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LEARNING FROM DECADES OF ONLINE DISTANCE EDUCATION: MOOCS AND THE COMMUNITY OF INQUIRY FRAMEWORK

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Despite their growing popularity, there are many contradictory arguments between supporters and detractors of MOOCs. Nevertheless, the advent of mass-scale online courses is increasingly credited to have the potential to reshape higher education significantly over time, and recent research analyses how and in which ways such a potential can be leveraged. Aim of this conceptual study is to incorporate the Community of Inquiry (CoI) framework into learning design practice to overcome current MOOCs pedagogical limitations. In order to be applied to a large number of participants, the three presences of the CoI framework (social, cognitive and metacognitive, and teaching) need to be adjusted and combined with the distributed learning approach. In this way, fostering distributed learning among participants would lead learners to take responsibility for their learning experience through the exploitation of roles and tasks traditionally assigned to distinct and separate roles. These adjustments could address

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issues of participation, motivation, and enhance successful learning experience.

1 Introduction

Massive Open Online Courses (MOOCs) are becoming increasingly popular especially in North America and Europe. They encompass a wide spectrum of design approaches and scholars from diverse disciplines have contributed to an intense debate on MOOCs pedagogies and methodological models (Brown *et al.*, 2015; Macleod *et al.*, 2015). A number of syntheses of the literature that attempted to summarize research in this field have emphasized distinctions between strands of MOOCs (cMOOCs, xMOOCs, etc.), impacts on education and demographics of users (Ebben & Murphy, 2014; Raffaghelli, Cucchiara & Persico, 2015; Veletsianos & Shepherdson, 2016). However, as reported by Veletsianos and Shepherdson (2016), there are further areas that deserve attention for future research, such as learners' voices or instructor-related topics.

Despite current limitations, it is important to go beyond hype and underestimation if we want to identify the research challenges for the future (Fischer, 2014). Indeed, MOOCs appear to be an online crossroad where to learn from other areas of studies and from professionals and scholars of different backgrounds. For instance, Kop and colleagues (2011) point out the potential of MOOCs for "shared knowledge" and "distributed cognition" and stress that MOOCs would act as an environment in which new forms of distribution, storage, archiving, and retrieval offer the potential for the development of shared knowledge. MOOCs would also be better conceptualized as being one of the components in a rich landscape of learning (Fischer, 2014).

In this study we propose the conceptual model of the Community of Inquiry (CoI) (Garrison, Anderson & Archer, 1999) as a framework to cope with some of the critical issues that have emerged in the field so far. In the following, we outline the main pedagogical challenges faced by MOOCs and the need to accommodate online distance education best practices that have been made available in the last decades. We then introduce the CoI framework and the three presences (social, cognitive and metacognitive, and teaching), in combination with the concept of distributed learning and how it may affect the three dimensions of the framework. We conclude with some considerations and implications for future research.

2 Limitations of current MOOCs pedagogical models

A number of pedagogical foundations and methodological approaches of MOOCs have been raised in recent studies (Conole, 2015; Ebben & Murphy, 2014; Fischer, 2014; Raffaghelli, Cucchiara & Persico, 2015; Veletsianos &

Shepherdson, 2016). Ebben and Murphy (2014) reviewed a MOOC project that adopted connectivist pedagogy in initial phases and, then, focused on approaches mostly aimed at renewing higher education business models. Glance and colleagues (2013) found that the main tools used in a great number of MOOCs were formative quizzes, short video formats, peer and self-assessment and discussion forums. The authors also argue that MOOCs are mostly a restatement of online distance instruction that have been in use for some time, except for the numbers of participants.

In another study Toven-Lindsey and colleagues (2015) examined the pedagogical tools used in 24 MOOCs and reported that the range of pedagogical practices currently used tends toward an objectivist-individual approach. Although all four categories of the Teaching Approach Framework (objectivist-individualist, objectivist-group, constructivist-individual, and constructivist-group) were identified, all MOOCs relied on the objectivist-individualist approach. Margaryan and colleagues (2015) analyzed the instructional design quality of 76 randomly selected MOOCs, including 26 connectivist cMOOCs and 50 xMOOCs, in the light of ten instructional principles derived from contemporary learning and instructional theories about effective instruction. The study found that the majority of MOOCs of both types rely on design principles that privilege high quality content rather than overall instructional design and learning experience.

A further consideration concerns higher education attitude according to which "*universities do not adopt technologies primarily for pedagogical or teaching and learning task-related reasons. Counter-intuitively, it is only afterwards that pedagogical concerns come forward and universities try to take advantage of this opportunity of technology*" (Amemado, 2014, p. 28). The advent of MOOCs seems not to be an exception. Today they constitute a potentially valuable alternative to campus-based courses or large classroom teaching. At the same time, they can emphasize the power of harnessing a global, distributed learning community of peers (Conole, 2015). However, identification of effective learning design has become one of the key challenges facing education today and massive open courses specifically.

MOOCs need to address some intrinsic limitations, such as the impossibility to support tens of thousands of learners providing tailored individual support, and consider a number of alternatives (*Ibidem*). For instance, encouraging participants to create their own personal learning environment made of tools and peers to support their learning, or providing tutors that summarize key elements of learning at key points in the course, are instructional measures that can be effective in supporting cognitive processes. At the same time, since learning is also an emotional and affective experience that need to be sustained (Veletsianos, Collier & Schneider, 2015), participants value communication,

trust, collaboration, inclusiveness, innovation and commitment as key elements in developing quality in online education (Ossiannilsson, Altinay & Altinay, 2015).

In the following, we address the Community of Inquiry framework (Garrison, Anderson & Archer, 1999) as a pedagogical model and a learning design framework to place MOOCs in a context of pedagogically-founded learning design. In fact, we advocate that, despite the diverse pedagogical theories that are at the basis of connectivist (cMOOCs) and objectivist MOOCs (xMOOCs), learning design of large courses needs to be based upon common pedagogical foundations aimed at facilitating meaningful learning and engaging learners in a successful and satisfying experience. After a short presentation of the CoI framework, the three dimensions that constitute the model are presented and revised according to a logic of sustainability for large online courses that is largely based on the construct of distributed learning.

3 The case of the Community of Inquiry framework

The CoI framework was originally developed by Garrison and colleagues (1999) to describe collaborative learning activities that occur within threaded online discussion forums. The pedagogical model underlying the framework is based on the assumption that knowledge can be constructed through social negotiation and that discussion with others - peers or tutors - is a primary way to learn because it encourages critical thinking and understanding. The main idea of the Community of Inquiry is "*the urgency of a new academic culture based on collaboration between participants, in an online or a blended teaching and learning environment*" (Amemado, 2013, p. 404).

The model is based on three elements: social presence, cognitive presence and teaching presence. Each element was object of specific investigation, with the aim of identifying the several factors that contribute to a successful learning experience. Cognitive presence was defined as "*the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry*" (Garrison, Anderson & Archer, 2001, p. 11). Social presence was defined as "*the ability of participants in a community of inquiry to project themselves socially and emotionally, as "real" people (i.e., their full personality), through the medium of communication being used*" (Garrison, Anderson & Archer, 1999, p. 94). Lastly, teaching presence was defined as "*the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes*" (Anderson *et al.*, 2001, p. 5).

Since then, the framework has been object of great debate and numerous adaptions have been proposed by other scholars with the aim of integrating

further dimensions or revising existing ones (Kreijns *et al.*, 2014; Pozzi *et al.*, 2007; Shea *et al.*, 2014). The same founders have extensively revised some of the original constructs, mostly in relation to cognitive presence, which has been enriched by the metacognitive component (Garrison & Akyol, 2013).

Originally proposed as a conceptual framework for investigating learning processes that occur in asynchronous-based learning environments, the model has been applied to blended learning (Garrison & Vaughan, 2008) and to courses that do not contain online elements (Archer, 2010). Some authors have employed the framework to large online classes with specific reference to peer education (Nagel & Kotzé, 2010).

4 Distributed learning as keystone for sustainability in large open courses

Distributed learning is "*an instructional model that allows instructor, students, and content to be located in different, non-centralized locations so that instruction and learning occur independent of time and place*" (Salzberg & Polyson, 1995, p. 10). In online learning, distributed learning has been framed as an instructional paradigm that offers "*the potential to create shared 'learning-through-doing environments' available anyplace, any time, on demand*" (Dede, 1996, p. 4). This means that resources, expertise, educational strategies, digital technologies and learners' groups or communities can be identified in many places and many times.

The idea of distributed learning is strictly associated with the connectivist approach to learning as exploration, connection, creation and evaluation processes within networks of people, digital artefacts and content (Siemens, 2005). From this perspective, social networks play an essential role in learning environments for knowledge sharing and student support. In this light, peer teaching, tutoring and distributed simulations have been highlighted as measures to carry out distributed learning (Dede, 1996), along with models of distributed leadership (Janovic, McCloud-Bondoc & Ralston, 2014).

As far as MOOCs are concerned, Grover and colleagues (2013) claim that the distributed nature of intelligence and the associated learning experiences are what are heightened most in MOOCs. Learning activity is distributed across people, environments and situations, thus exemplifying both the social and the material dimensions of distributed intelligence. Roles and responsibilities, either learners' or instructors', are distributed because of the scale of the course and distributed assessment practices are preferable to automatic grading.

As presented above, in the perspective of the CoI framework, distributed learning may be assigned to specific categories and indicators of the three kinds of presence (social, cognitive and metacognitive, teaching). In the following, the three presences are presented with a specific focus on their application in

large massive courses.

5 Distributed social presence

One of the key components in MOOCs success is to facilitate social interactions between students and create learning networks that promote effective flow of information. Some might argue that distribution of social presence is the norm in online learning. However, the scale of MOOCs might limit opportunities for establishing sense of trust between learners, likely leading to much more utilitarian relationships.

Recent research has pointed out how a strong sense of community and affective expression prove to be an influential factor of motivation, engagement and persistence in large courses. Social presence facilitates trust building and engagement in group-based problem solving (Gasevic *et al.*, 2014). Sense of community may be fostered, for instance, openly sharing thoughts and helping others during the study group sessions, or providing comments and encouragement to fellow participants (Chen & Chen, 2015).

In the perspective of distributed learning, learners need to know they are mutually dependent on each other to accomplish learning tasks, especially in the absence of an instructor or teaching coordinator. Anderson and Dron (2011) pointed out that the activities of learners may be distributed through a plethora of network tools (wikis, web forums, social network sites, micro blogging sites, etc.) that could be enriched by "*the comments, contributions, and insights of students who have previously engaged in the course and that persist as augmentable archives to enrich network interactions for current students*" (p. 88).

Profile pages and group awareness tools are technical features that make members aware of the activities of the others and foster impression formation. This is the case, for instance, of social badges that allow the automatic awarding of user activities (Dron & Ostashewski, 2015). Tools of this kind help convey information about members' learning interests, their knowledge and expertise, and any other type of relevant information for group learning. However, the increasing use of multiple social media platforms in MOOCs poses further challenges in linking online identities and content dispersed and distributed across diverse platforms (Absar *et al.*, 2016). From this point of view, social media mining and social learning analytics could serve the purpose of detecting and analyzing social media communication in relation to learning processes (Manca, Caviglione & Raffaghelli, 2016).

6 Distributed cognitive and metacognitive presence

The idea of distributed cognition was developed in the 90s with the aim of studying cognition as off-loaded into the environment through social and technological means, where information is also made available to other agents (Salomon, 1996). A distributed cognition system involves the coordination between individuals, artifacts and the environment and is based on internal and external representations (Zhang & Norman, 1994).

Cognitive presence refers to higher-order thinking processes rather than to specific individual learning outcomes, although it includes learning processes and outcomes. The four phases of the cognitive presence (triggering event, exploration, integration, and resolution) imply a number of steps that can be carried out individually or in a group. Each phase may be supported through the activation of resources, materials, expertise, that can be identified in the networks of learners and in the online digital sites. As an example, synthesis and connection of ideas may be based upon the integration of information from various synthesis sources such as textbook, articles, personal experience, but also from further resources distributed in the networks of learners. In contrast with what the original CoI framework addresses as beneficial for the group of learners, cognitive processes may be enhanced thanks to the shift of focus from the group to the network as the locus of learning.

From the perspective of MOOCs, shared artifacts that support external representations to sustain the development of internal representations, or peers that summarize key elements of learning at key points in the learning task, can be effective in supporting cognitive processes (Conole, 2015). In a perspective of distributed competence, participants who tend to exhibit more expertise in a specific area can be assigned or self-assigned to carry out the task. This shift of focus has direct consequences for the teaching dimension as well, since the two presences are strictly intertwined, as pointed out in the next section.

Although it was not addressed in the original model, metacognition was subsequently incorporated in the framework as part of cognitive processes and metacognitive skills became an objective of the learning process. In MOOCs, careful deployment of metacognition strategies and self-regulation are crucial for student success and learners are expected to navigate networks of people and content resources in completing learning tasks (Shea *et al.*, 2014). Developing self-regulation skills may become determinant in performing efficiently in a large course and in completing the learning tasks. Designing learning experiences through the development of self-regulatory competences would result in students' better performance (Milligan & Littlejohn, 2014).

7 Distributed teaching presence

Teaching large masses of learners can be very challenging and providing tailored individual support is not possible, unless a number of alternatives are adopted (Conole, 2015). The need to cope with teaching issues in online distance education was addressed in the CoI framework according to which "*all participants assume teaching and learning roles and responsibilities to varying degrees*" (Akyol & Garrison, 2011, p. 189).

Distributed teaching among instructors and participants has become a prominent imperative in large online classes. One adopted measure is peer-to-peer learning and peer-led teaching (Walji *et al.*, 2016). Moreover, peer and self-assessment through which students assess their co-students' work has been suggested by many authors to overcome the constraints and limitations of large online courses (Kulkarni *et al.*, 2013; Nagel & Kotzé, 2010).

Another important issue related to distributed teaching presence in MOOCs is the review of students' assignments. Best practices suggest that students use an evaluation rubric to guide the review, whereas supervisors grade the final project for exam purposes (Nagel & Kotzé, 2010). Moreover, evaluating peers' work also exposes students to solutions, strategies and insights that they would otherwise not likely see. Providing students with ad-hoc technical features to carry out assessment could contribute to scale peer-assessment effectively (Kulkarni *et al.*, 2013).

Another recommended measure related to the issue of direct instruction is to take advantage of the different levels of skills and expertise related to the several topics of the course and exhibited by different cohorts of students. The idea of relying on diverse expertise and competence might be coupled with the distribution of artifacts and resources across the networks. From this perspective, since MOOCs are frequently attended by students with different educational backgrounds, age levels and cultural and geographical provenance, designing group learning activities that take into account these variances could be greatly beneficial. As already stressed in socio-constructivist learning environments, the affordances exhibited by group techniques such as Jigsaw, role play and reciprocal teaching (Pozzi, 2011) could also be adopted in massive online courses.

Conclusion

In this study we presented the main challenges of current pedagogical approaches and foundations in MOOCs design. We proposed that the Community of Inquiry framework, that has been validated through a great number of studies over the last fifteen years, could serve as a pedagogical

benchmark to cope with high numbers and weak instructional design that are currently at issue in all types of MOOCs.

The implications of applying the CoI framework to massive large courses are of multiple orders. The first is related to the dimension of instructional or learning design aimed at improving the quality of educational interventions and learning experiences. It is fundamental that MOOCs rely on a design model based on collaboration suitable for large groups. For now, and with respect to current pedagogical models, the main point would be to facilitate learning at scale by fostering a peer-to-peer learning approach. With its focus and emphasis on group collaborative thinking and learning, though conceived for online communities that deal with small numbers of students, the CoI framework may stand as an effective design model for massive open and online courses. Through the exploitation of the three dimensions of social, cognitive/metacognitive and teaching presence, learning activities could be designed to enhance cognitive and metacognitive skills aimed at acquiring self-regulated competences.

A second order is related to the experience of the optimal social atmosphere where participants should feel united and not isolated. From this perspective, technical and functional features suited to foster the development of networks of interpersonal relationships or social networks would support affective work relationships, shared social identity, group cohesiveness, mutual trust and a sense of belonging and community. Designing an optimal social space where participants can share their previous competences and professional identities would be an added value in large courses, where participants do not know each other and do not have the chance to meet in person.

A final order is related to research. Although a few studies have already adopted the CoI framework in massive and large courses, further experimental research is required to validate the framework. The addition of the construct of distributed learning is proposed here as a specification of the CoI model applied to MOOCs contexts. MOOCs present specific features, requirements and challenges that the long tradition of distance education courses has never faced: high numbers and geographically distributed participants are expected to tackle different learning styles and cultural attitudes towards learning.

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