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Résumé de l'article

Over the last decade, several studies have focused on massive open online courses (MOOCs). The synthesis presented here concentrates on these studies and aims to examine the place held by content in these studies, especially those produced between 2012 and 2018: sixty-five peer reviewed papers are identified through five major educational technology research journals. The analysis revealed that these research articles covered a wide diversity of content. Content was mainly defined in terms of objectives of MOOCs, prerequisites required for participation in the MOOC, types of learning scenarios, and, though rarely, through the strategies used to convey content. In addition, empirical studies adopted a variety of conceptual frameworks which focused mainly on learning strategies without relating to the content in question. Finally, content was seldom considered as a research object. These results can provide MOOC researchers and instructors with insights for the study and design of MOOCs by taking into account the specificity of their content.

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Research on MOOCs in Major Referred Journals: The Role and Place of Content

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Abstract

Over the last decade, several studies have focused on massive open online courses (MOOCs). The synthesis presented here concentrates on these studies and aims to examine the place held by content in these studies, especially those produced between 2012 and 2018: sixty-five peer reviewed papers are identified through five major educational technology research journals. The analysis revealed that these research articles covered a wide diversity of content. Content was mainly defined in terms of objectives of MOOCs, prerequisites required for participation in the MOOC, types of learning scenarios, and, though rarely, through the strategies used to convey content. In addition, empirical studies adopted a variety of conceptual frameworks which focused mainly on learning strategies without relating to the content in question. Finally, content was seldom considered as a research object. These results can provide MOOC researchers and instructors with insights for the study and design of MOOCs by taking into account the specificity of their content.

Keywords: MOOC, research review, didactics, content

Introduction

The rise of MOOCs[1] is part of an unprecedented development of collaborative teaching and learning practices based on the intensive use of connected technologies. This growth is concomitant with a context of massification of university education where MOOCs are perceived as able to promote personal and social emancipation, as well as lifelong learning, particularly for those who are unable to attend universities regularly to follow a face-to-face curriculum. Following up on learners in these open and massive training systems benefits from the development of tools and methods for systematic text mining, automatic language processing, and recommendations generation combining user profiles, content descriptions, classification, filtering, trace analysis, and so on.

In this context of rapid change, academic institutions, mainly in the United States and Europe, have enthusiastically committed to supporting MOOCs to diffuse a large variety of content to a wide range of audiences. Nevertheless, the original idea that raised high expectations on the part of university training institutions, that of the potential for innovation and openness, has been transformed into a mechanistic strategy aiming at increasing the number of MOOC participants. Great difficulties prevent the transformation of the pedagogical discourse around MOOCs into relevant pedagogical practices. One of the main difficulties seems to be the naturalization of the principles underlying the elaboration, transmission, and construction of the content being conveyed.

This context has raised and guided several studies of MOOCs, a form of teaching and learning that is dynamic and experiencing rapid growth. This is evidenced by the production of multiple literature reviews since 2008, published in journals specializing in educational technologies (Bozkurt, Akgün-Özbek, & Zawacki-Richter, 2017; Davis, Chen, Hauffand, & Houben, 2018; Ebben & Murphy, 2014; Gašević, Kovanovic, Joksimovic, & Siemens, 2014; Israel, 2015; Jacoby, 2014; Kennedy, 2014; Liyanagunawardena, Adams, & Williams, 2013; Nortvig & Christiansen, 2017; Paton, Fluck, & Scanlan, 2018; Raffaghelli, Cucchiara, & Persico, 2015; Rolfe, 2015; Veletsianos & Shepherdson, 2015, 2016; Yousef, Chatti, Schroeder, Wosnitza, & Jakobs, 2014; Zawacki-Richter, Bozkurt, Alturki, & Aldraiweesh, 2018; Zhu, Sari, & Lee, 2018).

These research reviews have highlighted the fact that MOOCs have been analysed both in terms of design and from the perspective of scientific knowledge production. Two objectives emerge from the previous research. On the one hand, some of these studies sought to undertake a comprehensive analysis in order to take stock of the studies at a specific moment (Bozkurt et al., 2017; Ebben & Murphy, 2014; Gašević et al., 2014; Liyanagunawardena et al., 2013; Veletsianos & Shepherdson, 2016; Yousef et al., 2014; Zawacki-Richter et al., 2018). The first study on MOOC research trends, by Liyanagunawardena et al. (2013), reviewed 45 published MOOC studies (published between 2008 and 2012) in order to identify the themes of the MOOCs and the phases of their evolution. One year later, Ebben and Murphy (2014) examined empirical studies (published between 2009 and 2013) to determine the themes in MOOC research in two phases, titled "Connectivist MOOCs, Engagement and Creativity, 2009–2011" and "xMOOCs, Learning Analytics, Assessment and Critical Discourses about MOOCs, 2012–2013." Around the same time, Yousef et al. (2014) reviewed 84 MOOC studies to gain a deep understanding of key concepts in this emerging field. Gašević et al. (2014) outlined the specific finding of an analysis of the research proposals submitted to the MOOC Research Initiative (MRI) funded by the Gates Foundation and administered by Athabasca University. Furthermore, Veletsianos and Shepherdson (2016) reviewed 183 empirical MOOC papers published between 2013 and 2015 in

order to explore the geographical distribution, research components, article citations, and research methodologies of MOOC studies.

The following year, Bozkurt et al. (2017) conducted a systematic review of 362 empirical articles with the aim of identifying trends and patterns in research on MOOCs (2008 to 2015). Similar to this research, but with a different scope, Zawacki-Richter et al. (2018) published another review using a text-mining tool to analyse the titles and abstracts of publications in academic journals. On the other hand, other studies sought to focus on a specific theme or a particular issue: (a) taking stock of the characteristics attributed to MOOCs such as openness or retention (Kennedy, 2014); (b) examining collaboration between educational institutions on MOOCs launched in Europe and in the US for the previous 10 years (Nortvig & Christiansen, 2017); (c) analysing the literature on MOOC learner retention and engagement from a vocational education and training perspective (Paton et al., 2018); (d) exploring innovations in scalable learning strategies (strategies that engage students in the process of learning through activities and/or discussion in class) that aim to create a more active learning experience (Davis et al., 2018); (e) questioning the so-called disruptive innovation nature of MOOCs in training or certification programmes and the economic models adopted (Jacoby, 2014); (f) questioning the social and ethical dimensions of MOOCs (Rolfe, 2015); (g) summarising the studies that focused on the environments that integrate MOOCs into traditional classes/courses (Israel, 2015); (h) reporting on the methodological approaches adopted in the scientific literature on MOOCs (Raffaghelli et al., 2015; Zhu et al., 2018); and (i) analysing the interdisciplinary nature of research on MOOCs (Veletsianos & Shepherdson, 2015).

These literature reviews provide a valuable synthesis of trends and patterns in research on MOOCs. However, given that content constitutes a core component of MOOCs, it would be beneficial to investigate how it is questioned and analysed. Some literature reviews examined the learning process in MOOCs such as Lee, Watson, and Watson (2019) who conducted a systematic review of empirical research on self-regulated learning strategies in MOOCs or Wong (2016), who examined the literature covering the characteristics of teaching in MOOCs, the profile of participants, the instructional design of course materials, and/or the course assessment methods. However, the literature concerned with MOOC content needs to be explored in order not only to reveal the various content areas covered by empirical studies, but also to better understand the research issues about content and determine the gaps in the research so as to address them in the future.

Thus, the objective of this review is to provide a more comprehensive study of the literature related to MOOC content by scrutinizing the articles published in peer-reviewed journals between January 2012 and January 2018. More specifically, this literature review will attempt to respond to the following research questions: What are the content areas covered by empirical studies of MOOCs? How was content defined in the analysed research? Do the adopted conceptual frameworks take into account the specificity of the content conveyed by MOOCs? Does the content conveyed by the MOOCs analysed constitute a fully-fledged research object and if so, how?

Research Methodology

Selecting Journals and Articles

Five major referred journals were reviewed for this study. We selected journals based on their five-year h-index and h-median Google Scholar metrics. Among the five journals selected are the four journals considered top publications in the educational technology field. Based on the research methodology adopted by Nikou and Economides (2018) who focused on mobile-based assessment, we searched the journals in Google Scholar's main category of social sciences, within the subcategory educational technology. Figure 1 shows these four top journals with their h-index and h-median.

Categories > Social Sciences > **Educational Technology**

	Publication	h5-index	h5-median
1.	Computers & Education	91	152
2.	British Journal of Educational Technology	57	79
3.	The International Review of Research in Open and Distributed Learning	46	64
4.	The Internet and Higher Education	45	88

Figure 1. The top four educational technology research journals in 2019.

We added the journal *Distance Education* since it is considered one of the five key journals in Scopus that publishes research related to MOOCs (Zhu et al., 2018). Hence, the journals selected for this review are *Computers & Education (CAE)*, *British Journal of Educational Technology (BJET)*, *The International Review of Research in Open and Distributed Learning (IRRODL)*, *The Internet and Higher Education (IHEDUC)*, and *Distance Education (DE)*. These journals are all ranked in the first quartile (Q1) in the SCImago Journal Rank (SJR) indicator. Table 1 shows their SJR (SCImago) and impact factors (2019 Clarivate Analytics, Journal Citation Reports).

Table 1

Characteristics of the Selected Journals

Journal	SJR (2017)	JCR (2017)
BJET	1.34	2,729
CAE	2.63	4,538
DE	0.7	1.314
IRRODL	1.26	1,826
IHEDUC	3.35	5,847

We then selected articles published in one of the five selected journals (*CAE, BJET, IRRODL, IHEDUC, DE*) according to three criteria: (a) published between January 1, 2012 and January 1, 2018; (b) dealing explicitly with MOOCs, so that the keyword MOOC(s) or massive open online course(s) must be in the title or abstract; and (c) written in English.

The year 2012 was selected as a starting point since it was considered as the "Year of the MOOC" by the New York Times (Canbek & Hargis, 2015). In order to select only articles that correspond to our research goals, criteria were applied in two stages. In the first stage, we excluded: (a) studies that failed to provide precise research questions or objects of research and methodologies; (b) papers oriented towards engineering that addressed topics such as software development, software engineers, and platform development, return of experience or expertise (which focused on MOOCs design and participant satisfaction); (c) doctoral theses and books; and (d) articles not reporting empirical research.

To complete the selection phase, the three members of the research team read the abstract of each article so as to consider only empirical research. If no decision could be made by examining the abstract, the full paper was examined. Previous research reviews (12 articles) were also retained in order to provide some insights into the trends already observed in the literature. The researchers then independently validated the inclusion/exclusion criteria for each article. The intercoder agreement rate for coding was 92.30%. The result was 65 articles which fit the criteria above (53 empirical research articles and 12 research reviews). Table 2 shows the distribution of the articles that were found to be relevant for this study in the selected top journals. Table 2 reveals that most articles were published in *The International Review of Research in Open and Distributed Learning* (n=27) followed by *Computers & Education* (n=13), *Distance Education* (n=9), *British Journal of Educational Technology* (n=8), and *The Internet and Higher Education* (n=8).

An in-depth analysis of the 65 articles was undertaken on the basis of an analytical framework that facilitated data coding. The grid included both multiple-choice and open-ended questions (19 items) and had four sections: (a) writing characteristics (i.e., references, authors' affiliation, authors, field of study, type of document, nature of document); (b) conceptual framework adopted (i.e., theoretical foundations, research concepts, questions, objectives); (c) information on the empirical elements of the research (i.e., data collection method, data processing method, and key findings); and (d) the role of the training content analysed, namely whether or not it was an object of research.

Analysis Method

Using a thematic content analysis technique (Hasni et al., 2016), the analysis was carried out through the following two steps. First, for each item in the grid, excerpts identified in all of the articles were collected and read repeatedly by the analysts in order to propose thematic categories. Then, the excerpts were divided into units of meaning, that is, shorter segments of text that can be associated with a category. For example, for research in which the question "What did learners perceive as the most impactful instructional strategy in the MOOC?" (Watson, Kim, & Watson, 2016) is considered as a unit of meaning, the three raters assigned this research question to the thematic category labelled learning experience. While the research question "What are the self-regulated learning strategies that characterize MOOC learners?" (Costley & Lange, 2017) was assigned to the category "learning process." Determining inter-rater agreement allowed for checking that each category was associated with the proper thematic types. We note that the categories must be explicit and mutually exclusive (i.e., each

unit of meaning must only fall under one category), and they must make sense in terms of research in the field.

Research on Content Conveyed by MOOCs

Content Areas Covered by Empirical Studies

The content in the MOOCs analysed in the selected studies fell into three categories: humanities and social sciences, science and technology, and information and communication sciences. A wide variety of content was described in these empirical studies. Tables 2, 3,4 show that the content in the field of humanities and social sciences focused on education, sociology, art and design, policy, business and economics, and psychology. The science and technology category included mathematics, biology and medical sciences, chemistry, computer sciences, and engineering content. The content in the field of information and communication sciences focused on personal learning environments, networks, and knowledge creation and generation. The most frequently covered content categories were science and technology (52.5%), followed by social science, education, and humanities (45%), and information and communication sciences (2.5%).

Table 2

Content Category Social Science, Education, and Humanities

Category	Thematic types	Articles
Social science, education, and humanities (45%)	Education	(Almatrafi, Johri, & Rangwala, 2018; de Lima & Zorrilla, 2017; Kizilcec, Pérez-Sanagustín, & Maldonado, 2017; Rohs & Ganz, 2015)
	Sociology	(Soffer & Cohen, 2015; Watson, Watson, Yu, Alamri, & Mueller, 2017; Watson, Watson, Richardson, & Loizzo, 2016)
	Art and design (creative writing and reading, journalism, and poetry)	(Ashton & Davies, 2015; Chen & Chen, 2015; Hew, 2016; Huisman, Admiraal, Pilli, van de Ven, & Saab, 2018; Kwak, 2017; Phan, McNeil, & Robin, 2016;Yang & Su, 2017)
	Business and economics	(Kizilcec et al., 2017)
	Psychology	(Henderikx, Kreijns, & Kalz, 2017; Watson, Watson, Yu, Alamri, & Mueller, 2017; Zhang, Skryabin, & Song, 2016)

Note. One study may cover more than one content category.

Table 3

Content Category Science, Technology, and Mathematics

Category	Thematic types	Articles
Science, technology, and mathematics (52.5%)	Mathematics	(Firmin et al., 2014; Kellogg, Booth, & Oliver, 2014; Rieber, 2017; Wise, Cui, Jin, & Vytasek, 2017)
	Biology and medical sciences	(Almatrafi et al., 2018; Engle, Mankoff, & Carbrey, 2015; Jiang, Williams, Warschauer, He, & O'Dowd, 2014; Kahan, Soffer, & Nachmias, 2017; Milligan & Littlejohn, 2016; Soffer & Cohen, 2015; Watson, Kim, et al., 2016; Watson, Watson, Janakiraman, & Richardson, 2017; Wise et al., 2017)
	Physics and chemistry	(Formanek, Wenger, Buxner, Impey, & Sonam, 2017; Watted & Barak, 2018)
	Computer Sciences (programming and databases)	(Alario-Hoyos, Estévez-Ayres, Pérez-Sanagustín, Kloos, & Fernández-Panadero, 2017; Andersen & Ponti, 2014; Hew, 2016; Littlejohn, Hood, Milligan, & Mustain, 2016; Liyanagunawardena, Lundqvist, & Williams, 2015)
	Engineering	(Kizilcec et al., 2017; Watted & Barak, 2018)

Note. One study may cover more than one content category.

Table 4

Content Category Information and Communication Sciences

Category	Thematic types	Articles
Information and communication sciences (2.5%)	Personal learning environment, networks and Knowledge creation & generation	(Wang, Anderson, Chen, & Barbera, 2016)

Content Definition in Empirical Studies

In order to reveal the content conveyed by the MOOCs on which the research studies focused, we analysed the objectives and tasks underlying these MOOCs and the manner in which the content was conceptualised (or not). While content has not been considered as a central research issue, the objectives of the course and learners' roles were often presented or mentioned in the identified research. Objectives were formulated in terms of the knowledge and skills learners were to acquire. For example, in the Mathematics Learning Trajectories MOOC-Ed series, the MOOC titles *Equipartitioning* (Kellogg et al., 2014) dealt with the interpretation and implementation of core standards in mathematics. Soffer and Cohen (2015) explicitly set out the main objectives of a MOOC intended to introduce plant biology, and titled *What a Plant Knows and Other Things you Didn't Know About Plants*. The objectives of the MOOC *Fundamentals of Clinical Trials* analysed by Milligan and Littlejohn (2016) were explained in terms of the appropriation of concepts (the scientific, statistical, and ethical aspects of clinical trials research) and how the results of clinical trials are interpreted. Objectives were also formulated in terms of the soft skills or behaviours to be acquired, as in the *Human Trafficking* MOOC (Watson, Watson, Richardson, et al., 2016), the objective of which was to change learners' attitudes and motivate them to combat human trafficking. The *Animal Behaviour & Welfare* MOOC (Watson, Kim, et al., 2016) was designed to help students recognise that animal welfare is at the crossroads of several disciplines, such as ethics, sciences, law, and so on. The *Change 11* MOOC (Wang et al., 2016) sought to introduce and encourage interaction in the field of educational technology.

Content was also defined through the prerequisites required for participation in the MOOC. Although the MOOCs we analysed were of broad public interest and were open to all, a few MOOCs specified that some prerequisites were required before one could begin the course. For instance, the study by Engle et al. (2015) specified that the MOOC *Introductory Human Physiology* was designed to teach physiology to students enrolled in biomedical engineering. Littlejohn et al. (2016) also specified that to begin the *Introduction to Data Science* MOOC, learners required some basic knowledge (i.e., intermediate programming experience and some form of familiarity with databases). Wise et al., (2017) stated that to begin the "Statistical Learning (StatLearn)" MOOC, the necessary prerequisites included statistics, linear algebra, and computer science. Other studies indicated that certain MOOCs were addressed to a public with a specific professional level. The *Planning for the Digital Learning Transition* MOOC was designed for the professional development of K–12 teachers. The "Stat 95, Elementary Statistics" MOOC was primarily destined for decision makers in the fields of education and nursing, and for

administration personnel, psychologists, and sociologists; moreover, it required the satisfaction of ELM or math remediation, and two years of high school algebra (Firmin et al., 2014).

Learner roles and teaching scenarios also helped define the content of the MOOCs analysed. Learner roles were often structured as learning tasks and the resources required to complete these tasks. Tasks were set to achieve the objectives set in each teaching unit and as assessment tasks which helped ensure that objectives were met. Therefore, according to Phan et al. (2016), the pMOOC *Digital Storytelling* presented learning acquisition tasks consisting of watching digital stories on video platforms and a peer assessment activity in the form of students' mini projects produced and submitted each week, based on the topics created by the instructor.

Finally, content was defined through the strategies used to convey content (Hew, 2016). Indeed, for each MOOC (i.e., *Python Programming* and *Poetry and Design*), the author pointed out the strategies that can be used for each of the following factors: (a) problem-oriented learning with clear and comprehensive expositions rather than teaching a topic/concept in isolation, (b) instructor accessibility and passion, (c) peer interaction, (d) active learning using projects, and (e) course resources to address participants' learning needs.

Conceptual Frameworks to Analyse the Content Conveyed by MOOCs

Researching the issue of content in MOOCs can also be carried out by looking at the various conceptual frameworks mobilized in MOOCs. Indeed, in order to answer the multiple research questions noted, the empirical studies undertaken adopted a variety of conceptual frameworks. Among the articles that have adopted these conceptual frameworks (28/53); 21 of these were explicitly presented and the other 7 were identifiable through the text. The rest of the articles (25/53) did not state their conceptual framework. Table 5 shows that the conceptual frameworks refer mainly to learning theories such as self-regulation and social learning strategies (Milligan & Littlejohn, 2016; Zhou, 2016) without taking into account the specificity of the content being conveyed (e.g., mathematics, sciences, technology, literature).

Table 5

Conceptual Frameworks Mobilized

References	Conceptual framework mobilized
(Andersen & Ponti, 2014)	Social interaction in the learning process (Dysthe, 2001; Säljö, 2001). Zone of proximal development (Engeström, 1987). Mutual development (Andersen & Mørch, 2009).
(Chen & Chen, 2015)	Self-determination theory (Deci & Ryan, 1985, 2002).
(Kellogg et al., 2014)	Connectivist learning theory (Siemens, 2005). Classification of the process of network formation (Rivera, Soderstrom, & Uzzi, 2010).
(Milligan & Littlejohn, 2016)	Self-regulated learning (Zimmerman, 2000).
(Kizilcec et al., 2017; Littlejohn et al., 2016)	Connectivist learning theory (Siemens, 2005). Self-directed learning (Barnard-Brak, Paton, & Lan, 2010). Learner engagement (Milligan, Littlejohn, & Margaryan, 2013; Andersen & Ponti, 2014).
(Phan et al., 2016)	Instructional design (Dick, Carey & Carey, 2009).
(Wang et al., 2016)	A framework for interaction and cognitive engagement in a connectivist learning environments (Wang, Chen and Anderson, 2014).

Note. Conceptual frameworks of the other 20 articles are presented in the appendix.

Content Conveyed by MOOCs as a Fully-Fledged Research Object

Before focusing on the issue of content as research object, we provide an overview of the recurring research objects in previous research on MOOCs. In the 53 selected empirical articles, we identified four categories of research objects: (a) the learning process, (b) learning experiences, (c) predictors of retention, and (d) the design of MOOCs. We illustrate only the first category regarding its relevance to our perspective.

Categories of research objects. With regard to the learning process, two subcategories of research objects were identified: the determinants of learning, and interactions in the MOOCs. For instance, the research questions addressing the determinants of learning included how participants self-regulated their learning (Alario-Hoyos et al., 2017; Kizilcec et al., 2017; Littlejohn et al., 2016; Milligan & Littlejohn , 2016), people's motivations for participating or learning in a MOOC (Milligan & Littlejohn, 2017; Rieber, 2017; Shapiro et al., 2017; Stich & Reeves, 2017), and the learner behaviour in the course (de Lima & Zorrilla, 2017; Kahan, Soffer & Nachmias, 2017). Articles focusing on interactions

in MOOCs examined the modes of discussion that characterised the participation of learners in forums (Gillani & Eynon, 2014; Zhang et al., 2016), the modes of communication offered to learners, namely asynchronous or synchronous (Li et al., 2014), the processes of interaction between users and organisers in the case of cMOOCs (Andersen & Ponti, 2014), or the modes of interaction and their role in the co-construction of new knowledge (Kellogg et al., 2014). As can be seen by these various studies, one does not question whether or not (and if so, how) the content specifies the learning process and/or interactions.

The same observation could be made regarding the other three categories of research objects. Content is seldom taken into account for analysing types and conditions of MOOC designs (Henderikx et al., 2017; Soffer & Cohen, 2015; Walji, Deacon, Small, & Czerniewicz, 2016), predictors of retention as an emotional state, learning strategies (Engle et al., 2015; Firmin et al., 2014; Rohs & Ganz, 2015), or the experience of students by examining the self-assessment of their progress and the various difficulties encountered in MOOCs (Chen & Chen, 2015).

Content as a research object. As presented in the section above, the content conveyed by MOOCs is identifiable through the objectives, requirements, tasks, teaching scenarios, and resources of specific MOOCs, though rarely by way of learning strategies used to convey content. Thus, the content was often placed in the background, as a context of the study, along with other components such as evaluation, certification, and technological features. However, among the 53 empirical studies, 8 articles addressed the content of the MOOC as an object of research in its own right, meaning that at least one research question focused directly on content. Among these is the study conducted by Wise et al. (2017) who highlighted the difficulty of learners in a MOOC on statistics to distinguish between discussion forums in line with the course content and those whose content was unrelated to the course. Posts related to the content were those that sought/provided assistance, information, or resources directly related to the course subject. These included posts that asked or responded to questions related to the topic, to ideas related to the topic, and to comments on external resources. However, posts unrelated to the content addressed logistical and technical subjects. Wise et al. (2017) thus analysed the possibilities of using the linguistic characteristics of posts to distinguish them. They came to the conclusion that the linguistic model for classification that distinguishes the posts related to the content from those unrelated to content can be generalised to other statistics courses, even though they considered that the model would be less efficient in other areas. Similarly, Almatrafi et al. (2018) aimed to facilitate instructors' role in MOOCs. More specifically, this study sought to assist them in navigating students' posts in MOOC discussion forums in a more efficient and effective way. The study examined the possibility of building a model that can identify urgent posts in MOOC discussion forums. The authors then used linguistic features metadata to classify posts and identify urgent ones in MOOC forums. They concluded that this model can be used by instructors to accord priority to the urgent messages. Content was also designed as an object of research by Andersen and Ponti (2014) who analysed the co-creation of content by peers in MOOCs within the framework of a peer-to-peer university. By viewing learning as social interaction and as a zone of proximal development and mutual development, these authors analysed the interactions among participants in an open education course and questioned what this interaction involved, especially in terms of learning. Watson, Watson, Richardson, et al. (2016) distinguished the roles played by designers and facilitators in a MOOC and examined learners' actual experiences with regard to a given content topic, that of human trafficking, and a specific goal, namely to transform participants' attitudes in relation to the subject studied. They also examined participants' learning experience in the light of attitude change. According to these

authors, designing and facilitating a course in order to transform learners' attitudes requires instructors to establish cognitive, affective, and behavioural dissonance. They examined (from the perspective of learners, instructor, and instructional designer) the instructional design and facilitation of a MOOC designed to change attitudes on the social topic of human trafficking. Specifically, they analysed learners' perceptions to determine whether the instructional strategy—general, cognitive, affective, or behavioural—enabled attitude change. In the same way, Watson, Watson, Janakiraman, et al. (2017) examined instructors' use of social presence, teaching presence, and attitudinal dissonance in a MOOC titled "Animal Behavior and Welfare." From a learner's perspective, Kizilcec, Pérez-Sanagustín, and Maldonado (2017) explored the manner in which self-regulated learning (SRL) strategies are adopted by learners to interact with course content. The authors investigated this manifestation of SRL along two levels: level of individual transitions (such as revisiting an assessment after passing an assessment) and per-session activity (such as total time spent revisiting content). Veletsianos et al. (2015) identified the factors that shaped the ways participants used MOOC content. Based on learners' interactions in social networks outside of the MOOC platform, the authors found that the ways in which learners consumed MOOC videos were driven by personal and environmental factors. The design of each course seemed to impact the way participants used MOOC content. According to the authors, learners interact with content in multiple modes (e.g., video, digital transcript) and in different modalities (e.g., pausing and replaying videos, taking notes, reviewing printed transcripts).

But the clearest example of considering content as a research object is illustrated by Kwak (2017), who analysed how MOOC instructors teach academic writing. More specifically, Kwak (2017) examined the different approaches revealed within the methods in MOOCs designed for teaching writing. The author found that academic writing MOOCs rely on a traditional model of transmitting the writing content; most current writing MOOCs still focus on teaching and learning about textual structures (e.g., textual features, forms, correctness) rather than adopting the more extensive perspective of written language as social context (e.g., broader contexts of writing, social forces, power relations, critical awareness).

Table 6 summarises the different ways in which content was considered as a research object.

Table 6

Research Articles That Considered Content as an Object of Research

Research article	Examples of research questions focused on content
(Almatrafi et al., 2018)	Can linguistic features such as term frequency and features extracted from a linguistic tool along with some metadata identify reliably urgent posts in MOOC forums?
(Andersen & Ponti, 2014)	What processes of interaction occur in an online open educational course?
(Kizilcec et al., 2017)	How do self-reported SRL strategies manifest in interactions with course content?
(Kwak, 2017)	What approaches are revealed within the teaching methods in writing MOOCs: Traditional model of content transmission vs more extensive perspectives?
(Veletsianos et al., 2015)	What factors shaped the ways that participants consumed MOOC content?
(Watson, Watson, Richardson, et al., 2016)	How did a MOOC instructor establish social presence, teaching presence, cognitive dissonance, affective dissonance, and behavioral dissonance to facilitate attitude change around the social issue of human trafficking?
(Watson, Watson, Janakiraman, et al., 2017)	How did a MOOC instructor establish social presence, teaching presence, cognitive dissonance, affective dissonance, and behavioral dissonance to facilitate attitude change around the social issue of animal behaviour and welfare?
(Wise et al., 2017)	Do starting posts of content-related threads in a statistics MOOC discussion forum have linguistic features that distinguish them from starting posts of non-content-related threads?

Discussion

In the following, the results corresponding to each research question are briefly discussed. First, a wide diversity of content was covered by research articles on MOOCs as highlighted by a number of studies (Pappano, 2012; Riyami, Mansouri, & Poirier, 2016). For instance, Pappano (2012) stated that Coursera offers a wide range of courses, from computer science, to philosophy, to medicine. This finding can be explained by the fact that platforms and features of MOOCs advance quickly, allowing several new types of content to be integrated into MOOCs (Cisel & Bruillard, 2013). Our results also determined that science, technology, and mathematics, as well as social science, education, and humanities were the content categories covered most, which corresponds with findings from Pundak, Sabag, and Trotskovsky (2014). Second, content was mainly defined in terms of MOOCs' objectives, prerequisites required for participation in the MOOC, teaching scenarios, and, rarely, through strategies used to convey content. Furthermore, content was defined with regard to knowledge, skills, and behaviours to

be acquired, learning tasks, and the MOOCs' resources. Nevertheless, these research articles did not describe other categories of content such as values, practices, and relationships between an individual and a situation or an environment (Delcambre, 2013). Despite the fact that content can be a relational or transactional object (Fluckiger & Reuter, 2014), we noted that it was not defined, described, or even delimited by making reference to theoretical spaces, disciplines, or even learning actors, such as deducing the manner in which learners understand content from their interactions with the MOOC,. Also, no studies seem to have specified, for example, what they mean by programming content, digital technology content, and so on. Third, analysis of the conceptual frameworks mobilized clearly reveals a paucity of studies on the fate of the content created and transmitted in MOOCs. Although the conceptual frameworks used in the empirical studies focused on learning strategies (metacognitive and cognitive strategies), they did not relate these to the content in question. Fourth, our study highlighted that content is rarely considered as a research object in its own right. In the few articles that addressed content as research object, two orientations can be distinguished. On one hand, the content is analysed from how its transmission conditions are designed, such as presenting, interacting with content, or facilitating its transmission. On the other hand, the research deals with the correspondence between content (e.g., linguistic features of content, participants' pre-existing knowledge, beliefs, and attitudes) and the features of MOOC as transmission media. However, these research articles do not explicitly consider theoretical perspectives centered on knowledge, for instance, modeling the content's disciplinary structure, or the cognitive levels required to learn content through a MOOC. Such theoretical perspectives would ask questions regarding what disciplinary knowledge structure and what knowledge, skills, and abilities are required to learn a specific content (Svinicki, 2010). Furthermore, the learning difficulties concerning a specific content are not tackled. Indeed, only one research article identified the various difficulties encountered by participants learning the abstract concepts of Javascript programming (Andersen & Ponti, 2014). As a result, future research can consider dealing with the difficulties experienced by MOOC participants when learning specific content. However, we have shown that a great deal of research is focused, generally, on the learning process. This was emphasised by Raffaghelli et al. (2015) who outlined that massive courses are based not only on learners' self-regulation strategies, but also on their interaction with peers.

Conclusion

The research review presented here reveals several issues related to the research on content conveyed by MOOCs and offers a possible path for future research. But it has several limitations. The findings of our study are limited to searching using the keywords MOOC(s) or massive open online course(s), in articles published in English between January, 2012 and January, 2018. Furthermore, the scope of our study was intentionally limited to include five top educational research journals. Future work could consider a broader scope by including recent conferences, theses, and books using databases to allow for further analysis of global trends in research on MOOCs.

However, in both the literature reviews and the empirical articles presented previously, it seems that the content of MOOCs is little investigated in MOOC research. In particular, most MOOC research focused on the learning process, often related to the determinants of learning and interactions in MOOCs. MOOC researchers could benefit from exploring the difficulties experienced by participants when learning specific content. By investigating these difficulties, instructional designers could enhance

the design of MOOCs. More specifically, the didactic approach,[2] which has received little attention in the available studies, may help define the learning process and the factors that influence it. Indeed, a MOOC involves content characterized by both a didactic intention (main function) and specific components (actors, resources, content, technology, time, space, and so on; Zaid, 2017). We think that focusing on content, specifically according to a curricular didactic approach (Lebeaume, 2000; Martinand, 2012; Zaid, 2017) which examines content choices, how they are organized, and their consistency and relevance in relation to education and training missions and orientations may be a promising direction for future research. Several possible questions emerge, related to this research orientation. How does a MOOC specify or transform the content it conveys? What are the implications of an open and widely accessible course in terms of the principles of the development, transmission, and appropriation of this content? And finally, how do these principles enable learners to construct basic knowledge essential to the course?

References

Admiraal, W., Huisman, B., & Van de Ven, M. (2014). Self- and peer assessment in massive open online courses. *International Journal of Higher Education*, *3*(4), 119–128.

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology*, *22*(5), 453-474.

Alario-Hoyos, C., Estévez-Ayres, I., Pérez-Sanagustín, M., Kloos, C. D., & Fernández-Panadero, C. (2017). Understanding learners' motivation and learning strategies in MOOCs. *The International Review of Research in Open and Distributed Learning*, *18*(3), 120–137. doi:10.19173/irrodl.v18i3.2996

Almatrafi, O., Johri, A., & Rangwala, H. (2018). Needle in a haystack: Identifying learner posts that require urgent response in MOOC discussion forums. *Computers & Education*, *118*, 1–9. doi:10.1016/j.compedu.2017.11.002

Andersen, R., & Mørch, A. I. (2009, March). Mutual development: A case study in customer-initiated software product development. *In International Symposium on End User Development* (pp. 31-49). Springer, Berlin, Heidelberg.

Andersen, R., & Ponti, M. (2014). Participatory pedagogy in an open educational course: Challenges and opportunities. *Distance Education*, *35*(2), 234–249. doi:10.1080/01587919.2014.917703

Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45,* 369–386.

Ashton, S., & Davies, R. S. (2015). Using scaffolded rubrics to improve peer assessment in a MOOC writing course. *Distance Education*, *36*(3), 312–334. doi:10.1080/01587919.2015.1081733

Barak, M., Watted, A., & Haick, H. (2016). Motivation to learn in massive open online courses: Examining aspects of language and social engagement. *Computers & Education, 94*, 49–60

Barnard-Brak, L., Paton, V. O., & Lan, W. Y. (2010). Profiles in self-regulated learning in the online learning environment. *The International Review of Research in Open and Distributed Learning*, *11*(1), 61-80. doi: https://doi.org/10.19173/irrodl.v11i1.769

Bogdan, R. (2017). Integrating MOOCs in embedded systems blended Courses. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience, 8*(3), 101–107. Retrieved from http://www.edusoft.ro/brain/index.php/brain

Bozkurt, A., Akgün-Özbek, E., & Zawacki-Richter, O. (2017). Trends and patterns in massive open online courses: Review and content analysis of research on MOOCs. *The International Review of Research in Open and Distributed Learning*, *18*(5), 119–147. doi:10.19173/irrodl.v18i5.3080

Canbek, N. G., & Hargis, J. (2015). Educational innovation in e-learning: MOOCs and OER movements in Turkey. *Glokalde, 1*(1), 19–32. Retrieved from http://www.glokalde.com/

Chen, Y. H., & Chen, P. J. (2015). MOOC study group: Facilitation strategies, influential factors, and student perceived gains. *Computers & Education, 86*, 55–70. doi:10.1016/j.compedu.2015.03.008

Cisel, M., & Bruillard, É. (2013). Chronique des MOOC. *Sciences et Technologies de l'Information et de la Communication pour l'Éducation et la Formation, 19*. Retrieved from http://sticef.univ-lemans.fr/

Cohen, L., & Magen-Nagar, N. (2016). Self-regulated learning and a sense of achievement in MOOCs among high school science and technology students. *American Journal of Distance Education, 30*(2), 68-79.

Costley, J., & Lange, C. H. (2017). The effects of lecture diversity on germane load. *The International Review of Research in Open and Distributed Learning, 18*(2), 27-46. doi:10.19173/irrodl.v18i2.2860

Davis, D., Chen, G., Hauff, C., & Houben, G. J. (2018). Activating learning at scale: A review of innovations in online learning strategies. *Computers & Education, 125*, 327–344. doi:10.1016/j.compedu.2018.05.019

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.

Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, NY: University of Rochester Press

Delcambre, I. (2013). Contenus d'enseignement et d'apprentissages. In Y. Reuter, C. Cohen-Azria, B. Daunay, and D. Lahanier-Reuter (Eds.), *Dictionnaire des concepts fondamentaux des didactiques* (pp. 43–48). De Boeck Supérieur. Retrieved from https://www.cairn.info/dictionnaire-des-concepts-fondamentaux-des-didacti9782804169107.htm

de Lima, M., & Zorrilla, M. E. (2017). Social networks and the building of learning communities: An experimental study of a social MOOC. *The International Review of Research in Open and Distributed Learning, 18*(1), 40–64. doi:10.19173/irrodl.v18i1.2630

Dick, W., Carey, L., & Carey, J. O. (2009). *The systematic design of instruction. Upper Saddle River*. N.J.: Merrill/Pearson.

Dysthe, O. (2001). *Dialog, samspel og læring [Dialogue, interaction and learning]*. Oslo: Abstrakt Forlag.

Ebben, M., & Murphy, J. S. (2014). Unpacking MOOC scholarly discourse: A review of nascent MOOC scholarship. *Learning, Media and Technology*, *39*(3), 328–345. Retrieved from https://www.tandfonline.com/loi/cjem20

Engeström, Y. (1987). Learning by expanding: An activity-theoretical approach to developmental research. Helsinki: Orienta-Konsultit

Engle, D., Mankoff, C., & Carbrey, J. (2015). Coursera's introductory human physiology course: Factors that characterize successful completion of a MOOC. *The International Review of Research in Open and Distributed Learning*, *16*(2), 46–68. doi:10.19173/irrodl.v16i2.2010

Evans, S., & Myrick, J. G. (2015). How MOOC instructors view the pedagogy and purposes of massive open online courses. *Distance Education*, *36*(3), 295–311. doi:10.1080/01587919.2015.1081736

Firmin, R., Schiorring, E., Whitmer, J., Willett, T., Collins, E. D., & Sujitparapitaya, S. (2014). Case study: Using MOOCs for conventional college coursework. *Distance Education*, *35*(2), 178–201. doi:10.1080/01587919.2014.917707

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach*. New York, NY: Taylor & Francis. doi:10.4324/9780203838020

Fluckiger, C., & Reuter, Y. (2014). Les contenus «informatiques» et leur(s) reconstruction(s) par des élèves de CM2. Etude didactique. *Recherches en éducation*, *18*, 64–78. Retrieved from https://hal.univ-lille3.fr/

Formanek, M., Wenger, M. C., Buxner, S. R., Impey, C. D., & Sonam, T. (2017). Insights about large-scale online peer assessment from an analysis of an astronomy MOOC. *Computers & Education*, *113*, 243–262. doi:10.1016/j.compedu.2017.05.019

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. (2004). School engagement: Potential of the concept: State of the evidence. *Review of Educational Research*, *74*, 59– 119.

Freeman, L. C. (1977). A set of measures of centrality based on betweenness. *Sociometry*, *40*(1), 35-41. http://dx.doi.org/10.2307/3033543

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education model. *The Internet and Higher Education*, *2*(2–3), 87–105. doi:10.1016/S1096-7516(00)00016-6

Gasevic, D., Kovanovic, V., Joksimovic, S., & Siemens, G. (2014). Where is research on massive open online courses headed? A data analysis of the MOOC Research Initiative. *The International Review of Research in Open and Distributed Learning*, *15*(5), 135–176. doi:10.19173/irrodl.v15i5.1954

Gillani, N., & Eynon, R. (2014). Communication patterns in massively open online courses. *The Internet and Higher Education*, *23*, 18–26. doi:10.1016/j.iheduc.2014.05.004

Halasek, K., McCorkle, B., Selfe, C. L., DeWitt, S. L., Delagrange, S., Michaels, J., & Clinnin, K. (2014). A MOOC with a view: How MOOCs encourage us to reexamine pedagogical doxa. In S. D. Krause, & C. Lowe (Eds.). *Invasion of the MOOCs: The promises and perils of massive open online courses*. Anderson, South Carolina: Parlor Press

Hartnett, M., St. George, A., & Dron, J. (2011). Examining motivation in online distance learning environments: Complex, multifaceted, and situation-dependent. *The International Review of Research in Open and Distributed Learning*, *12*(6), 20–38. doi: https://doi.org/10.19173/irrodl.v12i6.1030

Hasni, A., Bousadra, F., Belletête, V., Benabdallah, A., Nicole, M. C., & Dumais, N. (2016). Trends in research on project-based science and technology teaching and learning at K–12 levels: A systematic review. *Studies in Science Education*, *52*(2), 199–231. doi:10.1080/03057267.2016.1226573

Henderikx, M. A., Kreijns, K., & Kalz, M. (2017). Refining success and dropout in massive open online courses based on the intention-behavior gap. *Distance Education*, *38*(3), 353–368. doi:10.1080/01587919.2017.1369006

Hew, K. F. (2016). Promoting engagement in online courses: What strategies can we learn from three highly rated MOOCS. *British Journal of Educational Technology*, *47*(2), 320–341. doi:10.1111/bjet.12235

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*(12), 1280-1300.

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. *Advances in Experimental Social Psychology*, *30*, 1-46.

Hone, K. S., & El Said, G. R. (2016). Exploring the factors affecting MOOC retention: A survey study. *Computers & Education*, *98*, 157–168. doi:10.1016/j.compedu.2016.03.016

Hood, N., Littlejohn, A., & Milligan, C. (2015). Context counts: How learners' contexts influence learning in a MOOC. *Computers & Education*, *91*, 83-91

Huisman, B., Admiraal, W., Pilli, O., van de Ven, M., & Saab, N. (2018). Peer assessment in MOOCs: The relationship between peer reviewers' ability and authors' essay performance. *British Journal of Educational Technology*, *49*(1), 101–110. doi:0.1111/bjet.12520

Israel, M. J. (2015). Effectiveness of integrating MOOCs in traditional classrooms for undergraduate students. *The International Review of Research in Open and Distributed Learning*, *16*(5), 102–118. doi:10.19173/irrodl.v16i5.2222

Jacoby, J. (2014). The disruptive potential of the massive open online course: A literature review. *Journal of Open, Flexible and Distance Learning*, *18*(1), 73–85. Retrieved from http://www.jofdl.nz/

Jiang, S., Williams, A. E., Warschauer, M., He, W., & O'Dowd, D. K. (2014). Influence of incentives on performance in a pre-college biology MOOC. *The International Review of Research in Open*

and Distributed Learning, 15(5), 100–112. doi:10.19173/irrodl.v15i5.1858

Kahan, T., Soffer, T., & Nachmias, R. (2017). Types of participant behavior in a massive open online course. *The International Review of Research in Open and Distributed Learning, 18*(6), 2–18. doi:10.19173/irrodl.v18i6.3087

Kamradt, T. F., & Kamradt, E. J. (1999). Structured design for attitudinal instruction. *In C. M. Reigeluth (Ed.), Instructional-design theories and models: A new paradigm of instructional theory*. Mahwah, NJ: Lawrence Erlbaum.

Kellogg, S., Booth, S., & Oliver, K. (2014). A social network perspective on peer supported learning in MOOCs for educators. *The International Review of Research in Open and Distributed Learning, 15*(5), 264–289. doi:10.19173/irrodl.v15i5.1852

Kennedy, J. (2014). Characteristics of massive open online courses (MOOCs): A research review, 2009–2012. *Journal of Interactive Online Learning, 13*(1), 1-16. Retrieved from http://www.ncolr.org/

Kizilcec, R. F., Pérez-Sanagustín, M., & Maldonado, J. J. (2017). Self-regulated learning strategies predict learner behavior and goal attainment in massive open online courses. *Computers & Education, 104*, 18–33. doi:10.1016/j.compedu.2016.10.001

Kwak, S. (2017). Approaches reflected in academic writing MOOCs. *The International Review of Research in Open and Distributed Learning, 18*(3), 139–155. doi:10.19173/irrodl.v18i3.2845

Lebeaume, J. (2000). *L'éducation technologique. Histoires et méthodes [Technological education. Stories and methods].* Paris: ESF.

Lee, D., Watson, S. L., & Watson, W. R. (2019). Systematic literature review on self-regulated learning in massive open online courses. *Australasian Journal of Educational Technology, 35*(1), 28–41. doi:10.14742/ajet.3749

Li, N., Verma, H., Skevi, A., Zufferey, G., Blom, J., & Dillenbourg, P. (2014). Watching MOOCs together: Investigating co-located MOOC study groups. *Distance Education, 35*(2), 217–233. doi:10.1080/01587919.2014.917708

Littlejohn, A., Hood, N., Milligan, C., & Mustain, P. (2016). Learning in MOOCs: Motivations and self-regulated learning in MOOCs. *The Internet and Higher Education, 29*, 40–48. doi:10.1016/j.iheduc.2015.12.003

Liyanagunawardena, T. R., Adams, A. A., & Williams, S. A. (2013). MOOCs: A systematic study of the published literature 2008–2012. *The International Review of Research in Open and Distributed Learning, 14*(3), 202–227. doi:10.19173/irrodl.v14i3.1455

Liyanagunawardena, T. R., Lundqvist, K. Ø., & Williams, S. A. (2015). Who are with us: MOOC learners on a FutureLearn course. *British Journal of Educational Technology, 46*(3), 557–569. doi:10.1111/bjet.12261

Marks, R.B., Sibley, S.D., & Arbaugh, J.B. (2005) A structural equation model of predictors for effective online learning. *Journal of Management Education*, *29*(4), 531-563.

Martinand, J. L. (2012). Éducation au Développement durable et didactiques du curriculum [Education for Sustainable Development and Curriculum Didactics]. *In Conférence au XIXe Colloque AFIRSE*. Lisbonne: Educagri.

Milligan, C., Littlejohn, A., & Margaryan, A. (2013). Patterns of engagement in connectivist MOOCs. *Journal of Online Learning & Teaching*, *9*(2), 149–159. doi: http://jolt.merlot.org/

Milligan, C., & Littlejohn, A. (2016). How health professionals regulate their learning in massive open online courses. *The Internet and Higher Education*, *31*, 113–121. doi:10.1016/j.iheduc.2016.07.005

Milligan, C., & Littlejohn, A. (2017). Why study on a MOOC? The motives of students and professionals. *The International Review of Research in Open and Distributed Learning*, *18*(2), 92–102. doi:10.19173/irrodl.v18i2.3033

Nikou, S. A., & Economides, A. A. (2018). Mobile-based assessment: A literature review of publications in major referred journals from 2009 to 2018. *Computers & Education*, *125*, 101–119. doi:10.1016/j.compedu.2018.06.006

Nortvig, A. M., & Christiansen, R. B. (2017). Institutional collaboration on MOOCs in education—A literature review. *The International Review of Research in Open and Distributed Learning*, *18*(6), 307–316. doi:10.19173/irrodl.v18i6.3110

Pappano, L. (2012). The year of the MOOC. *The New York Times*, *2*(12), 2012. Retrieved from https://www.edinaschools.org/cms/lib/MN01909547/Centricity/Domain/272/The%20Year%20of%20the%20MOOC%20NY%20Times.pdf

Paton, R. M., Fluck, A. E., & Scanlan, J. D. (2018). Engagement and retention in VET MOOCs and online courses: A systematic review of literature from 2013–2017. *Computers & Education*, *125*, 191–201. doi:10.1016/j.compedu.2018.06.013

Phan, T., McNeil, S. G., & Robin, B. R. (2016). Students' patterns of engagement and course performance in a massive open online course. *Computers & Education*, *95*, 36–44. doi:10.1016/j.compedu.2015.11.015

Pundak, D., Sabag, N., & Trotskovsky, E. (2014). Accreditation of MOOCs. *European Journal of Open, Distance and E-learning*, *17*(2), 117-129. Retrieved from www.eurodl.org

Raffaghelli, J. E., Cucchiara, S., & Persico, D. (2015). Methodological approaches in MOOC research: Retracing the myth of Proteus. *British Journal of Educational Technology*, *46*(3), 488–509. doi:10.1111/bjet.12279

Rieber, L. P. (2017). Participation patterns in a massive open online course (MOOC) about statistics. *British Journal of Educational Technology*, *48*(6), 1295–1304. doi:10.1111/bjet.12504

Rivera, M. T., Soderstrom, S. B., & Uzzi, B. (2010). Dynamics of dyads in social networks: Assortative, relational, and proximity mechanisms. *Annual Review of Sociology, 36*(1), 91–115. doi:10.1146/annurev.soc.34.040507.134743

Riyami, B., Mansouri, K., & Poirier, F. (2016). Towards integrating MOOC in the Moroccan higher educational system: Economic pedagogical model based on ICT for on-going education and teacher motivation. In *ICERI 2016.* Seville: IATED. Retrieved from https://halshs.archives-ouvertes.fr

Rolfe, V. (2015). A systematic review of the socio-ethical aspects of massive online open courses. *European Journal of Open, Distance and E-learning, 18*(1), 52–71. Retrieved from www.eurodl.org

Rogers, E. M. 1995. *Diffusion of innovations*. New York: Free Press

Rohs, M., & Ganz, M. (2015). MOOCs and the claim of education for all: A disillusion by empirical data. *The International Review of Research in Open and Distributed Learning, 16*(6), 1–19. doi:10.19173/irrodl.v16i6.2033

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54-67.

Siemens, G. (2005). Connectivism: Learning as network-creation. Retrieved from http://www.elearnspace.org/Articles/networks.htm

Shapiro, H. B., Lee, C. H., Roth, N. E. W., Li, K., Çetinkaya-Rundel, M., & Canelas, D. A. (2017). Understanding the massive open online course (MOOC) student experience: An examination of attitudes, motivations, and barriers. *Computers & Education, 110*, 35–50. doi:10.1016/j.compedu.2017.03.003

Simonson, M. R. (1979). Designing instruction for attitudinal outcomes. *Journal of Instructional Development, 2*(3), 15–19. doi:10.1007/BF02984375

Simonson, M., & Maushak, N. (1996). Instructional technology and attitude change. *In D. H. Jonassen (Ed.), Handbook of research for educational communications and technology (pp. 984–1016)*. Mayway, NJ: Lawrence Erlbaum.

Soffer, T., & Cohen, A. (2015). Implementation of Tel Aviv university MOOCs in academic curriculum: A pilot study. *The International Review of Research in Open and Distributed Learning, 16*(1), 80–97. doi:10.19173/irrodl.v16i1.2031

Song, L., & Hill, J. R. (2007). A conceptual model for understanding self-directed learning in online environments. *Journal of Interactive Online Learning, 6*(1), 27–42.

Stich, A. E., & Reeves, T. D. (2017). Massive open online courses and underserved students in the United States. *The Internet and Higher Education, 32*, 58–71. doi:10.1016/j.iheduc.2016.09.001

Stump, G. S., DeBoer, J., Whittinghill, J., & Breslow, L. (2013). Development of a framework to classify MOOC discussion forum posts: Methodology and challenges. *Proceedings of NIPS 2013 Workshop on Data Driven Education*. Retrieved from http://tll.mit.edu/sites/default/files/library/Coding_a_MOOC_Discussion_Forum.pdf

Svinicki, M. D. (2010). *A guidebook for conceptual frameworks for research in engineering education*. Retrieved from http://crlte.engin.umich.edu/wp-content/uploads/sites/7/2013/06/Svinicki-Conceptual-Frameworks.pdf

Veletsianos, G., Collier, A., & Schneider, E. (2015). Digging deeper into learners' experiences in MOOCs: Participation in social networks outside of MOOCs, notetaking and contexts surrounding content consumption. *British Journal of Educational Technology*, *46*(3), 570–587. doi:10.1111/bjet.12297

Veletsianos, G., & Shepherdson, P. (2015). Who studies MOOCs? Interdisciplinarity in MOOC research and its changes over time. *The International Review of Research in Open and Distributed Learning*, *16*(3), 1–17. doi:10.19173/irrodl.v16i3.2202

Veletsianos, G., & Shepherdson, P. (2016). A systematic analysis and synthesis of the empirical MOOC literature published in 2013–2015. *The International Review of Research in Open and Distributed Learning*, *17*(2), 199–221. doi:10.19173/irrodl.v17i2.2448

Walji, S., Deacon, A., Small, J., & Czerniewicz, L. (2016). Learning through engagement: MOOCs as an emergent form of provision. *Distance Education*, *37*(2), 208–223. doi:10.1080/01587919.2016.1184400

Wang, Z., Anderson, T., Chen, L., & Barbera, E. (2016). Interaction pattern analysis in cMOOCs based on the connectivist interaction and engagement framework. *British Journal of Educational Technology*, *48*(2), 683–699. doi:10.1111/bjet.12433

Wang, Z., Chen, L., & Anderson, T. (2014). A framework for interaction and cognitive engagement in connectivist learning contexts. *The International Review of Research in Open and Distributed Learning*, *15*(2). doi: https://doi.org/10.19173/irrodl.v15i2.1709

Wang, Z.J., & Chen, L. (2015). Theory framework building of instructional interaction in connectivist learning context. *The Journal of Open Educational Research, 5,* 25–34. doi: https://doi.org/10.19173/irrodl.v15i2.1709

Watson, W. R., Kim, W., & Watson, S. L. (2016). Learning outcomes of a MOOC designed for attitudinal change: A case study of an animal behavior and welfare MOOC. *Computers & Education, 96,* 83–93. doi:10.1016/j.compedu.2016.01.013

Watson, S. L., Watson, W. R., Janakiraman, S., & Richardson, J. (2017). A team of instructors' use of social presence, teaching presence, and attitudinal dissonance strategies: An animal behaviour and welfare MOOC. *The International Review of Research in Open and Distributed Learning*, *18*(2), 69–91. doi:10.19173/irrodl.v18i2.2663

Watson, S. L., Watson, W. R., Richardson, J., & Loizzo, J. (2016). Instructor's use of social presence, teaching presence, and attitudinal dissonance: A case study of an attitudinal change MOOC. *The International Review of Research in Open and Distributed Learning, 17*(3), 55–74. doi:10.19173/irrodl.v17i3.2379

Watson, S. L., Watson, W. R., Yu, J. H., Alamri, H., & Mueller, C. (2017). Learner profiles of attitudinal learning in a MOOC: An explanatory sequential mixed methods study. *Computers & Education, 114*, 274–285. doi:10.1016/j.compedu.2017.07.005

Watted, A., & Barak, M. (2018). Motivating factors of MOOC completers: Comparing between university-affiliated students and general participants. *The Internet and Higher Education, 37*, 11–20. doi:10.1016/j.iheduc.2017.12.001

Wise, A. F., Cui, Y., Jin, W., & Vytasek, J. (2017). Mining for gold: Identifying content-related MOOC discussion threads across domains through linguistic modeling. *The Internet and Higher Education, 32*, 11–28. doi:10.1016/j.iheduc.2016.08.001

Wong, B. T. M. (2016). Factors leading to effective teaching of MOOCs. *Asian Association of Open Universities Journal, 11*(1), 105–118. Retrieved from https://www.emeraldinsight.co

Xu, B., Zhang, Y., Li, F., & Yang, D. (2015). MOOC Ke Cheng Lun Tan Zhong Xue Xi Zhe Lun Tan Jiao Hu Wang Luo Jie Gou Te Zheng Fen Xi [The structural analysis of interactive network formed MOOC discussion forums]. *Computer Education, 15*, 23–35. doi:10.16512/j.cnki.jsjjy.2015.15.007

Yang, Q. (2014). Students motivation in asynchronous online discussions with MOOC mode. *American Journal of Educational Research, 2*(5), 325–330.

Yang, H. H., & Su, C. H. (2017). Learner behaviour in a MOOC practice-oriented course: In empirical study integrating TAM and TPB. *The International Review of Research in Open and Distributed Learning, 18*(5), 36–63. doi:10.19173/irrodl.v18i5.2991

Yousef, A. M. F., Chatti, M. A., Schroeder, U., Wosnitza, M., & Jakobs, H. (2014). A review of the state-of-the-art. In *Proceedings of the 6th International Conference on Computer Supported Education*. Barcelona: SCITEPRESS-Science and Technology Publications.

Zaid, A (2017). *Élaborer, transmettre et construire des contenus scientifiques et technologiques. Perspective didactique des dispositifs d'éducation et de formation [*Develop, transmit and build scientific content and technology. Didactic perspective of education and training systems]. Rennes: PUR.

Zawacki-Richter, O., Bozkurt, A., Alturki, U., & Aldraiweesh, A. (2018). What research says about MOOCs—An explorative content analysis. *The International Review of Research in Open and Distributed Learning, 19*(1), 243–259. doi:10.19173/irrodl.v19i1.3356

Zhang, J. (2016). Can MOOCs be interesting to students? An experimental investigation from regulatory focus perspective. *Computers & Education, 95*, 340–351. doi:/10.1016/j.compedu.2016.02.003

Zhang, J., Skryabin, M., & Song, X. (2016). Understanding the dynamics of MOOC discussion forums with simulation investigation for empirical network analysis (SIENA). *Distance Education, 37*(3), 270–286. doi:10.1080/01587919.2016.1226230

Zhou, M. (2016). Chinese university students' acceptance of MOOCs: A self-determination perspective. *Computers & Education, 92*, 194–203. doi:10.1016/j.compedu.2015.10.012

Zhu, M., Sari, A., & Lee, M. M. (2018). A systematic review of research methods and topics of the empirical MOOC literature (2014–2016). *The Internet and Higher Education, 37*, 31–39. doi:10.1016/j.iheduc.2018.01.002

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*(1), 82–91.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*(2), 64-70.

Appendix

1. **Alario-Hoyos et al. (2017)**: Self-regulated learning strategies in MOOCs (Cohen & Magen-Nagar, 2016; Hood et al., 2015; Zimmerman 2002);

2. **Almatrafi et al. (2018)**: Model to identify "urgent" posts that need immediate attention from instructors;

3. **de Lima and Zorrilla (2017)**: Social networks theory (Freeman, 1977);

4. **Evans and Myrick (2015)**: The diffusion of innovations approach (Rogers, 1995);

5. **Henderikx et al. (2017)**: Reasoned action approach (Fishbein & Ajzen, 2010);

6. **Hew (2016)**: Model of student engagement organized around the self-determination theory of motivation (Appleton, Christenson, & Furlong, 2008; Fredricks, Blumenfeld, & Paris, 2004);

7. **Hone and El Said (2016)**: Framework exploring the factors that affect MOOC completion/learner retention (Marks et al., 2005): course instructor effects, co-learner effects, design features;

8. **Huisman et al. (2016)**: Peer assessment of essay assignments in MOOCs (Admiraal, Huisman, & Van de Ven, 2014);

9. **Kwak (2017)**: Writing as a skill, creative, writing, writing as a process, writing as a social practice, writing in a socio-cultural context;

10. **Shapiro et al. (2017)**: Student motivations (Hartnett, St. George, & Dron, 2011), and barriers/challenges (Song & Hill, 2007);

11. **Watson, Kim, and Watson. (2016)**: Dissonance theory (Kamradt & Kamradt, 1999; Simonson, 1979; Simonson & Maushak, 1996);

12. **Watson, Watson, Richardson et al. (2016)**: Community of Inquiry (Garrison, Anderson, C& Archer, 2000) and dissonance theory (Kamradt & Kamradt, 1999; Simonson, 1979; Simonson & Maushak, 1996);

13. **Watson, Watson, Janakiraman, et al. (2017);**

14. **Watson, Watson, Yu et al. (2017)**: Dissonance theory (Kamradt & Kamradt, 1999; Simonson, 1979; Simonson & Maushak 1996), CoI framework (Garrison, Anderson, & Archer, 2000);

15. **Watted and Barak (2018)**: **M**otivational factors that influence participants' engagement in MOOCs (Barak et al., 2016; Halasek et al., 2014; Yang, 2014);

16. **Wise et al. (2017)**: Forum posts (Stump et al., 2013);

17. **Yang and Su (2017)**: Theoretical model for studying learners' continuance intentions toward participation in MOOCs**;**
18. **Zhang (2016)**: Regulatory focus theory (Higgins, 1997, 1998);
19. **Zhang et al. (2016)**: Social network analysis (SNA) (Xu, Zhang, Li, & Yang, 2015);
20. **Zhou (2016)**: Theory of self-determination (Ryan & Deci, 2002), theory of planned behaviour (Ajzen & Madden, 1986).

[1] A MOOC is a set of learning activities and resources on the web that is freely accessible to the greatest number of participants, usually at no charge and without prerequisites (Bogdan, 2017).

[2] The didactic approach consists of studying the teaching and learning processes from the point of view of the content—and its disciplinary structure—as conveyed by the MOOC.