create and maintain motivation through studies on satisfaction and usability that already exist for other online services (Serrano & Cebrián Robles, 2014), redesigning tasks, and user interaction with the materials through multimedia annotations (Monedero-Moya, Cebrián-Robles, & Desenne, 2014; Muellner, 2014), among others.

e. Finally, research and projects should place greater emphasis on *measures to further facilitate inclusiveness and access to training for all people*. The focus of MOOCs requires accessibility measures for the end user that set the personalisation of teaching –as one of its intrinsic values– against the homogenisation of content and standardisation of teaching processes. ICT accessibility is regarded as a right for people in the information and knowledge society, as well as being a quality of life indicator, regardless of the level of functional diversity of each individual (Rodríguez Ascaso & Martínez Normad, 2011).

There are currently over three and a half million people in Spain with some kind of disability according to CENTAC

(the Spanish national centre for accessibility technologies)², and there is also a significant number of people with disabilities in Brazil. According to the 2010 census by the Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics) over 47 million people (23.92% of Brazil's population) have some sort of disability, a number that is constantly increasing as it is estimated that over 10 thousand people contract some type of disability each month. This number will rise much more in future and so the United Nations recommends statistical studies to analyse the achievements made and present the prospects of achieving the Millennium Development Goals for all³. In its mission the European Union sets out the priorities and challenges faced in similar terms in its mission, including the search for strategies to *make education more accessible and encourage more inclusive education through access to information on the internet for everyone*⁴ and encouraging web skills and competencies through massive open courses⁵ and the *Open Education Europa* portal⁶.

On-line courses in general undoubtedly raise great interest among researchers, especially with regards to their technological support, supply setting, and the many tools provided by computer-based educational technologies. It is true that the objective of these technologies is to make learning experiences more effective and efficient, attractive and accessible for students (Koper, 2001). However, without prior planning and educational design they lose their value and focus. As Nativ-

idad and others (2015) state, technology in itself is neither good nor bad; the great educational challenge is to make it effective, efficient, and sustainable.

Until now, the methodological approaches and academic outputs of MOOCs have been very heterogeneous; however, all of them raise problems with students regarding the need to provide them with guidance and greater attention to pedagogical design (Roig, Mengual, & Suárez, 2014; Conole, 2015; Raposo-Rivas, Martínez-Figueira, & Sarmiento-Campos, 2015). Similarly, there is very high level of diversity among users, content, and contexts, but the average rates of certification are similar. Furthermore, most of them seem to share a general taboo about answering the question of what sort of learning these courses favour. Faced with these contradictions, the number available is, like their range, increasing at a dizzying rhythm and pace. This circumstance necessarily requires research to go beyond evaluation of a statistical record of the tasks —typical of the initial cMOOC focusses— and move forwards into this second current phase of xMOOCs (Ebben & Murphy, 2014), which are more interested in users' interaction and satisfaction with the materials (Monedero-Moya, Cebrián-Robles, & Desenne, 2015), as well as directing studies towards the impact and evaluation of the educational, ethical and cultural aspects of globalisation, and above all, a fundamental pedagogic approach in the course design from an inclusive education perspective.

The small number of users who complete MOOC courses and obtain accredi-

tation —certification that must be reconsidered for this type of courses (Ho and others, 2014)— has not prevented increased enthusiasm and multigenerational participation or scepticism at a similarly high level. Following the excessive expectations of the initial period of MOOCs, explanations are still being sought for the expectations that have been met and the paradoxes found in practice (Bartolomé-Pina, 2013; Daniel, 2012; Jona & Naidu, 2014). At the same time, new and interesting perspectives are being raised for research (Jona & Naidu, 2014), teaching (Bates, 2014), and the design of pedagogical content (Roig, Mengual, & Suárez, 2014; Raposo-Rivas, Martínez-Figueira, & Sarmiento-Campos, 2015). Faced with this realisation, studies focussing on research into the pedagogical aspects involved in on-line courses are notably less frequent, something that represents a reversal of values from an educational perspective.

Even with the exponential growth in the supply of MOOCs and the interest in evaluating and optimising the quality of these educational activities, the research base on this recent format in the history of on-line learning is still tentative and little-developed, despite the growing interest in them (Saadatmand & Kumpulainen, 2014). MOOCs must be examined more closely, analysing their educational components in search of a more in-depth and general view of the offer.

In just a few years, MOOCs have ceased to be an experiment and have become a reality with exciting possibilities for *lifelong learning*. These courses

offer a combination of technological and pedagogical innovations that are still to be explored in all of their dimensions owing to the growth in these courses (Raposo-Rivas, Martínez-Figueira, & Sarmiento-Campos, 2015). Faced with the exponential growth in MOOCs and the concern with verifying these formative activities and optimising their quality, the need to analyse their pedagogical dimension with greater care and attention has arisen. Similar studies with this educational focus have provided interesting recommendations for analysing them and taking decisions (Roig, Mengual, & Suárez, 2014; Raposo-Rivas, Martínez-Figueira, & Sarmiento-Campos, 2015).

2. Design and methodology

This study enables us to analyse and develop one of the objectives of the R&D&I project for producing massive courses [1]. It focuses on establishing what pedagogical designs the range of MOOCs on offer in Portuguese offers in order to be able to reveal the elements that depend on the platforms that support them. Portuguese is the language of three of the fourteen institutions taking part in the project. To do so a quantitative, non-experimental, cross-sectional research model (Hernández, Fernández, & Baptista, 2010) with a descriptive aim has been designed and developed.

To select the sample, criterion sampling was used (McMillan & Schumacher, 2005) with the MOOCs selected based on the following criteria: (i) they were in Portuguese; (ii) the course information

was available without having to register on the platform; (iii) the information was available during the months of February to April 2016. The inclusion criteria used are justified by the descriptive nature of this work. With these criteria, all of the population at this moment is covered. Consequently, we have obtained information for 356 MOOCs from 16 platforms.

For subsequent research on the same theme with aims going beyond the merely descriptive, a process of triangulating experts, focusses, and content to select which criteria to use would be advisable.

2.1. Objectives of the study

- Discover and analyse from a pedagogic perspective the offer and design of the MOOCs available in Portuguese in a specific time span;
- Describe the offer of MOOCs in Portuguese according to a particular level of pedagogical quality.

Taking into account the stated objectives, the following questions are answered:

- What is the pedagogical profile of the MOOCs offered in Portuguese?
- What pedagogical components categorise the MOOCs available in Portuguese?
- Is there a correspondence between the empirical aspects and the level of quality displayed in the pedagogical design of MOOCs in Portuguese?

2.2. Instrument

For data collection an adaptation of the Educational and Interactive Indicators in MOOCs Instrument (Instrumento de Indicadores Educativos e Interactivos en los MOOCs - INdiMOOC-EdI: Raposo-Rivas, Martínez-Figueira, & Sarmiento-Campos, 2015) was used. This was organised into four main sections (identifying data, descriptive aspects, formative aspects, and interactive aspects) with a total of 27 variables measured on various scales. The reliability and internal consistency analysis for this adaptation calculated using Cronbach's alpha was 0.731 for the whole sample. This can be considered to be satisfactory as «values from 0.60 to 0.70 are considered to be the lower limit of acceptability» (Hair, Anderson, Tatham, & Black; 2001).

With the data obtained, a descriptive analysis and a multiple correspondence analysis were performed using the IBM SPSS 23.0 program and selecting three dimensions. This number of dimensions was chosen as it was found, using the correspondence analysis and k-means clustering algorithm technique, that with this choice certain important characteristics were revealed that remained hidden if only two dimensions were used, or were diluted if four were chosen.

As the variables are measured on different scales, we opted for the simplest (the one that can include all of them), accepting a loss of information from some of them. Consequently we decided to turn them into nominal or categorical varia-

bles. With this classification of data we believe that the most appropriate statistical technique is *multiple correspondence analysis* as this tool enables us to show which courses have similar profiles in relation to the attributes that describe them (Pérez, 2005).

The variables considered for the multiple correspondence analysis (MCA) were: organising institution, platform, category, subcategory, field, importance for the public, end users, prerequisites, duration of the course, daily/weekly commitment, duration in weeks, weekly hours of work, number of people in the teaching team, number of people in the technical team, enrolment, introduction to the course, whether the course objectives are presented, work programme, number of blocks/modules, number of lessons, which working method is proposed, which ICT tools are used, which activities must be performed, how the process and results are evaluated, certification, accreditation, level of interactiveness, and related courses.

3. Results

3.1. What is the pedagogical profile of the MOOCs available in Portuguese?

Given the greater frequency displayed in the variables considered for the 356 MOOCs, we can sketch the following profile for massive open on-line courses in Portuguese:

— *Organising institution*: private institution (84, 23.6%), private university (68, 19.1%), private public-interest

institution (57, 16%), private business (40, 11.2%), individual initiative (39, 11%), public university (35, 9.8%), and public institution (33, 9.3%).

– *Platform*: Fundação Bradesco (84, 23.6%), Udemy (71, 19.9%), FGV Online (47, 13.2%), EaD SEBRAE (31, 8.7%), Coursera (29, 8.1%), Sabe-res ILB (24, 6.7%), SENAI (14, 3.9%), Veduca (13, 3.7%), SESI (12, 3.4%), MiriadaX (9, 2.5%), ESPM (7, 2%), ANP Cidadã (6, 1.7%), Open Education (5, 1.4%), EdX (2, 0.6%), OpenupEd and UAP (1, 0.3% each).

– *Thematic category* of the platform: business and economy (94), computing (42), applications development (34), courses without a tutor (24), computer science (18), professional initiation (20), personal development (12), law (11), advanced training (10), education (8), social sciences (8), languages (4), technological sciences (3), test preparation (3), earth and space sciences (2), design (1). This information is not specified in 39 cases (11%). The corresponding *subcategory* is not stated in 79.8% of the cases (284 courses).

– Grouping these categories by *field*, over 60% of the MOOCs studied are multidisciplinary (122, 34.3%) or technological (112, 31.5%) in character. Following on from this, almost 25% are from the fields of «arts and humanities» (54, 15.2%), and «science» (41, 11.5%). The least frequent are «legal-social» (23, 6.5%) and health sciences (3, 0.8%).

– The *importance* that the MOOCs have for the public is indicated on 230 courses (64.6%), and the *end users* are

identified as the general public (people interested in the subject matter) in 220 cases (61.8%), or someone with a particular profile (79, 22.2%). In 77% of cases the course's entry *prerequisites* are not indicated. These are stated on 82 occasions (23%).

– The *duration of the course* is generally undefined (142, 39.9%) or limited (122, 34.4%), although in over 25% of cases it is not stated (92, 25.8%). *Daily / weekly commitment* is often undefined (200, 56.2%) or not specified (123, 34.6%); the number of cases in which it is limited is under 10% (33, 9.3%). However, in a high percentage of courses, the *weekly hours of work* are not stated (325, 91.3%). The *duration in weeks* varies greatly as there are the courses range from 1 week (1, 0.3%) to 16 (6, 1.7%), although the most common are those lasting 8 weeks (25, 7%) or 4 weeks (54, 15.2%), with a mean score of 5.84. This information is not stated in 238 MOOCs (66.9%).

– With regards to the personnel connected to MOOCs we find that the *teaching team* has a highly variable number of people, from 1 (97, 27.2%) or 2 (38, 10.7%), up to 30 (1, 0.3%), although in over half of the cases this information is not stated (196, 55.1%). The *technical team* is not specified in 84% of cases (299 courses) and is the same as the teaching team on 57 occasions (16%).

– As for *enrolment* on the MOOCs, it is common for this to be permanently open (310, 87.1%), only 43 (12.1%) have it open for a specific period, and

in 3 cases (0.8%) it was closed when the data were collected.

— The *introduction to the course* normally refers to the content of the course (246, 69.1%), the topics (21, 5.9%), or both things (6, 1.7%), normally through an introductory video (81, 22.8%). Over 60% present the *course objectives* (219, 61.5%). The *work programme* is organised into modules or lessons (243, 68.3%) or by weeks (22, 6.2%); in almost 25% of cases it is not stated (88, 24.7%). The teaching sequences are presented in modules (170, 47.5%) varying from one single one to 10; lessons or topics (113, 31.7%), or others such as teaching units (5, 1.4%), weekly sessions or chapters (3, 0.8%). This is not stated on 62 occasions (17.4%).

— In the MOOCs analysed the *working method* is not usually specified (223, 62.6%). The cases where it is stated refer to «independent study» with the support of audiovisual resources (50, 14%), with the support of audiovisual resources and performing automated tests (39, 11%), with the support and guidance of a tutor (31, 8.7%), with the support of audiovisual resources and interacting with other participants (8, 2.2%), and through «individual work» (5, 1.4%). The *ICT tools* used are also not generally listed (249, 69.9%), on occasions «audiovisual material» are stated (49, 13.8%) or «a variety of audiovisual material and automated tests» (46, 12.9%), forums are added to these on 7 occasions (2%). The *activities* that have to be performed are not stated in 259

cases (72.8%), and in the cases where they are stated they are summarised as «viewing the material, studying it, carrying out the exercises and tests» (44, 12.4%), «viewing the material» (32, 9%), or variants such as «viewing the material and studying it» (18, 5.1%) accompanied by «carrying out the exercises and tests and collaborative participation» (3, 0.8%).

— With regards to *evaluation*, this is shown as final (summative) on 108 courses (30.3%), it is carried out by «access to educational resources and the score obtained in the tests» (55, 15.4%), or simply through «access to educational resources» (50, 14%). It is not specified in 143 courses (40.2%). The *certification* is mainly free (244, 68.5%), under 10% require payment (31, 8.7%), or both forms are provided —payment and free (17, 4.8%). This is not stated on 62 occasions (17.4%). *Accreditation* is by certificates (292, 82%) or in the form of «official proof of participation issued by the platform» (7, 2%). It is not stated for 55 courses (15.4%).

— The *level of interactivity* of participants on the MOOCs is not stated in over 80% of cases (316, 88.8%). On the few occasions that it is stated, it is as «Interaction with the tutor and with other participants in the formative process, during all of the period of the course» (31, 8.7%), «collaborative work» (5, 1.4%), and others such as «direct contact or contact by mail with the teacher», «peer corrected activities», or «section for discussion in the course space» (4, 1.2%).

– It is common for *related courses* not to be publicised on any particular MOOC (209, 58.7%), although there are also cases in which several appear: an undefined number (76, 21.3%) or three (24, 6.7%).

3.2. What pedagogical components categorise the MOOCs existing in Portuguese?

As all of our data are categorical in nature since we are working at an entirely nominal scale level, we initially seek some kind of underlying pattern or grouping in the information obtained. To do so we use cluster or grouping techniques opting for the use of the k-means clustering algorithm. So:

– If we wish to distribute the information into two groups, the out-

come that the algorithm provides is that Group 1 has 73 elements (21%) and Group 2 = 283 (79%).

– If we opt for three groups instead of two, we obtain a Group 1 with 73 elements (21%), Group 2 = 212 (60%), and Group 3 = 71 (20%).

– With a distribution into four groups we obtain a Group 1 = 69 (19%), Group 2 = 183 (51%), Group 3 = 33 (9%), and Group 4 = 71 (20%).

To ensure a minimum representation of 10% of the MOOCs, the decision was made to work with three dimensions. Therefore, starting from the model obtained using the multiple correspondence analysis with these three dimensions, in Table 1 we can see that the variance explained by each of the factors is high; the importance rank of the dimensions coincides with their number.

TABLE 1. Variance explained in the multiple correspondence analysis with three aspects.

Summary of the model				
Dimension	Cronbach's alpha	Variance explained		
		Total (eigenvalues)	Inertia	% of the variance
1	.957	12.692	.470	47.008
2	.914	8.363	.310	30.976
3	.902	7.633	.283	28.271
Total		28.689	1.063	
Mean	.930a	9.563	.354	35.418

a. The mean Cronbach's alpha is based on the mean eigenvalues.

Source: prepared by the authors.

Ordering the variables in each of the dimensions by importance, depending on the variance percentage of the respective dimension (Table 2), it can be seen that *platform* and *organising institution* appear in all three dimensions while other variables appear in two, and some are

specific to one dimension. Subcategory, activities to be performed, and introduction to the course appear in dimension 1; accreditation, end users, and number of teaching team are from dimension 2, and duration in weeks, commitment, and ICT tools are in dimension 3.

TABLE 2. Distribution of the variables in three analysis dimensions.

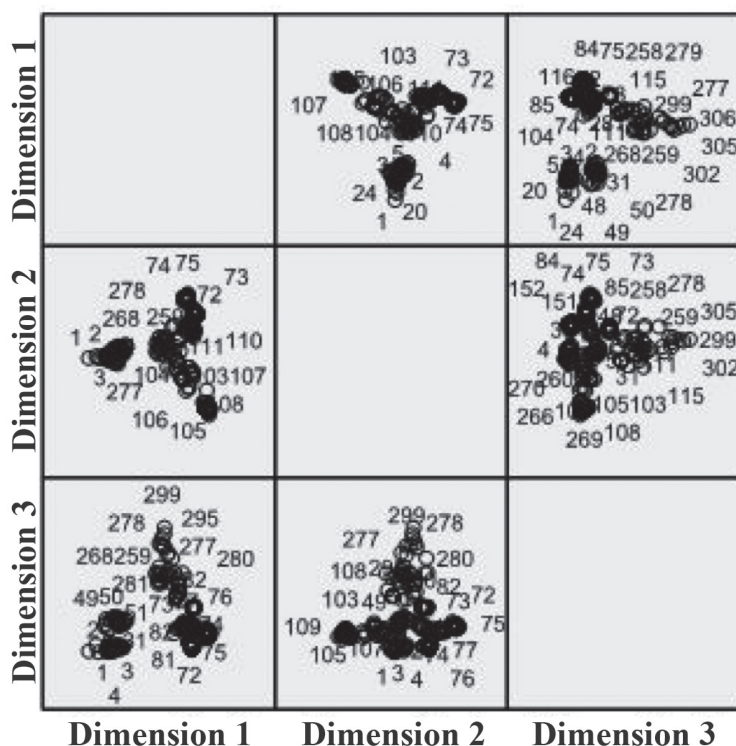
Dimension 1	Dimension 2	Dimension 3
Platform	Platform	Platform
Organising institution	Organising institution	Duration in weeks
Subcategory	No. of blocks/modules, no. of lessons	Certification
Related courses	Certification	Work programme
What working method is proposed?	Accreditation	How are progress and results evaluated?
What activities have to be performed?	End users	Organising institution
How are the process and results evaluated?	No. of people in the teaching team	Daily/weekly commitment
No. of blocks/modules, no. of lessons	Related courses	What working method is proposed?
Introduction to the course	Work programme	What ICT tools are used?

Source: prepared by the authors.

If we try to extrapolate the results obtained in the dimensions to the components that define the structure of the measurement instrument, it is apparent that dimension 1 to a greater extent contains subcomponents (variables) related to the *identifying and descriptive*

elements; while dimension 2 focusses on the *formative aspects* and to a lesser extent on descriptive ones. Finally, dimension 3 focusses on *formative and interactive aspects*. In a biplot diagram, the representation would be as shown below.

Biplot diagram



Principal normalization by variable

FIGURE 1. Biplot diagram.

The choice of three dimensions is also justified in light of Figure 1, as it shows how dimension 1 creates groupings that are loose and distinct from each other compared with the other two dimensions. Nonetheless, dimensions 2 and 3, even differentiating groups, create a more uniform distribution of courses.

The distribution of the courses in the three dimensions obtained by orga-

nising institution is shown in Figure 2. The ellipses show the courses organised by each body; ellipsis 1 refers to those organised by private institutions, number 2 to private companies, 3 to public university, 4 to private universities, 5 to private public-interest companies, 6 to state schools, and 7 to private institutions.

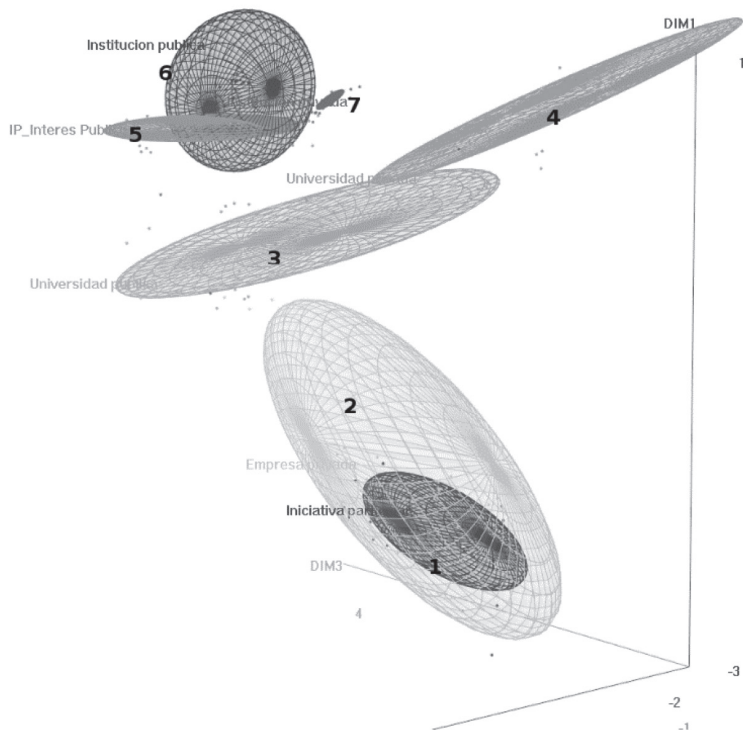


FIGURE 2. Distribution of the dimensions of MOOCs by organising institution.

3.3. Is there a correspondence between the empirical dimensions and the level of quality shown in the pedagogical design of the MOOCs?

To answer this question an overall score for each of the MOOCs was calculated according to the pedagogical elements they display (coinciding with the instrument variables) and each of them was weighted. To calculate this overall score, the following process was followed:

- 1) Taking into consideration all of the subcomponents whose achievement would result in a qualitative improvement, the maximum value for each of them was set as one with the

value set as zero when the subcomponent was not achieved at all. Intermediate values were proportionally and linearly weighted. For example, the «category» variable could take two values: «specified» (value 1) or «not specified» (value 0). The «end users» variable can take three values: «not stated» (value 0), «general public - interested in the subject matter» (value 0.5) or «with profile» (value 1).

- 2) Once weighted, all of the subcomponents were added together. From the sum of them, quartiles were established and each course was assigned to its corresponding quartile, taking into account that for the 356

MOOCs as a group, the descriptive statistics are: minimum score = 1.89, maximum = 14.88, average = 8.79, and standard deviation = 2.624.

3) Considering that the previous step provides a quality value for each course that situates it in one of the quartiles and that we also have the three dimensions obtained through the multiple correspondence analysis, the question arises of the extent to which the relative quality (obtained through the instrument) related to the dimensions underlying the empirical data.

Consequently, if we correlate the values that each of the three dimensions takes for each analysed MOOC and the variable that indicates the quality value for each course as well, we obtain clear results that, again, in this case justify the choice of three dimensions. It can be seen that the first dimension (identifying and descriptive elements) discriminates between those courses with low quality values (negative correlation), while dimensions 2 (formative aspects), and 3 (formative and interactive aspects) are directly related to the highest quality courses (positive correlation).

TABLE 3. Correlation between the dimensions of analysis.

Correlations					
		Dimension I	Dimension II	Dimension III	Total_MOOC
Dimension I	Pearson Correlation	1	.000	.000	-.682**
	Sig. (bilateral)		1.000	1.000	.000
	N	356	356	356	356
Dimension II	Pearson Correlation	.000	1	.000	.394**
	Sig. (two tail)	1.000		1.000	.000
	N	356	356	356	356
Dimension III	Pearson Correlation	.000	.000	1	.292**
	Sig. (two tail)	1.000	1.000		.000
	N	356	356	356	356
Total_MOOC	Pearson Correlation	-.682**	.394**	.292**	1
	Sig. (two tail)	.000	.000	.000	
	N	356	356	356	356

** The correlation is significant at the 0.01 level (two tail).

Source: prepared by the authors.

By relating the «formative aspects» and «interactive aspects» dimensions that indicate «higher quality» in the courses, with the quartiles of the quality index and the platforms analysed, we find that SEBRAE, Coursera, and Udemy show

the greatest percentage of courses in the highest quartile (in red). Nonetheless, it is Coursera that has the highest values in dimension 3 (interactive aspects), and SEBRAE in dimension 2 (formative aspects).

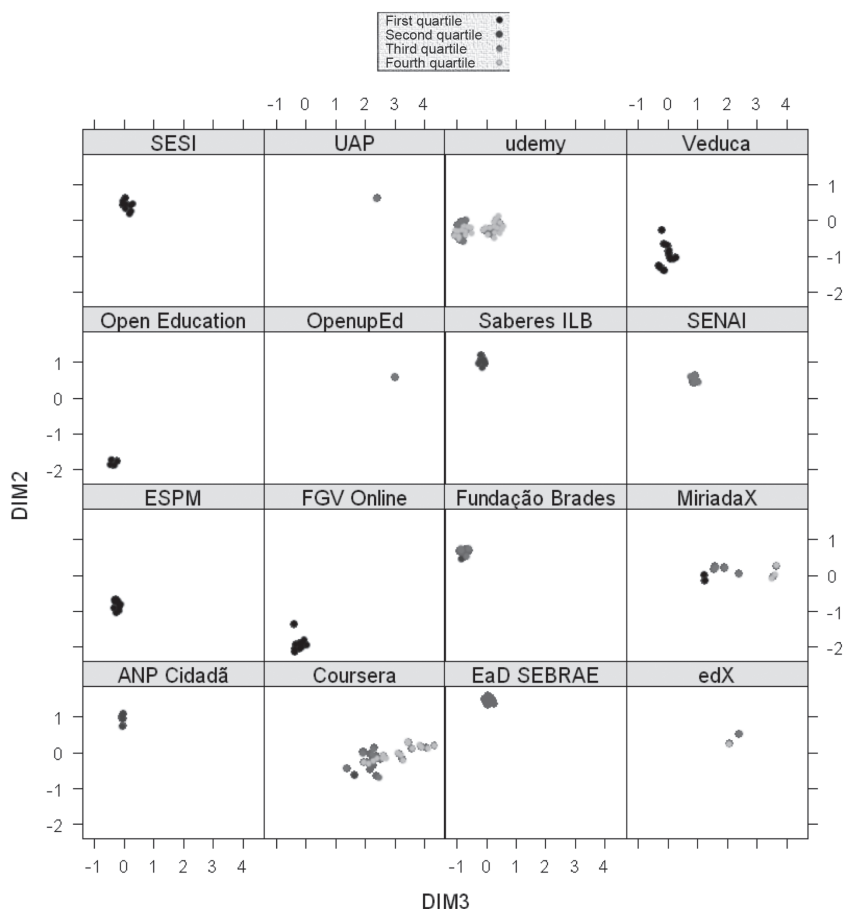


FIGURE 3. Dispersion by quartiles of the aspects of the MOOCs by quality index and platform.

4. Conclusions

The results of this study giving an overview of the pedagogical design of MOOCs available in Portuguese certainly provide the worlds of academia and for-

mative content production with useful elements for examining the pedagogical approaches most frequently observed in these specific cultural and linguistic contexts. Furthermore, it gives the pro-

vider institutions and professionals involved in offering this type of courses an opportunity for critical reflection about the educational formats, resources, and activities available for end users. It concludes with a series of pointers related to the findings by Raposo-Rivas and others (2015) that might guide future designs for massive open online courses in Portuguese. This work's main contributions are in the field of educational design. The linguistic adaptation of the instrument —INdiMOOC-EdI— has made it possible to perform potentially valuable analysis and reflections for proposing and classifying MOOCs by their components.

With the first question about the profile of users in Portuguese we find that, on the whole, a generic profile for the end user (61.8%) is found, with particular profiles and without entry requirements, something that helps to disseminate the input knowledge but that might limit it to professionals with specific interests. For the second question —the pedagogical components— the design of the courses shows a highly varied and undefined duration and a commitment of weeks ranging from one to four, the most common figure. It is normal for them to be permanently open (310, 87.1%), something that allows greater flexibility. The introduction to the course usually refers to the content (246, 69.1%), normally through an introductory video. Over 60% of the courses are defined by objectives (219, 61.5%) rather than competencies. Specifying the working method is uncommon (223, 62.6%) and in cases in which it is specified it refers to «independent study» with the help of audiovisual resources (50, 14%), automated tests (39,

11%), and the support and guidance of a tutor (31, 8.7%). Nonetheless, these differences contradict the similarity of the underlying methodological design in most of the MOOCs studied as a group, given that the portals use similar «templates» for content providers, leading to the courses resembling each other and the platform that hosts them, as was already concluded in the studies by Chiappe-Laverde, Hine, & Martínez-Silva (2015) and Raposo-Rivas, Martínez-Figueira, & Sarmiento-Campos (2015). This debate and discussion will be maintained in future if the design does not avoid repeating the «unidirectional» structure that proposes the didactics of videos, exercises, and the «banking» pedagogy, as we are reminded by Ebben & Murphy (2014) for whom the pedagogical models will not change despite the incorporation of the new proposals for «Learning analytics», «e-assessment», etc.

Once the MOOC platforms had been analysed we found differences and distribution according to the three dimensions, especially in the first one (identifying and descriptive elements), the second and third dimensions being more uniform (formative aspects and formative and interactive aspects), even though they do differentiate between groups, and these last two dimensions were directly related with the highest quality courses. Therefore, in response to the third question, we can conclude, unlike in the work of Roig Vila and others (2014), that there is a correlation between pedagogical quality and the media and platforms that host the courses, as can be seen in figures 2 and 3. Likewise, it has been possible to identify three platforms (SEBRAE, Coursera, and Udemy)

that offer a greater percentage of courses in the highest quartile, with SEBRAE standing out in the formative aspects and Coursera for the more interactive values.

Ultimately, the results show that MOOCs in Portuguese use a classic design that presents users with the materials and activities, distancing itself from more connectivist models and collaborative ideas (just 3.08%). We find these courses in an early design stage, planned more as xMOOCs, that does not consider students as knowledge creators, receiving the content with which they must interact (Dron & Ostashewski, 2015). Based on our analysis they should explore other designs that are closer to the cMOOC design, beyond the inclusion of connectivism that Siemens (2005) initially proposed as a theory and that represents a «pedagogic perspective» more than a theory that is a basis from which to propose models, methods, etc. (Zapata-Ros, 2012; Downes, 2012). Therefore, it remains to redesign the courses from a more pedagogical viewpoint, seeking standards that guide and improve this dimension, until we can construct a pedagogical theory. Without any doubt, we have only taken a step identifying benchmarks and pedagogical designs in the platforms, there is still much work remaining to propose a model that creates learning for all users.

Notes

- ¹ Funded by the call for R&D+i projects named: «Estudio del impacto de las erubricas federada en evaluación de las competencias en el practicum» (Study on the impact of federated eRubrics in the evaluation of the competences in the practicum). Plan Nacional de I+D+i de Excelencia (National R&D+i Excellence Plan) (2014-16) no. EDU2013-41974-P.

- ² Centro Nacional de Tecnologías de la Accesibilidad (the Spanish National Centre for Accessibility Technologies-CENTAC), a centre dedicated to provide for the development of accessibility technologies for companies, industries, and service sectors, as well as facilitating access to them and improving the quality of life of the elderly and people with disabilities, as well as their families: <http://www.centac.es/es>
- ³ Millennium Development Goals. United Nations, Report 2010. The Millennium Development Goals, also known as Millennium Goals (MDGs), are eight human development goals set in 2000 that the 189 member states of the United Nations agreed to achieve by 2015. <http://www.un.org/millenniumgoals/pdf/MDG%20Report%202010%20En%20r15%20-low%20res%2020100615%20-.pdf>
- ⁴ The European Commission Directorate- General for Research and Innovation established in 2014 the research and innovation programme (2014-2020). It is this Directorate-General's responsibility to define and implement the European Research and Innovation (R & I) policy with a view to attaining the objectives of the Europe 2020 strategy and its main initiative, the Innovation Union.
- ⁵ The Digital Agenda for Europe, created in May 2010 and updated in November 2014, has the objective of boosting Europe's economy by taking advantage of the economic and social advantages promoted by digital technologies.
- ⁶ The Open Education Europa portal, launched in September 2013, aims to provide students, teachers, and researchers with access to open educational resources in Europe in a single space.

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MOOCs for in-service teachers: The case of Uganda and lessons for Africa

Los MOOC para profesores en ejercicio: el caso de Uganda y las lecciones para África

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Abstract:

In recent times, computers and internet have penetrated secondary schools in Africa but with greater attention to students' computer literacy than teachers. At the same time, previous studies on digital literacy of teachers are unsustainable and mainly skewed on pre-service teachers than in-service teachers. These realities point to the need to investigate and implement effective and sustainable initiatives for improving digital literacy and online life-long learning for in-service teachers in Africa. This paper therefore presents a specialised MOOC platform known as TEP (Teachers' E-learning Portal) for digital literacy and online life-long learning for in-service teachers in Uganda. TEP is built for environments with inadequate access to computers, internet and technical assistance. As such, TEP is accessible online or offline, managed by accredited local universities in collaboration with beneficiary secondary schools, and runs on existing resources in schools (technical personnel, computers and internet). Results from initial implementation of a computer literacy MOOC through

TEP indicate that irrespective of age, when teachers are adequately supported internally by their schools and externally by a university, can improve their digital literacy and subsequently engage in online life-long learning. In addition, the results both in terms of high percentage of teacher participants' completions (89%) and high volume of educational e-content generated, confirm TEP as an effective, attractive, and self-sustainable MOOC platform for in-service teachers' in resource constraint environments. The paper finishes with an analysis of the relevance of TEP to Africa.

Keywords: MOOC, digital literacy, in-service teachers, life-long learning, Africa.

Resumen:

En la actualidad, los ordenadores e Internet han penetrado en los centros de secundaria en África, pero con un mayor énfasis en la competencia digital del alumnado que en la del profesorado. Al mismo tiempo, los es-

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tudios previos sobre competencia digital docente son insuficientes, con un enfoque más acusado en la formación antes del ejercicio docente que durante la práctica profesional. Esta situación impele a la investigación e implementación de iniciativas efectivas y sostenibles para la mejora de la competencia digital y el aprendizaje a lo largo de la vida durante la práctica profesional del profesorado africano. Este artículo presenta una plataforma MOOC conocida como TEP (Teachers' E-Learning Portal) enfocada a la competencia digital y el aprendizaje a lo largo de la vida para el profesorado en ejercicio de Uganda. TEP está construido para ambientes con un acceso deficiente a los ordenadores, Internet y asistencia técnica. Por este motivo, TEP es accesible *online* y *offline*, está dirigido por universidades locales acreditadas en colaboración con centros de secundaria y funciona con los recursos existentes en las escuelas

(personal técnico, ordenadores e Internet). Los resultados del desarrollo de un curso MOOC en TEP indican que independientemente de la edad, cuando los profesores reciben una atención adecuada dentro de las escuelas y de forma externa por la universidad, pueden mejorar su competencia digital y, por consiguiente, garantizar una formación continua. Además, los resultados muestran que las tasas de finalización del profesorado son altas (89%) y se genera un gran volumen de material digital, lo que confirma al TEP como una plataforma MOOC efectiva, atractiva y autosostenible para la formación del profesorado en ejercicio en contextos de especial dificultad. El artículo finaliza con un análisis de la incidencia del TEP en África.

Descriptor: MOOC, competencia digital, profesorado en ejercicio, aprendizaje a lo largo de la vida, África.

1. Introduction

Research on teachers' digital literacy in Africa is limited and skewed on challenges of teachers' information technology adoption (Mooketsi & Lwarence, 2014; Ngimwa & Wilson, 2012; Oyo & Kalema, 2014; Olson and others, 2011). Olson and others (2011) for instance, present two key observations regarding the dynamics of teachers' technology adoption. First, when teachers are faced with mandates on the use of technology, they tend to use the technology for personal productivity rather than learning. Second, teachers often resist the use of technology and e-learning because of an insufficient amount of time needed to prepare new

lessons or rework existing lessons using ICTs. Indeed, the issue of limited time for teachers to learn and use ICTs in their teaching has been widely reported in other country specific case studies, eg, South Africa (Mathipa & Mukhari, 2014), Kenya (Jobe, 2013), Uganda (Markon, 2013) and Ghana (Buabeng-Andoh, 2012). In the area of content development, Ngimwa and Wilson (2012) blame stagnation of open educational resources (OERs) adoption in Sub-Saharan Africa on low teachers' computer literacy. Buabeng-Andoh (2012) further claims that in-service teachers generally perceive ICTs as new technologies whose relevance to them is marginal. What is clearly missing

in this discourse is the role of schools in supporting digital literacy and online life-long learning for their teachers in order to fully utilise available computer infrastructure in schools.

In contrast, the Massive Open Online Courses (MOOCs) being courses designed for large numbers of participants with internet connection and without entry requirements, makes them most suitable for in-service teachers who do not only access internet but also receive technical support from their schools. The priority of our MOOC on in-service teachers has two important benefits. First, it minimises the well documented high dropout rates in traditional MOOCs due to open enrolment strategy (Jordan, 2014; Maceod, Haywood, Woodgate & Alkhatnai, 2015). Second, it gives an opportunity for local universities to offer MOOCs within their limits as opposed to traditional MOOCs that are dominated by a few platforms supported by international elite universities.

Motivated by the issues described above, in this paper, we investigate and implement an effective digital literacy and life-long learning MOOCs for in-service teachers through a participatory approach involving accredited local universities and secondary schools, and powered by a platform optimized for resource constraint environments called teachers' e-learning portal (TEP). This platform enables teachers to enrol and complete online computer literacy certification and other relevant programmes offered and supported by local universities. Teachers enrolled for MOOCs through TEP also receive additional

hands-on support from technical staff in their respective schools as well as access an offline cached content on their schools' local server. The offline server synchronises with the online server (TEP) when connectivity is established. A full account of TEP is discussed in a later section of this paper after strategies for implementation of MOOCs in resource constraint environments are presented next.

2. Strategies for MOOCs in resource constraint environments

Following from the previous section and recent findings in which MOOCs offered on the Coursera platform were found to be successful only in developed countries among the young, male, well-educated and employed students (Christensen and others, 2013), in this section, we explore strategies for implementation of MOOCs for in-service teachers in resource constraint environments of Africa.

Recent studies in Africa show that in-service teachers are not only intimidated by computers in schools but are also afraid to damage them (Mooketsi & Chigona, 2014; Oyo & Kalema, 2014). Other studies blame the low digital literacy of teachers on a number of issues, namely; lack of self-driven initiatives (Buabeng-Andoh, 2012; Markon, 2013), weak school management support for teachers' computer literacy programmes (Mooketsi & Chigona, 2014; Byabazaire & Oyo, 2014), and lack of enabling policies for holistic digital literacy initiatives for teachers, students and school administrators (Walls,

Santer, Wills & Vass, 2015; Mathipa & Mukhari, 2014).

At the same time, the state of ICT integration initiatives in African secondary schools is improving, with several on-going activities on acquisition of computer infrastructure and training of students in basic computer skills. In effect, ICT has become one of the core secondary school subjects, having been introduced in most African countries over the last decade, ie, Uganda in 2004 as an optional subject before becoming compulsory in 2011 (Markon, 2013) while South Africa in early 1990 with further reinforcements in early 2000s (Mdlongwa, 2012; Mooketsi & Chigona, 2014); Nigeria in 2005 (Adomi & Kpangban, 2010); Ghana in 2008 (Amenyedzi, Lartey & Dzomeku, 2011); Cameroon in 2002 (Mbangwana, 2008); and Tanzania in 2006 (Furuholt & Kristiansen, 2007). To date, however, computers are generally accessible in

most secondary schools and yet in-service teachers have remained largely computer illiterate.

Rather than engage in fault finding debate over who/what is responsible for low digital literacy of in-service teachers in Africa, effort should be directed to exploring effective digital literacy and life-long learning initiatives through MOOCs that leverage available resources in schools. To this end and from the above contention, we distil five strategies, namely: school management support, enabling policy, availability of infrastructure, internet access and funding models, necessary for successful implementation of MOOCs for in-service teachers in Africa. Based on these strategies, Table 1 gives lessons for MOOCs implementation for in-service teachers in Africa. These lessons are drawn by comparing current situations in Africa against international baselines.

TABLE 1. Strategies for MOOCs for in-service teachers in resource constraint environments.

Strategy	Current situation in Africa	Baseline case	Lessons for MOOC implementation
School management support (Byabazaire & Oyo, 2014; Oyo & Kalema, 2014)	School managers are generally computer illiterate and therefore attach less value to teachers' digital literacy. Moreover, the prevailing perception is that ICT can be self-learned (Mooketsi & Chigona, 2014)	School administrators are responsible for creating environments to facilitate the teachers' integration of ICT in teaching and learning (Ottestad, 2013)	The ideal MOOC implementation model for teachers starts with support from the school administrators. As such, digital literacy of school administrators should be top priority if other related programmes for teachers are to succeed (see, Lorenz, Eickelmann & Gerick, 2015).

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Strategy	Current situation in Africa	Baseline case	Lessons for MOOC implementation
Enabling policy (Walls, Santer, Wills & Vass, 2015)	Policy and implementation strategy of computer literacy of students is widespread, unlike computer literacy of teachers (Mathipa & Mukhari, 2014; Oyo & Kalema, 2014)	Holistic digital literacy strategy for students, teachers and teaching support staff, eg, DigiLit Leicester project (Hall, Atkins & Fraser, 2014)	The rising penetration of computers in schools should propel holistic digital literacy and online life-long learning for teachers and school administrators
Infras-structure readiness (Ngima & Wilson, 2012; Warugaba and others, 2016)	Computer-to-teacher ratio is unknown. However, mobile phones are widely accessible across all sections of society (Walls and others, 2015)	One-to-one laptop programme for teachers, eg, digital education revolution initiative by the Australian government (Howard, Chan & Caputi, 2015).	Shared access to computers in schools between students and teachers. MOOCs can leverage mobile phones that are ubiquitous.
Internet access (Jordan, 2014; Labbas & Shaban, 2012)	Internet access is expensive, slow and unreliable in most parts of Africa (GSMA, 2014; Mooketsi & Chigona, 2014; Oyo & Kalema, 2014).	Broadband internet is accessible both at home and schools in developed countries (Voogt, Erstad, Dede & Mishra, 2013).	Offline and online access modes are important for MOOC platforms. These have been argued as the baseline for e-education programmes in Africa (see, Walls and others, 2015).
Funding mechanisms (Adomi, 2014)	Computer access in schools is largely improving. Internet is still expensive and computer literacy programmes for teachers are scarcely funded by African governments or schools themselves.	Funding of ICT infrastructure, internet and teachers' computer literacy in the developed world is driven by governments and/or schools themselves (Hall, Atkins & Fraser, 2014; Lorenz, Eickelmann & Gerick, 2015).	Affordable broadband connectivity currently available to higher education institutions, eg, through <i>Ubuntu-Net Alliance</i> for Eastern and Southern Africa (https://www.ubuntunet.net/), should be extended to secondary schools

Source: prepared by the authors.

Teachers in Africa have generally been brought up in a world with limited technology and therefore find it difficult to use

technology in e-education. The readiness analysis in Table 1 is consistent with the findings of a large international study

(2010-2014) on computer and information literacy of secondary school students in 21 countries, that, ICT infrastructure in schools on its own is not enough to enhance the ICT competency but the efforts of the teachers and administration are more important than any other factors (Lorenz, Eickelmann & Gerick, 2015). This insight is depicted in other related studies in Africa that were initially promising but are currently unsustainable. Two of these studies are briefly discussed here.

First, the Teacher Education in Sub-Saharan Africa (TESSA) research and development initiative established by Open University UK in 2005 and currently implemented in 15 institutions in sub-Saharan Africa. By 2012, seventy five adaptable open educational resources (OER) TESSA units had been produced covering key topics in five primary school subject domains, including literacy, mathematics, science, life skills, and social studies and the arts; in four languages Arabic, English, French and Kiswahili (Murphy & Wolfenden, 2013). Since 2010, TESSA extended material development to secondary education covering science subjects, including biology, chemistry and physics (Murphy & Wolfenden, 2013). Whereas OER TESSA units have been largely portrayed as successful in a number of studies (see Murphy & Wolfenden, 2013; Wolfenden, Wolfenden, Umar, Aguti & Addel, 2010), the actual secondary science resources available on the TESSA website (see www.tessafrica.net) have stagnated on only a few topics

since its initiation in 2010. In fact, the coverage in the respective subjects is rather shallow as the average number of pages for the available content is 2 pages across the five content units in all the three subjects. Moreover, new content does not seem to be available since the existing one was last uploaded by second quarter of 2012.

Second, the Kenyan cloud school (KCS), which is a MOOC containing all courses taught at the secondary school level in Kenya. KCS MOOC consist of online, on-going subjects in both English and Kiswahili with self-testing and peer assessment functions as well as digital badges and certificates awarded on completion to recognize and validate non-formal learning (Jobe, 2013). KCS is built with responsive web design to increase ubiquitous access from any device and its access is free and open to any student. The content development process is on-going collaboratively using researchers from developed western countries and Kenya. Clearly KCS is built on a solid technology and design standards, however, its long term impact depends on appropriateness of the content (notes, tests, revision exercises and video lessons) that will be developed by the Kenyan teachers, but the majority of these teachers are not computer literate.

The implementation strategies for MOOCs for in-service teachers as presented in this section, have been argued against the backdrop of challenges at the level of sustainability, accessibility and

teachers' digital illiteracy. The next section builds on these discussions and presents the Ugandan MOOC platform for in-service teachers.

3. The Ugandan MOOC platform for in-service teachers

In this section, we present a specialised MOOC platform known as TEP (Teachers' E-learning Portal) for digital literacy and online life-long learning for in-service teachers in Uganda. The section begins with TEP background and its justification, then the design and adoption strategy for TEP is presented. Subsequently, the preliminary results following TEP's initial roll-out are discussed.

3.1. Background

The TEP idea is linked to a series of activities that followed the Google's Computer Science for High School (CS4HS) 2012 project implemented by Gulu University and coordinated by the first author of this paper. The aim of the latter project was to re-tool secondary school ICT teachers in northern Uganda with knowledge and skills in: (1) web development using HTML5 and CSS; (2) database development using MySQL and PHP; and (3) multimedia development using Flash and Action Script. Emerging from this project was the need for further content sharing among the participants' schools which lead to the development of Mwalimu open educational resource (now accessible at

www.mwalimu.ug) by Gulu University with additional grant from Google's 2013 CS4HS grant towards its roll-out across different regions in Uganda. Details of the participants distribution and roles in these two Google's CS4HS projects can be found in Byabazaire and Oyo (2014, p. 36-37). Through the Google CS4HS-2013 project's post workshop survey, the perspectives of digital literacy issues by all the 89 participants were sought. The perspectives rated as *strongly agree* or *agree* by at least 60% of the participants were, that in-service teachers:

- Have access to computers in their schools.
- Are aware of the usefulness of computers in teaching and learning and are awaiting external support to get them started.
- Prefer to engage computer literate users for computer services such as typing and printing tests, notes, etc, but are reluctant to perform these tasks themselves.
- Own and can operate mobile phones effectively.
- Use computers mainly for leisure, eg, playing music and watching movies.
- Need basic computer skills but are not decided on when to start acquiring these skills and how best to proceed.
- Feel that computers are not for their generation.
- Have not grasped how computers and computer applications can support teaching and learning in their respective subjects of specialisation.

- Fear that pervasive use of computers in schools places their jobs at risk and over time computers will replace them.

- Believe that computer literacy is a special skill for ICT professionals or teachers who have undergone rigorous training in ICT.

- Believe that digital literacy does not affect their productivity as classroom teachers.

- Imagine that there are no significant added advantages in adoption of ICTs in teaching and learning.

The above perspectives depict marginal benefits to in-service despite increasing computerisation in their schools. As such, the teachers' digital literacy and online life-long learning MOOC powered by TEP was conceptualised.

3.2. TEP design

TEP is designed as a community outreach initiative for universities to support digital literacy of teachers in collaboration with schools. The universities, schools and teachers are the pillars of TEP and as such, the design of TEP is based on their roles. Universities and not higher education institutions are emphasised because of the overarching community outreach requirement of universities. In particular, the university roles within TEP include:

- Identifying and initiating training collaboration with target schools including registering the schools and managing their logins on TEP.

- Identifying and contracting schools that are strategically located and with the necessary computing facilities as examination centres. For integrity of the online examination process, registered teachers (participants) attend their online certification examinations at their convenient examination centres. For each participant attached to an examination centre, a unique code is sent to the examination centre that activates the underlying examination. As such, participants cannot access the online examinations outside their respective examination centres.

- Managing and/or providing content in form of notes, audio books, presentations, video lessons and other forms of learning objects. The teaching content on TEP is provided by the collaborating university. The baseline content is informed but not restricted to the highly regarded International Computer Driving License (ICDL) curriculum. As a prerequisite for final certification examination, teachers registered for the TEP initiative are required to develop and submit subject specific content in reflection of skills acquired. The latter content is in turn uploaded on TEP as a benchmark for other teachers intending to enrol for TEP as well as a resource for additional electronic content access to enhance teaching and learning.

- Providing and managing examinations. New examinations are uploaded and scheduled on TEP while past examinations are archived by

year and examination period. The final course examination accounts for 50% from 50 multiple choice type questions that are marked automatically on submission. Prior to the final course examination, the participants complete their course assignments which also accounts for 50% and thus on submission of the final online course examination, a digital certificate is generated for participants whose final score is at least 60%.

- Generating and analysing reports on academic performance, completions and participants' (teachers) feedback.

Within TEP design, schools are responsible for providing access to computers and internet as well as technical personnel to their teachers. These roles include the following:

- Setting up and managing an offline server for local access by teachers undertaking TEP programmes. The offline server automatically synchronises with the online server when connectivity is established.

- Monitoring teachers' online and offline activities to ensure higher participation and completions in TEP programmes.

- Managing teachers' login accounts. A participant/teachers' login is created from the registration page but remains inactive until approved by the respective school administrator.

- Providing important feedback to the collaborating university on overall usability of TEP.

Figure 1 gives an overview of TEP underpinned by the roles of its three pillars. As shown in Figure 1, the preferred training curriculum for the teachers is at the discretion of the implementing university, but focus should be on giving teachers authentic and relevant experiences with the available tools in their subject teaching contexts and thus going beyond the traditional computer literacy training which is based solely on ICDL curriculum. For instance, a chemistry teacher needs the basic computer skills from ICDL curriculum and specific skills in using *ChemDraw* software. Similarly, a geography teacher would need specific skills in using *Google Maps*.

As depicted by Figure 1, TEP can be implemented in two ways: first, through a one university to many schools collaboration, in which the university is the main implementing entity. Secondly, through many universities to many schools collaboration, whereby an external entity e.g., the education ministry or a funding agency would coordinate its implementation by supporting a consortium of universities and schools.

Further analysis of TEP's adoption strategy is given next.

3.3. TEP adoption strategy

The focus of TEP is to support improvement of digital literacy and online life-long learning especially among in-service teachers. This is possible using the existing operational structures in schools whereby digital literate teachers and the school administration work together to

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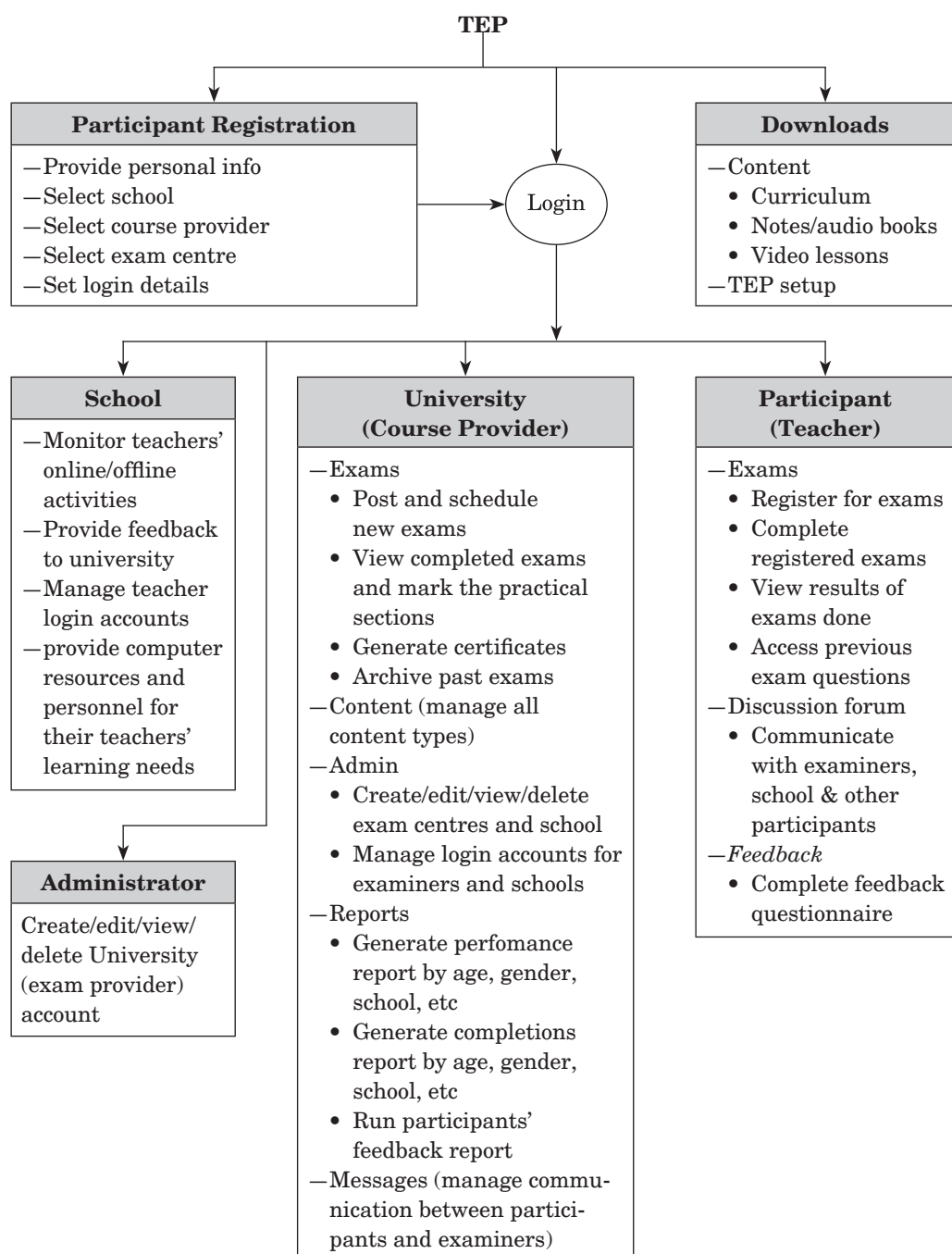


FIGURE 1. Overview of teachers' e-learning portal (TEP).

support their digital illiterate colleagues. In effect, TEP as a MOOC platform for environments with limited resources is more successful when integrated within the internal school academic structures by promoting teachers' access to available computing resources and technical personnel.

At the same time, the traditional relationship between universities and schools through the school practice programme for university education students provides additional opportunity for the in-service teachers to benefit from the school practice students' digital knowledge and skills. Indeed, anecdotal evidence suggests that students on school practice have adequate digital knowledge because they undergo double ICT training during their secondary school education and first year of university education.

Given the bandwidth and connectivity challenges in Uganda and off course Africa, offline support is a necessary requirement for MOOC platforms. In the context of TEP, offline support is possible in three ways. First, by promoting a new culture in schools whereby the digital literate teachers freely support their digital illiterate colleagues. Second, by the collaborating university encouraging their students on school practice to engage with registered teachers under their university's digital literacy programme. Third, through a technological solution whereby the collaborating school sets up an offline server for local access by their teachers enrolled for MOOCs under TEP. The offline server automatically synchro-

nises with the online server when connectivity is established.

4. The initial MOOC implementation through TEP

The initial MOOC offered on TEP was under the many universities to many schools implementation strategy as already highlighted. In this respect, TEP was integrated into the prominent secondary school online space called *Mwalimu* open educational resource (OER) and accessible at www.mwalimu.ug. Within this space, Gulu University as the pioneer MOOC implementer, was linked to secondary schools already registered under Mwalimu OER and in the same region as Gulu University. Gulu University was preferred because the Mwalimu OER was developed under a Gulu University - Google CS4HS project as already highlighted. Following the introduction of TEP on the Mwalimu online space, the original Mwalimu OER was conveniently renamed *secondary education e-learning tool* (SEET). To date, both SEET and TEP are accessible from the same Mwalimu URL (see www.mwalimu.ug). This is because of the symbiotic relationship whereby SEET provides a consortium of schools for TEP, while TEP generates content for SEET. In addition, the *Mwalimu App* which gives access to SEET and TEP will soon be available on the Google Play Store.

4.1. Participants

Participants for this study were drawn from an existing pool of 172 schools reg-

istered under SEET and distributed over 48 districts in Uganda. The top four active schools were identified based on school login analysis and number of examination materials downloads during the peak period of July and September 2014. July and September are peak months because of mock and post-mock examinations downloads respectively, in preparation for the Uganda national examinations in October/November. The schools were required each to identify 30 teachers from the lowest age bracket (<26 years) to the highest age bracket (>50 years) to participate in this study.

The emphasis on age was informed by Google C4HS-2013 project (Byabazaire & Oyo, 2014, pp. 15-16) and other previous research where age was found to influence digital literacy initiatives among in-service teachers (Andema, Kendrick & Norton, 2013; Mathipa & Mukhari, 2014; Labbas & Shaban, 2012). Table 2 presents the participants details. The schools labelled A to D in Table 2 are from the districts of; Gulu, Lira, Soroti and Serere, respectively. The respective population of full-time staff in these schools are 64, 76, 58 and 39, giving the percentage enrolment as shown in Table 2.

TABLE 2. The MOOC participants' enrolment by age.

School	Enrolment by age							% enrolment
	<26	26-30	31-35	36-40	41-45	46-50	>50	
School A	2	2	5	5	6	7	3	46.9
School B	2	3	5	5	6	7	2	39.5
School C	1	3	5	6	4	9	2	51.7
School D	2	3	4	7	5	5	4	76.9

Source: prepared by the authors.

Given the significant percentage enrolment variation as shown in Table 2, and the fact that teacher participant selection criteria was fixed on 30 persons, the selected schools in this study were evenly distributed across smaller school population (eg, school D) to larger school population (school B) continuum.

pletions by school and age group. This was based on the understanding that support from schools as well as participants age affect enrolment and completions in digital learning programmes (see Buabeng-Andoh, 2012; Mathipa & Mukhari, 2014).

5. Results

Findings were organised by comparing digital literacy training com-

5.1. Computer literacy course completions by school

One of the known challenges of MOOCs is low course completion rates of



between 10%-20% (Jordan, 2014). This was not the case with the computer literacy MOOC delivered on TEP that recorded high completions, i.e., 78%, 90%, 87% and 100% completions for the schools A to D respectively. A plausible explanation for the high completion rates is the effective implementation structure involving teachers, schools and universities as already discussed. In effect, high teachers' withdrawals from TEP programme, implies weakness of the respective schools in supporting the teachers. As such, school D that had 100% completions is considered more effective in supporting digital literacy of its teachers compared to School A with 78% completions.

5.2. Analysis of course enrolment, completions and scores by age group

The issue of age and digital literacy is a well-researched topic with some claims on the one hand, that older teachers who were born before computers are less likely to adopt computer applications compared younger teachers who were born in the computer age. Results from our study on the influence of age on digital literacy initiatives as shown in Figure 2 indicate that age difference was not a determinant in completions and average scores (79%) for computer literacy MOOC offered to teachers in the four secondary schools teachers by Gulu University.

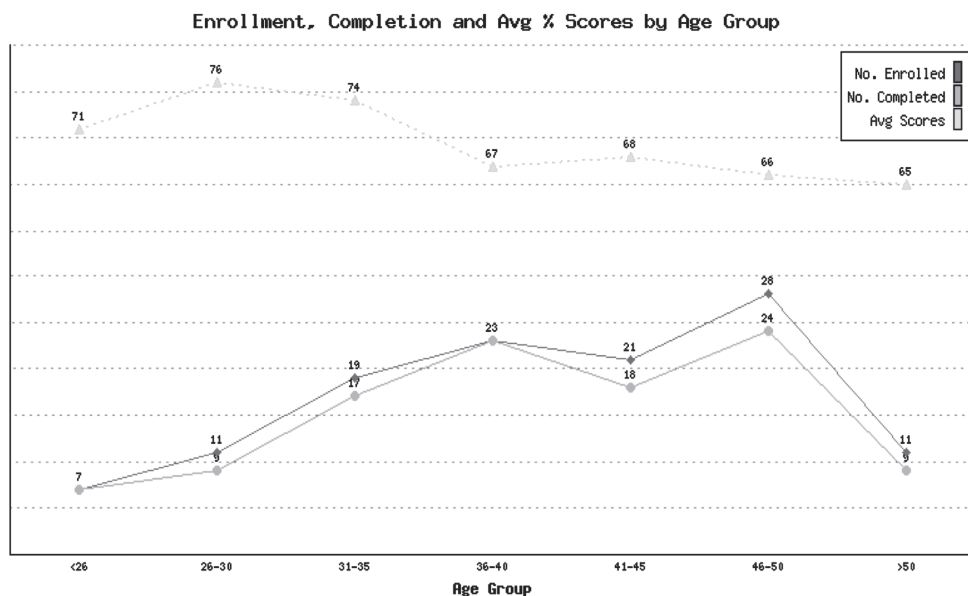


FIGURE 2. Analysis of course enrolment, completions and average scores (%) by age group.

In effect, Figure 2, reiterates the importance of effective support mechanism for teachers involved in digital literacy MOOC by their schools, without which the teachers' course completions and final scores would decline.

6. Discussion

Teachers' digital literacy is at the centre of e-education since digital literate teachers do not only influence students' access to e-resources but are directly responsible for development of e-resources. As for Uganda, the small number of active computer literate teachers is responsible for the low volume and quality of educational e-resources. In the context of the initial MOOC implementation in this paper, digital literacy of in-service teachers was addressed concurrently with development of e-resources. This is reflected by results from 120 teachers who enrolled for the basic computer training MOOC for which 107 completed, generating 107

content units. After further moderation of the content generated for duplication and to ensure relevance and quality, the units were reduced to 73, distributed over 7 subjects including mathematics, chemistry, physics, biology, geography, commerce, history and English. The moderated content units (notes or animated tutorials) are accessible without any restrictions from TEP's 'companion' application called secondary education e-learning tool (SEET).

Compared to other related initiatives in Africa, eg, TESSA's secondary education e-resources, as already discussed, that has existed since 2010 but with stagnated content, the initial TEP results both in terms of high ratio of teacher participants' completions (89%) and high volume of e-content generated, makes TEP an effective and attractive MOOC platform for in-service teachers' digital literacy and life-long learning needs.

TABLE 3. Analysis of TEP effectiveness for resource constraint environments.

Challenge	Evidence of the challenge	Mitigation strategy	Context of TEP
Sustainability	Content on TESSA's online platform has stagnant since 2012.	Explore self-sustainable strategies such as school management support and commitment of the target group (see, Warugaba and others, 2016)	Explicit emphasis on commitment of the collaborating parties (universities and schools) as well as the target teachers.

Challenge	Evidence of the challenge	Mitigation strategy	Context of TEP
Accessibility	In the context of Africa, internet access that enables MOOC participation is expensive, slow, unreliable and often unavailable (GSMA, 2014; Oyo & Kalema, 2014).	Offline and online access should be promoted concurrently for MOOCs. Walls and others (2015) maintain that offline platforms are more important than online platforms for building sustainable South African (and indeed African) e-education strategy.	Implementation of both online and offline access modes. Offline access is by design managed by the school through a local cached content server that synchronises with the online server when connectivity is established.
Digital literacy	There are no explicit digital literacy support strategies for in-service teachers in previous studies, ie, TESSA emphasises digital literacy of pre-service teachers and KCS engages already digital literate teachers.	Teachers' digital literacy initiatives are more successful when integrated into school programmes.	Digital literacy and life-long learning of in-service teachers are at the centre of TEP.

Source: prepared by the authors.

In order to comprehend the importance of TEP results, a comprehensive comparison with related initiatives in Africa is necessary. To this end, the generic challenges to MOOCs in resource constraint environments in the context of sustainability and accessibility (Warugaba and others, 2016) as well as digital illiteracy of teachers (Oyo and Kalema, 2014) is examined in Table 3.

Whereas the primary focus of TEP is supporting digital/computer literacy of in-service teachers, its implementation strategy involving teachers, schools and a local university, creates a unique op-

portunity for teachers' lifelong learning. The collaborating university under TEP is challenged to develop and deliver other relevant short courses for teachers' continuous educational development. Gulu University that pioneered TEP has developed other short courses for teachers including learning objects development, computer networking, computer repair, computer security, business process outsourcing and project management. These can be adapted by other intending universities in Africa.

From the feedback on user satisfaction, namely on how the teacher participants'

made use of the learning resources and how TEP influenced peer-to-peer collaboration, we learned that the teachers who participated in the training programme attracted other teachers who were either resistant to or afraid of computer skills training. Furthermore, through word of mouth, other schools that were not initially part of the training programme, requested for inclusion in the next training phase. The focus now is to create more awareness among schools and universities on MOOCs driven by TEP for digital literacy and online life-long learning of in-service teachers. This will create a critical mass of digital literate teachers and ultimately impact on existing and future e-learning initiatives in schools. We now end this discussion with the relevance of TEP to Africa.

6.1. Relevance of TEP to Africa

Africa is known for scarcity of resources in the key development areas including education. New interventions are therefore challenged to maximise impact with minimal funding. TEP is specifically designed to thrive in an environment of limited funding and/or limited internet access provided the collaborating partners (local universities and schools) are committed to their roles. The importance of TEP as a platform for implementing MOOCs for in-service teachers, in the context of Africa's situations is underscored by the following:

1. Enabling access through online and offline modes. One of the key premises of TEP is provision for caching

of digital content on an offline content server of the participating school for local access by teachers' on MOOCs. The offline server functions without constant internet connection and synchronises with the online server when connectivity is established. This is particularly important since internet access in many communities in Africa is expensive, slow, unreliable and often unavailable (GSMA, 2014; Oyo and Kalema, 2014).

2. Empowering schools to monitor and support study progress of their teachers thereby ensuring high completion rates. TEP as a MOOC platform for teachers' digital literacy and life-long learning is not immune to low completion rates in MOOCs (Christensen and others, 2013; Jordan, 2014). However, the high completion rate expected from TEP enabled MOOCs as already demonstrated by the preliminary results in this paper is partly due to the support by schools to their teachers. As such, the magnitude of teachers' withdrawals from TEP enabled MOOCs reciprocate into the quality of support and monitoring by their schools.

3. Minimising or eliminating costs by leveraging existing resources. TEP is designed to use existing resources to support digital literacy and life-long learning of in-service teachers. From the university side, part of the existing web hosting space for university website and academic staff time under outreach provisions are the main resources. The schools resources are the existing computers, internet subscrip-

tion, and ICT personnel. Through devotion to TEP enabled MOOCs by the collaborating university faculty/unit and school coordinators, greater teachers' digital literacy and other forms of literacy is achievable.

4. Flexible implementation options for the university as the main driver of TEP enabled MOOCs. Any university wishing to implement MOOCs under TEP has several initiation options, e.g., through existing school practice programme whereby undergraduate students majoring in education promote and support TEP in secondary schools during their school practice. Alternatively, the university can engage schools with relevant ICT resources directly as community outreach activity.

5. Life-long learning opportunity. TEP primarily supports basic computer literacy of teachers on which other skills programmes can be addressed. Other planned programmes beyond digital literacy currently include: development of learning objects, computer networking, computer repair, computer security, business process outsourcing and project management. New programmes can be initiated as their need arise.

The outstanding advantage of TEP enabled MOOCs is its unique sustainability strategy which is based on solidarity between its implementers (universities and schools) and reliance on existing resources (eg, university staff time, and computers and internet in schools), and not direct funding.

7. Conclusion

In this paper, we have presented TEP as a specialised MOOC platform for in-service teachers' digital/computer literacy and online life-long learning. TEP supports life-long learning through short course programmes in or at the interface of education, management studies, and information technology. For greater effectiveness and long term sustainability, TEP uses a unique implementation strategy involving teachers and their schools' support (technical personnel, computers and internet), and a local university. This extends the relevance of TEP beyond Uganda, where it has been successfully piloted, to the wider African situation. Moreover, TEP is also accessible offline through a local content managed under school account.

The effectiveness of TEP was tested in a pilot study involving four schools, each with 30 teachers. Percentage completions against age of these teachers were investigated and an average computer skills training completions of 89% was recorded for the four schools combined. These results confirm that teachers' digital literacy MOOCs are successful when teachers are adequately supported internally by their schools and externally by a university. In other words, as the participating schools provide the push force and the collaborating university the pull force, the resulting effect is teachers' improved digital literacy.

Judging from the findings reported in this paper, this study may be viewed as a model case, however, in depth analysis shows disparities in completions between teachers of mathematics and science sub-

jects versus the rest of the arts subjects. In fact the 11% completion deficit in this study, were all teachers of arts subjects. In light of this revelation, future research should investigate the effect of subject specialisation on teachers' use of technology to engage and support learning. Furthermore, digital/computer literacy is only the entry point into teachers' literacy needs. Other types of literacy, eg, multimedia literacy need to be addressed if teachers are to fully integrate ICTs into teaching and learning.

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Book reviews

Llano, A. (2016).

Otro modo de pensar [Another way of thinking].

Navarra: EUNSA. 224 pp.

«Few people dedicate some time every day to the adventure of conversing with the sort of quiet friends who will tell a story, set their thoughts out for us, or help us guide our life along a promising path» (p. 222). This paragraph from the closing chapter of Alejandro Llano's book sums up the author's aim when he wrote this «other way of thinking». His aim was to share his thoughts with these quiet friends, perhaps giving them a voice through the arguments he sets out to them, perhaps freeing them from «political correctness» and making them think, for «no task is harder or more elusive. Everything conspires to stop us doing it» (p. 9). Perhaps because he is restless and sees the present moment as «serious» and wants to find companions for this «other way of thinking». When reading this book, each chapter is like a chat in a café with Professor Llano, or Alejan-

dro if I may be so bold. The professor, the figure of authority, shines through, but we can also see his closeness when he attempts to share his views on topics he considers to be very important or fitting. So, he navigates through such important topics as education, the family, ethics, politics, social justice, the most humane economy, citizenship, humanism, the university, and transcendence. I say navigate for he clearly cannot examine questions of such importance in great depth in 224 pages, something reflected in the fact that there are occasional leaps in the argument that a specialist in a given area or a well-versed reader might question. Examples of this can be found in the chapter on education where he identifies activity with restlessness (pp. 21 & 22) and in the chapter on the family where he links social poverty and divorce (p. 42) or effusive expressions of affection as enemies of strength (p. 49). However, the author's aim is clearly not to provide a thorough analysis of a topic – although obviously he does on the whole – but instead to show and share

his way of thinking and so offer another way of seeing, interpreting, and acting in this world.

You might or might not agree with him, but you stay at the table in the café and, taking your cup of coffee in both hands like on a quiet autumn or winter afternoon, you decide to continue to listen to the thoughts of a seasoned expert in philosophy, a professor and researcher who has countless publications to his name and a perspective on life that is well-rooted and has a considerable background. This is the most interesting element of this book. It is a mature work in which it appears that the author is no longer interested in specialist treatises or academic accreditation; he is simply interested in communicating what he thinks about the topics in current society that most concern him, something that is most welcome. It does not contain erudite quotations but does sometimes mention authors, as though attempting to show us that this is a kind of reference. Deep down, we can discern a paternal attitude that is thankful for life and for which we too should be thankful, one that aims «to help guide our life along a promising path» (p. 222).

Llano starts by reproaching us; he warns us about political correctness and urges us to think for ourselves, the only way of freeing ourselves from subjugation. To do this, he starts and ends the book by encouraging dialogue as a necessary way of thinking, in particular the respectful dialogue that takes place in reading, and he praises the role of reading in life. Consequently, he

criticises idealisms and extreme individualism.

In the chapter on education he identifies the main problem by considering the most current topics with an awareness of the tensions currently affecting this field. He focuses his attention on the right places – maturity, vitality, fertility, training, learning, and effort – and criticises aimless activism, the appropriation of education by ideologies, excessive bureaucratic control, and the search for an efficacy that is not appropriate for the field of education where a slower pace and fertility are more apt. He also offers a clear attack on pragmatism and the tendency to subordinate education to employability in place of educating a mature personality.

In the chapter on the family, Llano identifies it as «the most fundamental group for creating meaning» (p. 40) and notes that, in a world that perhaps lacks meaning, it is especially important to cultivate and care for family ties. He also sees the family as the locus of «primary solidarity, the most radical and basic sort» (p. 40). The following statement is the key to this chapter: «The great paradox is that the welfare state ignores the radical human source of authentic well-being: the family» (p. 42).

As for «Practical reason and ethical practice», the author shows that «these three concepts – goods, virtues, and rules – can no longer be fully understood by the currently dominant mentality ... we do not accept that there is something like common moral goods, but instead we tend

to think that moral goods are an individual matter ... we have lost the genuine meaning of what virtue might be ... we do not accept moral rules being imposed on us» (p. 61). In light of this, as well as attempting to question the foundations of these modern statements, he restates the importance of the family for overcoming this «stormy weather» (p. 68).

The chapter with the most current references is «Outrage and politics». Here he gives his opinion on whether the «outraged» really are a new phenomenon, returning to the key area of education and the need for it not to focus on purely instrumental knowledge. In a way, he situates us at one of the central points of this book's argument: the importance of the humanities and the family for creating a more supportive and just society.

After this, he tackles «Wealth and inequality» before moving on to «The topicality of the classical world» and the importance of «Leadership and humanism in the new economy». Of these three chapters, «The topicality of the classical world» is worth considering. Here it is easy to see the professor of philosophy who performs an elegant historical reading of how we have come to our current way of thinking, and what its risks and possibilities are. This chapter's level of erudition sets it apart from the other ones.

The author goes on to situate us in the dichotomy between «citizens and unwanted guests». This is clearly the necessary outcome of the preceding three chapters:

«Husserl understood that the disorientation of the Europeans derived from a way of thinking that – by renouncing true knowledge – became incapable of tackling issues critical to existence» (p. 129). He thus offers a critique of mechanism and individualism. In an especially interesting chapter, he encourages us to choose on the one hand between true citizenship that binds us vitally by pursuing the common good and on the other, the role of a spectator who is «silenced» by the welfare state.

With the chapters on «Public administration and humanism», «The reality of fiction», and «Civil humanism: Risks and opportunities», Llano tries to cast light on how a state capable of moving towards the common good through active citizenship would be organised. In essence, he clarifies the relationship between the private and public realms in his humanist «way of thinking». He also emphasises the importance of literature in the understanding of the permanent and essential elements of the human condition and how the classics are necessary for this understanding to be successful and profound. Finally, he supports a civic humanism, like the one he proposes, to replace this «top-down model of colonisation of vital worlds with a bottom-up paradigm of the emergence of civic energies from the family and through supportive communities in the framework of a culture of citizen responsibility» (p. 176).

The book ends with chapters on the relationship he sees between «the current crisis and transcendence» in which he ad-

vocates the logic of the gift, his suggestion for the university where he identifies as a key point its relationship with the Truth, and the invitation to «read and live» that we have been discussing since the beginning.

Ultimately, as the author states, «books have many strong points: they are entirely free to use, they do not aim to overwhelm anyone, they invite without obligations, they can be replaced without envy, and, furthermore, they are cheap» (p. 223). And it is certainly true that Llano's book has many strong points: it is simple and clear, it does not attempt to convince anyone, it presents his way of thinking when covering topics that, as noted above, are important and relevant. It is a mature work by an expert, showing us how he views the world, what he thinks about it, and how we can actively and consciously react to its gaps and weaknesses.

If there is one criticism, it is that Heidegger is occasionally used as a source, and while the author does accurately recognise his role in one the saddest and most repulsive chapters in the history of the university (p. 204), I think that the points that rely on Heidegger could just as well refer to other authors. One other objection is a certain tendency to regard this «other way of thinking» (p. 16) as substantive. I feel this might run the risk of closing down our thinking or of «other people», «some people», seeing it as the «other politically correct way of thinking» and so risking not encouraging everyone to think in-depth and with rigour, vitality, and dialogue, which I believe is the true aim of the book.

This book, as mentioned above, is like spending a few afternoons in a café with the professor and the human being, with a paternal Alejandro Llano in the most positive sense of the word. We may or may not agree with him, but he makes us think about fundamental topics and the connections between them: the only rigorous way of thinking, coherently structuring topics. We should not expect a scholarly book, even though there are chapters where his mastery in handling authors and their thought is apparent, and as this is not one, it is also ideal for the general public and as part of general reading so that students can learn to think with integrity and coherence.

Thank you, Professor Llano.

María del Rosario González Martín ■

Ballester, L. and Colom, A. J. (2015).

Walter Benjamin: Filosofía y pedagogía
[Walter Benjamin: Philosophy and pedagogy].
Barcelona: Octaedro. 253 pp.

In an academic field like pedagogy, which is already widely acknowledged as a science, it is common to find treatises, articles, research projects, and studies that approach education from a scientific perspective. Indeed, this type of text is the most used when training individuals who wish to teach. It is believed that only in this way can they teach with scientific rigour, independently discovering how to prepare hypotheses and fol-

low and apply a method, thanks to the proven certainty of bodies of knowledge previously acquired through these texts. There are even numerous works along these lines for parents who also wish to have the scientific certainty that teachers now enjoy.

In contrast, testimonies, pedagogical writings that approach education taking individual experience as a basis without a method or scientific basis as a foundation, texts simply based on educational observation and reflection in a given moment with concrete experiences as their basis, are becoming ever rarer. These documents do not provide security or certainty, but may be the ones that teach us the most. The work discussed here is a clear example of this latter group, containing in its 250 pages the testimony of a specific life that reflected on education at a given moment in our recent history.

Walter Benjamin: Filosofía y pedagogía covers the academic and personal journey of the German philosopher Walter Benjamin (1892-1940) and dedicates many of its pages to his reflections on education. This uniformly structured work is divided into two large sections preceded by one smaller but no less important one. The first of this work's seven chapters provides a brief overview of Benjamin's biography, chapters two to four cover his main contributions to the field of philosophy, and the last three chapters concern his interest in the field of education. While these parts are all separate, they are all interrelated since, as the authors note, life and thinking were always connected with Benjamin. This makes it hard to understand his pedagogical ideas with-

out understanding his philosophy, and it is almost impossible to delve into his thinking without knowing something of his personal life as this is the undoubted foundation of it. A life, a historical moment, and a thinking interwoven with them; this is Benjamin.

Chapter one concerning his biography shows someone marked from childhood by his education. His dyslexia meant that he was an outsider who was taunted by classmates and teachers alike, causing him severe psychological and performance problems. This is perhaps what led his parents to send him as a boarder to a reformed school – one that believed in the innovative methodologies typical of what in Spain was called the «new school». His time at this school showed him the differences between the iron discipline that ruled traditional schooling and the freedom that characterised the other type of school. He realised here that freedom was much more effective in the education of a child, making the child more human and less subject to the impositions of a capitalist society that, with merely economic aims, used discipline to train but not educate. These initial thoughts based on his experience would combine with his later academic relationship with Marxism to make his philosophy and pedagogy essentially proletarian and counter to the values of the bourgeoisie.

The next three chapters cover his contributions to the field of philosophy and contain what could be called principles. While it is no easy task to set these out in a summarised and systematic fashion, given the fragmentary and sometimes even contradictory nature of Benjamin's

work, Ballester and Colom try with excellent results, making this thinker's work, which is so often confusing thanks to its unsystematic nature more accessible. Chapter two considers his most important proposals as whole. These mainly cover his concept of history and time classified as historical, language, culture, tradition, and technique. As we can see, these are all essential aspects in the development of humanity. Chapter three focusses on his working methods. He thinks and writes in a fragmentary manner, not by choice but because of coherence and need. Human work is never finished; history is not progressive and linear, but instead the past, present, and future are interconnected and are always liable to change. This is why he cannot impose a system but instead explores fragmentary paths that try to illuminate that which has meaning or what we mean when we speak of humanity. In this regard, the concept of collective memory is fundamental, and chapter four is dedicated to it as a coda to the tour through Benjamin's philosophy. The past is alive in our memories and can always resurface in different ways depending on what our experience of it is like. The important thing is not to forget it, not to disconnect from tradition, as then anything becomes possible: good and terrible things alike. This is why education was always essential for Benjamin.

The last three chapters of this book relate to this point. Chapter five considers Benjamin's first pedagogical thoughts, written between 1911 and 1915 when he was barely in his twenties. The ideas here provide a critique of the bourgeois

disciplinary system, praising reformist methodologies that saw the child as a child and not just a potential adult who would have to respond to the demands of his or her society. These are idealist proposals where the youth and liberty that typify this stage of life would govern the future of humanity. These early thoughts are complemented by later ones, analysed in chapter six. These, developed by Benjamin in the 1930s, already show a clear Marxist influence. He criticises highly individualist bourgeois education, arguing for a proletarian education that is class-based and above all collective. Finally, chapter seven covers some passages that are not easily classified, but that are undoubtedly somehow related with education, albeit indirectly.

As we have seen, this work covers a life and a historical period, and their expression in reflections that provide an in-depth analysis of a specific way of viewing education. In a moment when referents seem to have disappeared, where tradition is in stasis and is dormant, a piece like this resuscitates an attitude to life if not a way of thinking; namely, how to conceive of education experientially. We agree with the authors that Benjamin is not an easy thinker, but, «when we do understand him, it is because we understand ourselves and our time better» (p. 105), a time that, counter to Benjamin's claims, does not stop looking forwards without waiting to think about the importance of analysing where we are, where we have come from, and where all of this is leading us.

Alberto Sánchez Rojo ■

Touriñán López, J. M. (2015).

Pedagogía mesoaxiológica y concepto de educación [Mesoaxiological pedagogy and the concept of education].

Santiago de Compostela: Anvira. 382 pp.

«In my opinion, education is an inherently complex object. And the objective complexity of ‘education’ derives from the very diversity of the individual’s activity in educational activity» (p. 340). This statement contains the condensed meaning of and reason behind this book. This is one of the few occasions on which Touriñán has given such a personal opinion on the subject of a book. Therefore, we will use this statement as an introduction to his personal concept of the phenomenon of education and to the *raison d’être* of this work. José Manuel Touriñán holds a chair at the University of Santiago de Compostela, and has over forty years of experience. His academic work has been recognised on many occasions; he holds the Gold Badge from the University of Santiago de Compostela (1998), the Silver Medal of Galicia (1998), and the Gold Badge of the University of A Coruña (2000). He is also an honorary professor at the University of Buenos Aires (1993). From 1990 to 1997 he was also the head of universities and research for the Galician regional government. Touriñán’s work comprises over 250 pieces of research.

His work in this book is important for at least two reasons. The first is epistemological; it provides an in-depth systematic and theoretical examination of knowledge of education that contrasts with the popularisation of pedagogical

knowledge. Indeed, the familiarity and routine nature of the educational experience hide or mask its complexity and the need for rigorous and scientific study. Secondly, this piece is not just intellectual speculation. Instead it is a response to the interest in providing foundations for educational actions and dissemination and giving them pedagogic meaning based on (autonomous) educational science itself and not as something subordinate or marginal (as Touriñán explained in a piece in 1988 in the journal *Educación*). It is, therefore, an elemental (and foundational) book for anyone studying pedagogic disciplines, from undergraduate students to doctoral students and even lecturers who have the exciting task of teaching theoretical and philosophical knowledge of education and introducing people to them. This is expressed through a clear didactic aim with over 40 explanatory tables. Therefore, we do not regard this as a work for disseminating the subject to the general public, nor is it intended for parents who want pedagogical guidelines.

This work comprises eight coherently organised chapters that provide a holistic overview of education, in other words, an overview of the features that lead us to classify certain processes as education. Furthermore, to frame it adequately, we should also mention other works that complement its themes and go into them in greater depth, namely the book *Dónde está la educación: actividad común interna y elementos estructurales de la intervención* (Where is education: Common internal activity and structural aspects of intervention, Netbiblo, 2014). These total

over a thousand pages exclusively dedicated to understanding education and knowing what education is in order to intervene in it and create educational fields.

Chapter one introduces a series of conceptual tools for (re)constructing a pedagogical hermeneutics around the meaning of education to overcome the antinomies that burden its content. In effect, Touriñán, following Esteve and others, identifies a series of criteria for accurately discussing educational phenomena. These defining features meet the criteria of content, form, educational use, and balance, to go from being a merely nominal definition to being a real one.

The chapter dedicated to the educational relationship (chapter two) is, to some extent, a necessary methodological continuation or prolongation of chapter one. In this chapter, Touriñán attempts to distinguish and identify the distinctive nature of a type of relationship, the educational relationship, which is different and distinct from other types of relationship that might also arise in the educational context while not strictly being educational. These include relationships of care, communication, and coexistence. Therefore, the educational relationship is axiological, personal, and hereditary and is also integral, gnoseological, and spiritual (p. 116). It is the moment in which education comes into play, it is a *risk* that demands an appropriate understanding of liberty and neutrality (p. 123 and *passim*) and, as Touriñán himself senses, leads us towards an understanding of the educational relationship in terms of commitment, responsibility, and compassion.

In chapter three the educational relationship is exposed to intercultural reflection insofar as this is understood to be a way of describing education based on the educational principle of diversity and difference. This chapter considers how education should approach coexistence in plural and diverse areas. Touriñán understands intercultural education as the use and construction of axiological experience of diversity and difference within education as a whole (p. 157) with the aim of ensuring students can choose and implement their own life plans (p. 161) based on the notion of identity and cultural rights (p. 170). Educational provision in each place must consider the question of coexistence. However, this chapter lacks a more holistic perspective that including the environment and nature; in other words, one that not only covers intercultural education but also environmental education.

Two elements are added in chapter four that consider the real definition (insofar as it is an internal activity guided by an aim) of the concept of education in greater depth and explain the reasoning behind a *mesoaxiological pedagogy*. This chapter explains how Touriñán moves from a nominal definition of education to establishing its real definition and the criteria accompanying it. In effect, the real definition of education is the convergence of character and meaning; the character of education is its determination, while its meaning is what distinguishes it. In other words, the specific perspective or focus serving the link established between the self and the other (p. 179). Both character and meaning

are part of the features that determine the real definition of education. Once this real definition has been established, cultural areas can be turned into educational fields (p. 187).

As well as developing the «real definition» of education, this chapter is important as it examines the «mediated» condition of education in greater depth, not just education as an autonomous field, but also as necessary knowledge for transforming cultural areas into educational fields. However, as Arendt previously observed, pedagogy cannot be entirely freed from the specific subject being transmitted; in other words, mediation is necessary. We cannot assume that pedagogy is sufficient for constructing educational spheres; knowledge of cultural areas is also necessary, hence the need for mediation.

Education for the development of societies (chapter five) can be seen as a necessary expansion of the work on intercultural and civic education in chapter three. While intercultural and civic education is based on the rights of the third generation (based on identity), education for development is a way of understanding the development of «planetary citizenship» based on solidarity and guided by the rights of the fourth generation. This new educational field also includes education for sustainability, consumption, and entrepreneurship. The environmental concern that was lacking in chapter three is present in this chapter.

This pedagogical concern for developing a global citizenship must be understood not just in terms of solidarity and

development. The idea of a citizenship that goes beyond the geographic and cultural boundaries of one's own community is old; what is new is that this notion is only now a historical socio-political need. Understanding what it means to belong to humankind is an ethical requirement that addresses education. This international dimension in courses and campuses is ever more important in university education and is not restricted to learning foreign languages.

Chapter six aims to make an argument for the need for specialised professional competences for those working in the field of education, based on the foundations and status offered by the knowledge that characterises education. Developing these professional competences is intimately related to the educational function. Therefore, the specific characteristic of the pedagogic function is to create pedagogical facts and decisions that make it possible to justify, explain, and discover what and how any states of things, events, and educational actions are produced and should be produced (p. 243). What is important about this chapter is the author's ability to connect the need for specific professional competences to the pedagogical function, thus establishing a bridge or nexus between professional needs and the demands deriving from an individual's knowledge of education. Consequently, it is possible to state that the pedagogical function is identified as a specific activity based on specialised knowledge (p. 247).

This chapter, entitled «Where is education: About mesoaxiological pedagogy»,

along with chapter one contains the basic core question of the work: what makes pedagogy mesoaxiological? Because any area of experience must be turned into a medium or field of education (p. 330). This transformation would just be a technical procedure were it not for the moral element that characterises educational processes. This element requires a transformation in which values (mesoaxiological) are integrated, not just into the «process» (the student's dignity prevents us from treating him or her however we wish) but also into the intentions, in other words, taking into consideration the aims of the process or of the educational activity itself. Touriñán's greatest success, in our opinion, lies in how he integrates values into the process of educational transformation through two elements: the pedagogical mentality and the perspective (p. 344).

The last chapter in this book – «Applying mesoaxiological pedagogy: Artistic education as an educational field» – could be nothing other than an example, an application of the knowledge of education contained in the preceding chapters. In other words, what we should do to develop pedagogically an area of culture such as art and turn it into an educational field. Art was not chosen by chance, and it reveals the inherent complexity of educational processes, which are frequently compared with artistic processes in that the outcome is an original work and not a mass-produced one. Educational action, as Touriñán notes, not only offers a theoretical-practical perspective, but also an intrinsic artistic and aesthetic

one (p. 343). Consequently, it could be claimed that artistic education, in that it is a value chosen as an educational end, is an educational field subject to extrinsic aims.

We cannot end this analysis without mentioning another of this book's strengths. Unlike the technological pedagogy of the 1980s and some current utilitarian pedagogical mentalities, Professor Touriñán opts for an axiologically *mediated* form of mediation. Although he could have gone into this topic in greater depth, the very important role he gives to values in constructing the areas of education or setting educational aims and so on seems to us to be very successful. The following statement from the final chapter is a good example: «not everything is valid as content in the aims of (artistic) education». This is something that could well be generalised to any of the fields developed as educational; *not everything is valid*.

Juan García Gutiérrez ■

Vázquez-Cano, E., López-Meneses, E. and Barroso, J. (2015).

El futuro de los MOOC: retos de la formación online, masiva y abierta [The future of MOOCs: Challenges for massive, open, online training]. Madrid: Síntesis. 207 pp.

The various editions of the Horizon Report, led by the New Media Consortium and Educause, collate studies about the future use of technology and

coming educational trends in various countries. The ninth edition of this report examines the impact of MOOC (Massive Open Online Courses) training platforms on the current educational landscape. Faced with the need for life-long training of human capital in the knowledge society setting, efforts are being made in the educational sphere to boost, promote, and reactivate the development and economic growth of countries by using technology as an effective instrument for helping to teach literacy to the population and democratise knowledge. Consequently, taking a technological and innovative approach in higher education and occupational training and pre-university education, it is important to make the most of Web 2.0 resources and create new learning scenarios through virtual communities for social construction of knowledge from a cooperative, pedagogical, and inclusive perspective. Accordingly, the work discussed here considers the workings of MOOCs, the philosophy of which should be aimed at meeting the educational needs of contemporary society by offering new informal and non-formal learning scenarios that serve all citizens and have a democratic focus to eradicate the digital and social divide. The most significant features of the book's seven chapters are set out below.

The opening chapter presents the defining features of the MOOC phenomenon along with the identifying features of these platforms. The different types of online educational platforms are analysed and, from a variety of approaches, a critique is made of the current train-

ing model in place from an economic perspective, as well as of the didactic and pedagogic aspects that comprise and support it. The chapter ends by offering an in-depth analysis of the main challenges that must be faced to guarantee their sustainability, alluding to a practical proposal about sMOOCs (sustainable MOOCs), the aim of which is to overcome the limitations MOOCs have shown up to now.

Chapter two considers one of the main challenges the MOOC movement must confront: finding a sustainable economic model. An overview is provided of the current dominant economic models as well as an analysis of the advance of the evaluation and experimentation systems, raising questions such as whether MOOCs should charge for certification or extra course content, or instead propose an open model but charge for complementary services, such as tutoring. Furthermore, it considers the possibility of exploiting the analysis obtained and derived from the thousands of students who join the platforms, or even through including advertising in this type of social environment. The chapter ends with a series of economic options aimed at ensuring the sustainability of these platforms so that they continue to be freely available and accessible to all.

Chapter three uses a cooperative and open position to refer to the connectivist paradigm that must support MOOCs to encourage learning based on professional competences among the students. To do this, a change in student and teacher roles is needed, with teachers providing tutoring as a key element in the educa-

tional process to make possible constructive, autonomous, and meaningful learning by students. The chapter concludes by setting out the advantages and disadvantages of MOOCs in the view of experts.

Chapter four provides an overview of current and future technological models and their application to MOOCs. It emphasises the importance of new digital learning strategies for the immediate future through content curators, online comments, information categorisation and filtering programmes (recommendation systems), learning algorithms, multi-platform systems, intelligent and self-adapting tutorial systems, robots, and new virtual self-evaluation models. It ends with a proposal for didactic design in MOOCs that emphasises the utility of interactive learning activities.

Chapter five takes article 26 of the Universal Declaration of Human Rights, which states that every human being has the right to an education, as its starting point. The chapter's aim is for MOOCs to act as a mechanism for closing the digital and social divide, thus making possible true democratisation of knowledge. Consequently, starting from the basic features of MOOCs as massive, open, accessible, and free training platforms, and bearing criteria of sustainability in mind, access to these courses should allow for multilingualism, multiculturalism, and people with functional diversity. Furthermore, it underlines the potential of smartphones and BYOD (bring your own device) initiatives, from a pedagogical perspective and for alleviating shortcomings in technological facilities

in educational centres owing to lack of funds. Following a series of studies, conclusions are reached that focus on the possibility of universally extending an online training mode in different socioeconomic and cultural settings by using mobile devices as a resource to enable better accessibility for disadvantaged or developing people and settings. The models of attention for people with functional diversity in terms of accessibility are then considered, and the chapter ends by reviewing MOOCs in non-university education such as occupational and business training settings.

Chapter six expands on the main indicators that can be used to measure the quality of MOOC courses, the national and international bodies charged with measuring, aspects of standardisation in mass settings, and the certification and regulations in place for online education in the Spanish setting. It also summarises different pieces of research published in high-impact academic journals to establish what type of analysis and results are being obtained in research into the quality of MOOCs.

Finally, chapter seven sets out the most significant features of the MOOC movement since its appearance in Spain in 2012, its current position in higher education, and the best-established models at present. The institutions that have implemented MOOC-based educational provision in higher education are considered, a list of website addresses and search engines for courses in this format is given, and finally a study of the MOOC platforms most frequently used by Spanish universities is provided.

In conclusion, this work offers an in-depth analysis of the MOOC phenomenon and their importance in the field of higher education, concentrating on the desirability of establishing a type of MOOC based on connectivist and constructivist models where students play a key role in jointly constructing knowledge, promoting a type of autonomous, collaborative, cooperative, participative, and ubiquitous online learning where the teacher acts as a tutor. Consequently, the implementation and effectiveness of MOOCs does not so much rely on increasing the number of them but on achieving a pedagogical aim regarding quality that encourages new virtual learning environments where participants, with a Web 2.0 attitude, are interconnected, beyond the economic, institutional, or technological aspects on which the current debate focuses.

Noelia Margarita Moreno Martínez ■

Cano García, E. and Fernández Ferrer, M. (Eds.) (2016).

Evaluación por competencias: la perspectiva de las primeras promociones de graduados en el EEES
[Competence based evaluation: The perspective of the first cohorts of graduates under the EHEA].

Barcelona: Ediciones Octaedro. 156 pp.

Spanish universities have now turned out their first cohorts of graduates edu-

cated under the terms of the European Higher Education Area (EHEA). As is stated and argued in the prologue to this work, this makes it an ideal time to collect information about the competences these students acquired on these new degree programmes based on their perceptions, those of graduates from the old licenciature degrees, and those of academic staff, programme coordinators, employers, and experts. The preface to this work also describes the hypotheses presented, the main aims of the study, the common framework of competences created for all participating universities and qualifications, the methodological perspective or paradigm, the research methodology, the data collection instruments, and the participating respondents.

Starting from data collection, this book is arranged in nine chapters, where the authors use quotes and references to guide the reader clearly through the topic of skills-based evaluation and the main results of the research performed while also providing explanations.

In chapter one, Ibarra and Rodríguez introduce some basic questions about developing competence-based evaluation, this topic currently being of interest given the need to move from a model focussed on evaluating knowledge to a model focussed on evaluating competences. In this way, they frame the object of study and make an important contribution concerning the use of technology in evaluation processes.

In chapter two, Pons, Barrios, and Iranzo set out a statistical analysis of the data from the questionnaire sent to new graduates from the four courses analysed at the seven state-run public universities that participated in the research. The results are compared with other previous studies (PROLEX, REFLEX, and others) in the categories analysed.

In chapter three, Giné, García, and Halbaut try to answer the question of how evaluation contributes to learning and the development of competences. In this case, the results are displayed organised by the students' discussion groups to delineate possible explanations for the development of skills-based evaluation processes (especially cross-cutting ones) and what the new graduates associate with them. In other words, students' voices are collected with regards to where we should attribute the effect of evaluation on the development (or not) of competences. This chapter also presents, among other elements ordered from most frequent to least frequent, the characteristics combined by the strategies that, in their view, are most closely connected to the development of competences.

In chapter four, Fabregat, Guardia, and Forés set out the opinions of academic staff regarding evaluation. Based on the open-ended and closed questionnaires and a comparison with other studies that consulted university teaching staff, the current state of play is described according to the opinions of the teaching staff from the universities and courses participating in the project. Their voices, alongside the views of the graduates, can offer

clues to the eventual opportunity to introduce changes in the evaluation process and, where appropriate, introduce ways of achieving them.

In chapter five, Tierno and Ion, based on a lexical-metric analysis of the interviews with programme coordinators, present their opinions and suggest what the role of these academic leaders is and could be in the university setting. In fact, these authors refer to specialised literature on teaching collaboration and coordination in the university and reflect, with the voices of the academic leaders consulted, on what trends are apparent in the competence evaluation process.

In chapter six, Cabrera, Portillo, and Padres build on the results of the interviews held with employers, attempting to interpret the distinguishing elements that they supply regarding competence evaluation processes and instruments. The employers' view about the *what* and *how* is analysed in this chapter: *what* competences are most highly valued in graduates and *how* they should be evaluated, both in universities and in selection processes.

In chapter seven, Benedito and Parcerisa present the opinions of experts in university pedagogy about the process of competence-based evaluation. This chapter covers the positive aspects of competence-based design and the risks and difficulties that can be encountered when applying it. In other words, the authors of this section review the strong and weak points that teachers from the field of pedagogy see in the competence-based

focus, and set out their proposal for future lines based on this analysis, asking where these might lead, to improve the quality of higher education.

Chapter eight is especially valuable as it offers an overview of the findings of the work, setting out the convergences and divergences in the perspectives of the different agents who participate in the project. In this chapter, Fernández provides an overview and an organised and verified joint holistic analysis of the collection of information that has created explanatory results based on the previous six chapters. She provides a possible triangulation of the various agents from the seven universities and the four courses consulted who participated in the project, with the aim of making suggestions to improve future evaluation processes. In effect, Fernández indicates that this triangulation could be a key element to ensure that future designs result in a graduate profile that is closer to and in line with the demands of all agents involved in higher education.

Chapter nine is important as it offers an overview of the book's content. Cano provides an exhaustive and in-depth analysis of the future challenges in competence-based evaluation, based on the results of this book's research. Here, the reader can find a diagnosis of challenges and a list of proposals that might contribute to improving evaluation processes for developing competences.

In my opinion, this book enables a reflection on evaluation in higher education, defined as the corner stone of

the system, making new contributions regarding the paths that competence development and in-depth and authentic learning by students should follow. It combines a recent theoretical corpus with substantiated documentation and the findings this research reveals, allowing for a good overview of the state of the question for the topic under consideration.

In particular, from chapter two to chapter seven, the authors participating in the research provide the reader with the findings of the project, organised according to the six types of respondent (recent graduates, licence degree holders, teaching staff, programme coordinators, employers, experts in university pedagogy), using textual quotations from the narratives produced by the different data collection tools used. Also, each of these six chapters is complemented by the analysis of other studies based on consulting current literature, allowing for a deeper understanding of the state of the art in the topics covered. Finally, these results are combined in chapter eight where an organised and tested overview of them is provided, allowing for a better understanding of the topic being consideration.

In short, this book is highly recommended. It offers an analysis of the impact of educational evaluation on the development of competences in the university setting, of ways to advance the design and practice of competence-based focuses in higher education, and provides a better understanding of the impacts of competence-based designs (fundamentally in re-

lation to evaluation methodologies). Consequently, it will of use to teachers and researchers, as well as schools and scholars and researches who are interested in higher education.

Laia Lluch Molins ■

Orden Jiménez, R. V., García Norro, J. J., and Ingala Gómez, E. (Eds.) (2016).

Diotima o de la dificultad de enseñar filosofía
[Diotima or the difficulty of teaching philosophy].
Madrid: Escolar y Mayo. 367 pp.

Although philosophy seems to be indivisible from how it is taught and communicated, a sufficient distinction is not always made between research into philosophy and the processes of teaching it. Consequently, an explicit reflection on the methodology of learning philosophy is sometimes missing. This is precisely during a period when the discipline's position in syllabuses has been reduced to the extent that it is now almost absent. It is increasingly necessary and relevant to study how it is taught and its importance as a subject.

This book, coordinated by Rafael V. del Orden, Juan José García Norro, and Emma Ingala, includes many of the papers presented by speakers at the Jornadas Internacionales de Innovación Didáctica en la Enseñanza de la Filosofía [International philosophy teaching workshops], held in late 2014 at the Faculty of Philosophy of the Complutense

University of Madrid. This conference brought together academics, secondary-school teachers, philosophers working in non-formal teaching settings, and students on the master's degree in teacher training to share their reflections on questions relating to the teaching of philosophy at present, such as the implementation of the European Higher Education Area in the field of philosophy, the move from knowledge-transfer to teaching competences, the problem of evaluating philosophy learning, the position of philosophy teaching in Spain and other countries, philosophy competitions or debating contests, and experiences of teaching innovation, among others.

Accepting Kant's famous adage that philosophy can only be learnt by philosophising, many philosophy teachers have traditionally been aware that, above all, they teach their students competences rather than content, anticipating how the EHEA insists strongly on the value of competences, as though calling for a fundamental change of approach the teaching-learning process.

Diotima o de la dificultad de enseñar filosofía, the title of which refers to Socrates' teacher who taught him all he knew about love, contains four sections: «The role of the philosophy teacher», «Philosophy's place in teaching», «Philosophy teaching by country», and «Didactic experiences and innovations». Although the book contains almost thirty papers, here we will limit ourselves, on grounds of space, to four of them.

In «Transformaciones didácticas» [Didactic transformations] Johannes Rohbeck, from the TU Dresden, takes as his starting point philosophy teaching as a process of mediation of knowledge that involves the teacher's effort to explain philosophical ideas and concepts, and arguments from the philosophical tradition, without forgetting the ultimate aim of teaching how to philosophise. He distinguishes three basic types of mediation between philosophy and teaching, that correspond to three philosophical focuses and involve their respective didactic theories.

When starting from philosophy as an academic and theoretical speciality that is shaped by the philosophical tradition and the current system, the teacher's role involves a sort of reproduction of philosophy. Consequently, a mere *didactic of reproduction* that uses the deductive method is debated.

When the essence of philosophy is defined as dialogue, focussing on the practice of teaching, the teacher's task entails discussion with the students. A *thesis of constitution* is discussed here that would use the inductive method.

If we distinguish between philosophy and the teaching of philosophy as two autonomous and independent spheres, the didactic potential of the practice of teaching under the assumption of a productive distance from philosophy increases. Rohbeck therefore proposes his *transformation model*, to which an «abductive» method (in the sense of the American pragmatist Charles S. Peirce) would correspond.

Rohbeck understands «didactic transformation» as a strategy in the didactic discourse that shapes the choice and modification of what is transmitted: «That which is regarded as fundamental in academic philosophy (for example, formal logic) might have a secondary role in teaching practice. In contrast, that which is regarded as something very specific and particular in philosophy (for example, certain methods), might become a fundamental procedure in teaching practice. And, finally, topics that for university philosophers are merely marginal (like certain textual genres, beyond the habitual treatises), might be the centre of attention in a school» (p. 15). He assumes, therefore, that concepts and arguments acquire their meaning through the context in which they are positioned within certain discourses, as the discursive field decides the semantic function.

This «didactic transformation» involves extrapolating and reformulating the currents of thought of contemporary philosophy in the philosophical procedures or practices that are learnt in class and that students can apply autonomously, such as analytical philosophy, constructivism, phenomenology, dialectics, hermeneutics, deconstruction, or experimental philosophy, among others. In this case, philosophical competences are vital, and must be transmitted in the classroom through dialogue, conversation, reading texts, or writing essays.

Ultimately, it is a matter of «extracting the living implementation from a di-

rected methodical philosophical practice and turning it into achieved competences» (p. 18), bringing philosophical theories into habitual, everyday practices. Methods are not just technical skills but instead a fundamental attitude of philosophy, and so their transmission helps fulfil the objective of students learning to do philosophy for themselves.

García Norro, of the Complutense University of Madrid, complains that teaching focusses exclusively on aptitudes and that teaching of attitudes of has been neglected, as while aptitudes give students knowledge and power, they do not give them the will without which action is impossible. One mindset that has become pervasive is «the conviction that, all things considered, we do not have the right to implant attitudes and that we do not know how to verify whether we have achieved this if we do try it. To a *moral* inability (I have no right to do this) is added an *effective* inability (I would not know how to do it, above all because I lack the resources to verify whether I have achieved it)» («Aptitudes y actitudes del profesor de filosofía» [Aptitudes and attitudes of the philosophy teacher], p. 28). This condemns teaching to failure. We all teach each other continuously, even without intending to, as it is a necessary consequence of personal interaction. The teacher is not the only educational agent and society creates a series of attitudes in the student that might not be the most desirable ones.

García Norro suggests teaching six fundamental attitudes for future second-

ary school teachers: reflexivity, research, respect for the law, collaborative work, civic commitment, and professional conscience. The two complementary ways attitudes can be taught are through reflection (ever since Plato's dialogues, philosophy has reflected on the virtues, their definition, purpose, and nature) and by example (in other words, exercising these virtues). In the same way that the theoretical teaching of aptitudes is complemented by exercising them, in the realm of attitudes it is also necessary for students to see them fulfilled in the behaviour of their teachers.

Enrico Berti of the University of Padova argues for using the history of philosophy, not just to teach philosophy but also to teach other disciplines such as history, literature, physics, or biology. This does not mean that it is necessary to give oneself over to a merely doxographic, relativistic, and sceptical form of teaching, but instead that a philosophical method must be adopted that involves evaluating the internal coherence of systems, of the attitude for facing the problems in which their origin and their truth or falsehood reside. In other words, a critique of the systems and a proposal of alternative solutions.

We must, Berti warns, be conscious of the limits of this position; a completely impartial presentation of philosophy is impossible, in order to create a history of philosophy it is always necessary to have a concept of philosophy, in other words, to have a philosophy, whether elaborated by oneself or by someone else.

A complete and homogeneous knowledge of all of the history of philosophy is also impossible.

For his part, Tomás Calvo Martínez reflects on the «Funciones formativa e informativa de la Historia de la Filosofía» [Educational and informative functions of the history of philosophy]. He notes that historical interest in philosophy is usually associated with a culturalist vision of philosophical thought that sees it as another cultural manifestation, while most philosophers reject this reductionism and defend the specificity of philosophy, even if they do see it in different ways.

«Doxography» (exposition of differing opinions), the «philological history of philosophy» (based on the rigorous study of texts and materials), and the «philosophical history of philosophy» (that seeks its meaning and is based on different moments of the systematic unfolding of reason itself) would be the three main ways of conceiving the history of philosophy.

Calvo argues for a certain integration between the philological and philosophical concepts of the history of philosophy, eliminating their deficiencies and strengthening the educational and informative aspects of the discipline. «Harmonically integrating both perspectives will make it possible to discuss philosophy in its own history, and more broadly, the different historical-cultural contexts in which philosophical reflection has developed. And it will also serve to educate students in argumentation and critical

reflection on the ultimate and most fundamental philosophical questions that humankind has historically raised and continues to raise» (p. 90). To do this, he proposes reconciling doxography and the history of philosophy with the moment of «appropriation» and reconciling philosophical history with the moment of overcoming estrangement and «distance» as constitutive moments of the hermeneutic task of comprehension.

From the other papers in this book, the following ones are particularly noteworthy: Ignacio Pajón Leyra's paper on the recovery of rhetoric in the teaching of philosophy, Javier Gracia Calandín on the systematisation of experiences in ethics based on a Comenius exchange, Annalisa Caputo on the laboratory experience of *Philosophia ludens* philosophy didactics at the University of Bari, and Gemma Muñoz Alonso on the impact of the digital environment on philosophy teaching.

Ultimately, *Diotima o de la dificultad de enseñar filosofía* is a very interesting book that helps us think about philosophical education and provides guidance on the challenges this sets us for the future. Although the distinction in philosophy between the mode of discovery or research and the mode of exposition or transmission of knowledge is not as marked as in other areas, philosophy teachers must reflect on how they teach their discipline without delegating this task exclusively to the figures of pedagogues or experts in didactics.

Didactic reflection belongs to the essence not only of teaching philosophy but

also to philosophy itself. Philosophy that includes a reflection in other areas of knowledge and consequently establishes itself as a *metaknowledge* (philosophy of science, philosophy of history, philosophy of religion, philosophy of art, etc.), must

also by definition include a *metaphilosophy*. In a manner of speaking, both the teaching of philosophy and didactic reflection are integral parts of philosophy.

Ernesto Baltar ■