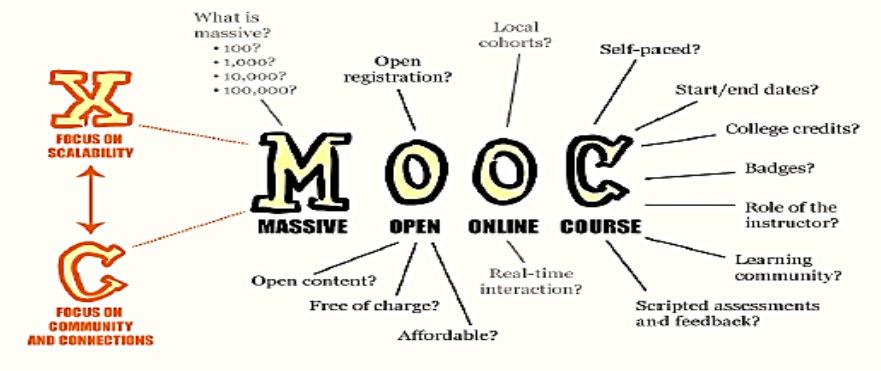
Mohsen Saadatmand

A NEW ECOLOGY FOR LEARNING

An Online Ethnographic Study of Learners' Participation and Experience in Connectivist MOOCs



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Abstract

This dissertation focuses on Massive Open Online Courses (MOOCs) which have emerged and heralded as new online learning environments able to serve large numbers of students. Identifying two main types of MOOCs known as connectivist MOOCs (cMOOCs) and instructivist MOOCs (xMOOCs), emphasis is placed on the learning ecology of connectivist MOOCs and how the format, with all of its attention on learner-centered pedagogy and social media invite collaboration and networking. The thesis provides detailed analysis and description of learners' experiences and perceptions of participation and their use of online tools and resources in the process of learning and networking. CMOOCs promote the ideals of restructuring the spaces of learning from classrooms to open networked ecologies that enable learners to have greater control over their learning experiences, content, and use of technologies.

The study builds on the theoretical foundations of networked learning and connectivism that undergird the affordances of technology in promoting connectedness among learners, resources, networks and communities. The investigations into personalized learning and ecological learning design shed light on the significant role of learners and acknowledge their autonomy in creating their learning environments. The study employed and developed "online ethnography" to gain a better understanding of the dynamics of learning in cMOOCs from the perspectives of learners themselves. Data were gathered from several MOOCs over a five-year period through participant observation, interviews, open-ended questions, surveys, and online artifacts.

The findings demonstrate that cMOOCs are learner-centered ecologies of learning in which learners participate in the flow and generation of knowledge by creating and sharing content through networked technologies such as blogs, wikis, Twitter, and Facebook. Developing a personal learning environment (PLE) in cMOOCs enhances learner autonomy and creates a space for them to aggregate, remix, repurpose content, reflect, and share their learning experiences. Additionally, the results indicate that participation in cMOOCs requires learners to assume active roles in a spirit of openness in forming their learning experiences and networking activities; to develop digital competence to manage the abundance of resources.

Theoretical understandings and empirical evidence of the sub-studies helped delineate cMOOCs as an open networked learning ecology that positions a learner at the intersection of personalized and networked situations to foster processes of self-directed learning and connectedness in open online contexts. The study contributes to the knowledge and pedagogy of open networked learning and provides insights to help universities, course designers, MOOC providers, instructors, and participants improve online learning experiences.

Keywords: MOOCs, networked learning, connectivism, learning ecology, e-learning design, open education, online learning, personal learning environments, online ethnography, community of inquiry

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Mohsen Saadatmand

Online-Etnograginen Tutkimus Oppijoiden Osallistumisesta ja Kokemuksista Liittyen Vuorovaikutteisiin Massiivisiin Avoimiin Verkkokursseihin (cMOOCs)

Tiivistelmä

Tämä väitöstutkimus käsittelee merkittäviksi uudenlaisiksi verkko-oppimisen ympäristöiksi muodostuneita massiivisia avoimia verkkokursseja (massive open online courses, MOOCs). MOOC-ympäristöjen kaksi päätyyppiä ovat vuorovaikusta ja yhteydenpitoa painottavat kurssit (connectivist MOOCs, eli cMOOCs) ja opetusta painottavat kurssit (instructivist MOOCs eli xMOOCs). Tutkimuksessa tarkastellaan, kuinka osallistujat hahmottavat ja jäsentävät cMOOCs-kurssien oppimisen ekologian. Tutkimus tarjoaa yksityiskohtaisen analyysin ja kuvauksen oppijoiden osallistumisen kokemuksista ja havainnoista sekä heidän online-työkalujen ja resurssien käytöstä toimiessaan cMOOCs:ympäristössä. Siirtämällä oppimisen luokkahuoneista avoimiin verkostoituneisiin ekologioihin cMOOC-kurssit pyrkivät muuttamaan oppimisen tiloja mahdollistaen oppijoille suuremman vastuun oman oppimiskokemuksensa muodostumiseen. Ne tarjoavat myös oppijoille mahdollisuuden ottaa käyttöön laajan valikoiman teknologioita joiden avulla he valitsevat, luovat, jakavat sisältöä sekä tuottavat materiaalia tiedon virtaan.

Tutkimuksen teoreettinen perusta on verkottuneessa oppimisessa sekä konnektivismissa, jotka korostavat teknologian käyttömahdollisuuksia oppijoiden, resurssien, verkostojen ja yhteisöjen välisen vuorovaikutuksen rakentamisessa. Keskeisiä ovat esimerkiksi henkilökohtaisen oppimisen (personalized learning) sekä ekologisen oppimisen (ecological learning) suunnittelu, jotka painottavat oppijoiden keskeistä roolia sekä tunnustavat heidän autonomiansa omien oppimisympäristöjensä luojina. Tutkimuksessa käytettiin ja samalla kehitettiin online-etnografiaa pragmaattisena tutkimusmetodina, jonka avulla voidaan paremmin ymmärtää oppimisen dynamiikkaa cMOOC-oppimisympäristöissä. Aineistoa kerättiin useilta verkkokursseilta osallistuvan havainnoinnin, haastattelujen, strukturoitujen ja avoimia kysymyksiä sisältävien kyselylomakkeiden sekä online-tuotosten avulla reilun viiden vuoden aikana.

Tulokset osoittavat, että cMOOC-kurssit ovat oppijakeskeisiä ekologioita, joissa oppijat osallistuvat tiedon tuottamisen ketjuun luomalla ja jakamalla sisältöä verkottuneiden teknologioiden, kuten blogien, wiki-alustojen, Twitterin ja Facebookin avulla. Henkilökohtaisen oppimisympäristön (personal learning envi-

ronment, PLE) kehittäminen cMOOC-kursseilla mahdollistaa oppijan autonomian sekä luo heille tilan, jossa voi koota, yhdistellä, uudelleen järjestellä ja suunnata sisältöä sekä reflektoida ja jakaa omia oppimiskokemuksia. Lisäksi tulokset osoittavat, että cMOOC oppimisympäristöihin osallistuminen edellyttää oppijoilta aktiivisen roolin omaksumista ja avoimuutta heidän oppimiskokemustensa ja verkostoitumista koskevien toimintojensa muodostamisessa. cMOOCs oppimisympäristöt edellyttävät oppijoilta myös digitaalisten kompetenssien kehittämistä, joilla tarjolla olevien resurssien runsautta on mahdollista hallita.

Tutkimuksen tuottama teoreettinen ja empiirinen ymmärrys massiivisista avoimista verkkokursseista mahdollistaa viitekehyksen luomisen avoimen verkostoituneen oppimisen ekologialle (open networked learning ecology) joka asettaa oppijan henkilökohtaisten ja verkottuneiden tilanteiden risteyskohtaan sekä edistää itseohjautuvan oppimisen ja yhteyksien luomisen prosesseja avoimissa online-konteksteissa. Tutkimuksen tulokset hyödyttävät avoimia verkottunutta oppimista koskevaa tietoa ja pedagogiikkaa sekä tarjoavat näkökulmia, jotka auttavat, MOOC-ympäristöjen tarjoajia, opettajia ja osallistujia kehittämään online-oppimisen kokemuksia.

Avainsanat: MOOCs, verkottunut oppiminen, oppimisen ekologia, avoin kasvatus, online-oppiminen, henkilökohtaiset oppimisympäristöt, online-etnografia

Dedicated to the loving memory of my mother,
who made it possible but could not witness it!

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Abbreviations

cMOOC:	Connectivist Massive Open Online Course
CMS:	Content Management System
COI:	Community of Inquiry
CSCL:	Computer Supported Collaborative Learning
FOSS:	Free Open Source Software
HCI:	Human Computer Interaction
ICT:	Information and Communication Technologies
LA	Learning Analytics
LMS:	Learning Management System
MOOC:	Massive Open Online Course
MIT:	Massachusetts Institute of Technology
OEP:	Open Educational Practices
OER:	Open Educational Resources
PLE:	Personal Learning Environment
SNA:	Social Network Analysis
TEL:	Technology Enhanced Learning
RSS:	Rich Site Summary
xMOOC:	Instructivist MOOCs (e.g., Coursera, Edex)
VLE:	Virtual Learning Environment

List of sub-studies

I Saadatmand, M., & Kumpulainen, K. (2012). Emerging technologies and new learning ecologies: learners' perceptions of learning in open and networked environments. In V. Hodgson, C. Jones, M. de Laat, D. McConnell, T. Ryberg, & O. Sloep. *Proceedings of the 8th international conference on networked learning* (pp. 266-275). ISBN 978-1-86220-283-2

II Saadatmand, M., & Kumpulainen, K. (2013). Content aggregation and knowledge sharing in a personal learning environment: serendipity in open online networks. *International Journal of Emerging Technologies in Learning, 8* (S1), 70-78.

III Saadatmand, M., & Kumpulainen, K. (2014). Participants' perceptions of learning and networking in connectivist MOOCs. *Journal of Online Learning and Teaching*, *10* (1), 16–30.

IV Saadatmand, M., Uhlin, L., Hedberg, M., Åbjörnsson, L., & Kvarnström, M. (2017). Examining Learners' Interaction in an Open Online Course through the Community of Inquiry Framework. *European Journal of Open, Distance and E-Learning, 20* (1), 61–79.

1. INTRODUCTION

> "The potential of new technologies is presenting all of us in higher education with a historic opportunity: the opportunity to better serve society by reinventing what we do and how we do it. It is an opportunity we must seize."
>
> — MIT President Rafael Reif

The starting point of the thesis is that emerging technologies convey new possibilities for education and create a new ecology for learning, and that knowledge and cognition is distributed across multiple objects, individuals, artefacts, and socio-technological means. From a learning design perspective, technology can help design learner-centered and distributed learning environments that allow learning and interaction occur beyond time and space barriers and across contexts. As such, the subject of this study is massive open online courses (MOOCs) as a new ecology in online learning. The increasing uptake and development of MOOCs over the past few years have instigated extensive discussions around the topic by many stakeholders, including higher education institutions, course designers, educators and learners. The upsurge of massive open online courses is rooted within the ideals of openness in education; it is response to the idea that knowledge should be freely shared and learning opportunities should be available beyond institutional, geographical, financial, and time barriers, with the potential of emerging technologies (Bonk, Lee, Reeves, & Reynolds, 2015; Mulder, 2015; Cormier & Siemens, 2010; Couros, 2006; McAndrew, et al., 2012; Weller, 2014; Wiley, 2006, 2010; Yuan & Powell, 2013). Online learning has evolved in many ways in the past decade new generations of networked technology and online tools have created the opportunities for open distributed learning environments and easily accessible learning resources. From a pedagogical point of view and learning design perspective, what is most important, when it comes to any technology-mediated learning practice, is how education exploits technology and not vice versa. Thus, when designing novel learning environments with utilization of emerging technology, it requires appropriate pedagogical assumptions and learner's needs to be taken into consideration.

It is important to understand the possibilities and challenges of MOOCs, and how they are perceived by students, teachers, educational institutions, learning designers, and policymakers. Although there is a heated debate and discussion around MOOCs (Conole, 2014; Siemens, 2013), there is still a lack of research knowledge and empirical evidence on the effectiveness of MOOC pedagogy, realities of interaction and networking, and learners' experiences in MOOCs (Gillani & Eynon, 2014; Liyanagunawardena, Adams, & Williams, 2013; Swan, et al., 2015). Spector (2017) states that research on MOOCs is not extensive and still

there is limited knowledge of the impact of MOOCs on learning. Conole (2014) also mentions that while today's learners are technologically immersed and technologies are an essential part of their learning processes, there is a growing body of research focusing on learners' experiences and perceptions about technology and its opportunities for learning and interaction. While MOOC research is a growing area, Bates (2014) states that a larger body of MOOC research comes from xMOOCs dealing with user profiles, big data sets, and learning analytics and there is still little research on cMOOCs.

1.1 Motivation and personal aspirations

The research endeavor in this doctoral project cannot be detached from personal grounds; the researcher's interests in learning technologies, learning experiences and ethnographic insight in open online spaces. My background is in educational technology and e-learning, and open education has been my interest for a long time. I am passionate about technology; the ways it can transform human communication and interaction. From this perspective, I have always been keen to understand how emerging technologies could augment personal and professional life. The widespread applications of Web 2.0 (O'reilly, 2007) and social media, particularly developments in free and open-source software[1] have resulted in novel online learning solutions. Massive open online courses (MOOCs)[2] are the latest learning innovation in online learning made possible by the philosophy of open education and the affordances of technology[3]. Any innovative learning practice opens up new areas for investigation and as a matter of fact, MOOCs as such, caught my attention as a researcher in e-learning to explore the realities and challenges associated with this learning format.

I became interested in the topic of MOOCs after I attended a seminar on social media and their potential in transforming human learning and communication as part of our research project activities in the summer 2010 at Aalto University. At the end of the seminar, I was introduced to few "open online courses" that were open for everyone to take part. At the time, I was not quite familiar with such a learning format (today known as MOOCs). It stimulated my curiosity to explore and learn more about them. On the one hand, I was looking to such courses on the

[1] Free and open-source software (FOSS) is a term refers to bridge ideas from the open source movement with free software to indicate the software which is freely licensed to anyone to use, change, study and improve (Couros, 2006).

[2] The definition and a detailed account of MOOCs will be presented in chapter 2.

[3] Open education and the concept of affordances will be discussed in more details in chapter 2 and chapter 3.

topic of open education to possibly include as part of my doctoral coursework; on the other hand, I was inspired to investigate new online learning formats that are being experimented in higher education. The term "MOOC" was not so popular nor did it have a common definition and understanding in education sphere at that time.

My journey as an open learner began in the autumn 2010. The first open online course I took part was "Social Media and Open Education" *(#EC&I 831)*[4]; a graduate-level course offered by the University of Regina, Canada. This course was open to both credit and non-credit students. I attended as a non-credit participant in September 2010. It happened to be very timely and in fact a turning point in my research that I shifted the focus of my research to MOOCs. Spending a few weeks with a positive experience of an online learning journey in this course, later in the autumn 2010 I started participating in another open online course: "Personal Learning Environments Networks and Knowledge" *(#PLENK10)*[5]; a ten-week course offered by the Athabasca University in Canada. Participating in these two open online courses helped me develop my ideas and define my dissertation research on learning experiences in open online courses. During the course participation, in addition to gaining a better understanding of open education and expanding my professional connections, I developed my research objectives and data collection means.

Next, I continued my endeavor both as an open learner and a researcher by participating in few more open online courses. In January 2011, I partook in "Connectivism and Connective Knowledge" *(#CCK11)*[6]; this was an open online course as part of the University of Manitoba's certificate in emerging technologies. These three courses were the main empirical context of my research in which I conducted a survey and interview with the course participants in the spring of 2011. Since then, I have been both a learner (whether lurking or more actively participating) and a participant observer in many other MOOCs[7] and the iterations of the three above-mentioned courses. The last open online course that I attended as an active learner was "Open Networked Learning" *(#ONL151)*[8], an eight-week, open online course offered as a professional development course at three Swedish universities: Karolinska Institute, Lund University, and Linnaeus University. The last empirical sub-study of the dissertation was conducted in this course in which

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4 http://eci831.ca/hub/

5 http://connect.downes.ca/

6 http://cck11.mooc.ca/

7 Some of them include: #CHANGE11 (http://change.mooc.ca/about.htm), #LAK11 (http://learninganalytics.net/syllabus.html#Week_1), #DS106 (http://ds106.us/), #etMOOC (http://etmooc.org/), #mobiMOOC (http://mobimooc.wikispaces.com/)

8 https://opennetworkedlearning.wordpress.com/

we examined learners' presence and interaction. Therefore, immersing myself in the "lived experiences" of several connectivist MOOCs over the course of about five years has provided me with substantive ethnographic means and resources to investigate and gain a better understanding of the nature of learning and participation in such an open and disruptive learning environment. Being both a MOOC learner and participant observer, I employed and developed online ethnography as an appropriate research design to explore the realities and challenges, learners' experiences and perceptions of learning and networking in cMOOCs. Although some research has been done on different aspects of MOOCs since their emergence, this study benefits from the massive and rich sources of data gathered ethnographically through different means and resources. In addition to data gathered through survey and interviews, other resources include: participant observations over a five-year period, learner-participant experiences, and interactions with many participants in different communities and networks in a variety of MOOCs. Learners' online artifacts (blogs and tweets), course newsletters, social bookmarking tools, and an abundance of aggregated and curated content and materials accessed through RSS feeds also formed part of the research base.

1.2 Context and scope of the study

The past decade has observed an exponential advancement in Web technology and online tools. This technological development has augmented human communication and interaction in many ways. Consequently, teaching and learning practices have also been enormously influenced. Web 2.0 tools and emerging technologies offer learners an abundance of information and resources, create opportunities for open and distributed learning environments, and enable multimodal learning and rich forms of online collaboration (Bates, 2014; Conole, de Laat, Dillon, & Darby, 2008; McLoughlin & Lee, 2008; Siemens & Tittenberger, 2009). The rapid co-evolution of technology and new learning formats (e.g., open content, open course, and open access) expand traditional learning provisions, offer universality of learning, and place the onus of responsibility on educational institutions to improvise open and distributed learning resources (Dabbagh, 2005; deWaard et al., 2011; Kop & Fournier, 2011). Säljö (2010) notes that the application of digital technologies in educational practices has been a major theme of research and development work for a long time. Technology brings new formats for learning, including changes in learning spaces and infrastructures, new ways of interaction and collaboration. This has brought more flexibility and choices for learners help them benefit from the various available learning materials in different forms. On the other hand, all these socio-technological changes bring new demands for learning designers and educational institutions to adapt to these developments and be

able to response to the needs of twenty-first century learners. The level of engagement of higher education students in Web 2.0 and social networking tools is growing (Sclater, 2008). They have become more reliant on these technologies both in their collaborative learning activities on campus and on online collaborative learning environments (e.g., Wikispaces) (Gholami, Saadatmand, & Mobaraki, 2011). Kumpulainen and Sefton-Green (2014) assert, "Learning environments that extend across space and time, that are responsive to students' learning lives and diverse 'funds of knowledge,' call for pedagogical innovation and transformation" (p. 10).

Furthermore, Poole (2005) postulates "We live in the era of transforming university" and in the age of globalization and technological change, higher education institutions are expected and increasingly pressured to adapt transformation strategies in order to accommodate the demands of contemporary learners by creating new courses and offering flexible learning (p. 196). In many respects, the digitization of modern life also influences learning practices in higher education, so the existing narratives of the university concept are being expanded to include more online and blended learning offerings with a power shift towards learner freedom to access content and interact outside of the boundaries of traditional classrooms (Siemens, 2015; Siemens & Matheos, 2010). Mulder (2015) states that the digital evolution has flanked open movement in education in the past couple of decades and initiatives such as open educational resources (OER), open courseware, open source, open content, open access, open data, open teaching, and open innovation are examples of open education trends and general digital openness. Open education models such as OER, open courseware, and MOOCs lead to more equitable access to education and serve a broader range of learners than traditional education and might lead to financial benefits for students and/or institutions (Weller et al., 2015). The potential of massive open online courses to open higher education to the masses is challenging the existing higher education provisions and will force universities to make their curriculum delivery models and courses truly flexible and accessible in response to demand from learners (Yuan & Powell, 2013). Therefore, in the present era of globalization and digitalization, when technology and open online applications can scaffold global and easy-accessible learning opportunities, MOOCs are promising to act as change agents to boost "opening up education for all" (Mulder, 2015b). In another vein, we may relate the current educational evolution to Illich's notion of *deschooling of society* (1971) and his assumptions of *learning webs*[9] which are now being ac-

[9] By learning webs (or networks) Illich argued that a good education system should provide all who desire it access to resources at any time in their lives, empower those who

tualized in the 21st century via modern technological infrastructures. Illich postulates the potential of technology to decentralize educational systems to make learning resources available to all at any time, and to promote self-directed learning supported by social interactions.

Translating the potential of technology into innovative learning practices (e.g., OER, MOOC) provides a huge number of learners worldwide with the opportunity to utilize online tools such as wikis, blogs, Twitter, and Facebook to seek, create, and share content, and to develop learning communities and networks beyond the boundaries of traditional classrooms (Saadatmand & Kumpulainen, 2014). Brown and Adler (2008) suggest that as more of learning becomes Internet-based and a 'new ecology' of learning rises, a "*Long Tail*[10] in learning" occurs; in contrast to the limits of traditional schooling, the Web offers innumerable online resources. They further argue that perhaps, the major influence of the Internet on education has been the open educational resources (OER) movement that has provided access to a wide range of materials. They note, "The building blocks provided by the OER movement, along with e-Science and e-Humanities and the resources of the Web 2.0, are creating the conditions for the emergence of new kinds of open participatory learning ecosystems that will support active, passion-based learning: *Learning 2.0*" (p. 32). Today's abundance of Web technologies and online tools allows the transformation of learning environments and practices and integration of such tools for social interaction, connectivity and co-creation of knowledge (Kumpulainen & Sefton-Green, 2014). As a result, we observe that a transformation is taking place in the design and format of learning, and the ways learners can access learning materials and organize their learning activities. Dillenbourg (2016) asserts that learning technologies are more open today than before in terms of design and architecture of learning environments (e.g., RSS feeds, personalized tool), in the sense of free access (e.g., open online course and MOOCs), and in the sense of content (OER, participants' contributions in content generation), and openness of the learning communities and networks.

Tools and digital technologies can afford various actions (Conole & Dyke, 2004; Gaver, 1991). Conole (2013a) states that "new technologies provide a plethora of ways in which learners can communicate with their peers, their teachers and others beyond the course cohort. Tools such as Twitter provide learners potentially with access to an international community of others with shared interests, providing the opportunity for just-in-time learning" (p. 94). These *technological*

want to share knowledge, and create opportunities for those to present challenges to the public to be known.

[10] Chris Anderson (2004) introduced the concept of "Long Tail" to show how Internet-based commerce (e-commerce) is different from commerce in the physical world. Amazon, eBay, Google, Netflix, and iTunes are examples of Internet enterprises that have used 'long tail' as part of their business strategy.

affordances (Conole, 2013a; Conole & Dyke, 2004a; Day & Lloyd, 2007; Doering, Miller, & Veletsianos, 2008; Gaver, 1991; Hutchby, 2001; Kirschner, Strijbos, Kreijns, & Beers, 2004; Säljö, 2010) convey a range of *pedagogical innovations* (Conole et al., 2008; Day & Lloyd, 2007; Greenhow, Robelia, & Hughes, 2009; Webb, 2005) that promote multifaceted interaction and multimodal teaching and learning (Anderson, 2004; Multisilta, 2012; Conole, 2013a; The Economist Intelligence Unit, 2008). These affordances offer drives to reshape learning environments and practices. MOOCs as such are the results of open movement in education and the affordances of emerging technologies and digitization of the learning offerings. We might say that the rise of MOOCs (particularly connectivist MOOCs) helped promote the idea of thinking about learning spaces as "ecologies" rather than classrooms and to change hierarchical content to distributed content that is easily -accessible to learners (Barron, 2006b; Siemens, 2008). In fact, networks and ecologies are metaphors to conceptualize learning in ubiquitous environments such as MOOCs, which offer students instantaneous access to information, resources and communities through methods and models that best support their needs, interests, and personal situations (Richardson, 2002). Online tools and mobile devices convey the possibilities for seamless learning across different contexts scaffolded with the abundance of OER repositories and MOOCS (Conole, 2013a). The networking affordances of technologies that foster communication and collaboration (Conole & Dyke, 2004) are an integral parts of learning design in connectivist MOOCs.

As there are differences in the philosophy and design of MOOCs, here, it should be briefly clarified that this study is empirically situated in connectivist MOOCs (known as cMOOCs). They are based on networked learning and connectivism in which social interaction is fostered through utilization of social and participatory media and engagement in distributed networks in contrast to instructivist MOOCs (known as xMOOCs), which are primarily based on predesigned resources and activities such as videos, quizzes and assignments (Bates, 2014; Bonk et al., n.d.; Conole, 2014; Daniel, 2012; Rodriguez, 2013; Saadatmand & Kumpulainen, 2014)[11].

CMOOCs are evolving "ecosystems of digital learning environments" that are characterized by a range of course designs (Pata & Bardone, 2014; Veletsianos, Reich, & Pasquini, 2016, p. 1). This new ecology of learning, which is often conceived as an example of disruptive technologically-based innovation in higher education (Bates, 2014; Conole et al., 2008), challenged the traditional assumptions of learning environments. Eisenberg and Fischer (2014) are not surprised that there are a number of controversies and issues regarding the MOOC phenomenon

[11] MOOC types will be discussed in more details in the next chapter.

that have been raised by scholars in online learning. Some of the issues and concerns include: (e.g., Bates, 2014; Bonk et al., 2015; Conole, 2016; Daniel, 2012, 2014; Fischer, 2014; Karesenti, 2013; Margaryan, Bianco, & Littlejohn, 2014; Siemens, 2015, 2013; Spector, 2017)

- Are MOOCs becoming a mainstream learning format in online learning or are the subject of hype?
- Do MOOCs democratize education and provide widespread access to learning opportunities?
- Do MOOCs have the same impact on all levels of education (primary through secondary) or if their main impact is on higher education?
- How will educational institutions and universities adapt MOOCs?
- What are the pedagogical underpinnings of MOOCs and how emerging technologies can be appropriately implemented in designing and offering MOOCs?
- Are MOOCs able to foster community building among participants?
- How can MOOC learning be assessed and accredited?

Of course, this list could be even longer, but these questions are indeed relevant to the discussion and research on MOOC as a new learning format in online learning. As a new pedagogical model in online learning, little is known about the opportunities and challenges associated with MOOCs and what such a learning environment can offer. Previous research, however, has examined some aspects of MOOCs such as learner autonomy, patterns of engagement, and learning conditions (e.g., Irvine, Code, & Richards, 2013; Mackness, Fai, Mak, Williams, & Mak, 2010; Milligan, Littlejohn, & Margaryan, 2013; Williams, Karousou, & Mackness, 2011) but, still literature on MOOCs is immature and needs further development.

Based on the issues discussed above, it can be derived that MOOCs, as new ecologies of learning, have technological, pedagogical, and institutional bearings. To unpack such considerations and the MOOC impact on online learning, they can be identified on the following three levels:

- ***Individual level.*** This aspect is related to how individual learners create and find their own learning pathways in MOOCs. How do they utilize available tools and learning resources to create their own personal learning environments (PLE)? The affordances of social technologies and the ability of cloud and pervasive computing that enable greater flexibility for learners to create more personalized learning experiences (McLoughlin & Lee, 2010) led to the development of the concept of personal learning environment (PLE). The PLE is both a pedagogical and technological approach to personalization in order to value learner's central role in creating and shaping adaptive learning environments (Attwell, 2007; Fiedler, 2006; Gillet, Law, & Chatterjee, 2010;

Sclater, 2008; Wilson, et al., 2007). Zimmermann (2010) emphasizes that current generations of learning solutions are geared towards the requirements of the individual learners and a range of learning services that are bundled into a personalized learning environment. The Web 2.0 capabilities, personalization of tools and resources, and a shift from learners as consumers to learners as producers have resulted in moving from institution-controlled learning management systems (LMS) to learner-centered environments. PLE as used in cMOOCs offer greater autonomy for learners and afford learners an ample opportunity for involvement in all processes of seeking, sense-making, creating and sharing information (Downes, 2007; McLoughlin & Lee, 2010; Skrypnyk, Joksimović, & Kovanović, 2015). From the standpoint of the learner, one of the features of a MOOC is its flexibility in which it can be taken from anywhere anytime using Internet-based tools at the hands of learners in their own personalized ways (Eisenberg & Fischer, 2014). As defined in this study, cMOOCs act as open, adaptive learning environments that allot greater room for learners to create their own pathways and personalize tools and resources in the process of learning and interaction.

- ***Social level.*** This level refers to communal and interactional aspects of learning, learner engagement in learning networks, and presence in online learning environments. Social technologies and numerous online resources and networks enable new ways of learning, interaction, and communication. Learners are not just consumers of information, but they are also contributors to the flow of information by creating and sharing content in online forums and networks. Active participation in an online environment, which is called 'presence' by some scholars is learner creation and contribution through multi-mediated forms of communications in communities (Mckerlich, Riis, Anderson, & Eastman, 2011). Social presence or engagement is the ability of learners to identify and project themselves socially and emotionally in a community (Rourke, Anderson, Garrison, & Archer, 2001). Connectivist MOOCs are spaces of community formation and connection development and Anderson and McGreal (2012) state that MOOCs provide a wide range of learners with open content and distributed communities of learners. According to Siemens (2013), who has established connectivism and is one of the pioneers in MOOC development, "cMOOCs are based on a connectivist pedagogical model that views knowledge as a networked state and learning as the process of generating those networks and adding and pruning connections" (p. 8). McAuley et al., (2010) while defining a MOOC, state that cMOOCs, by building on the active engagement of a large number of self-organized participants and integrating social networking and freely accessible online resources, create networked learning environments that foster connectivity and learners' connectedness. Connectivist MOOCs are *platforms* to foster networked learning

(Siemens, 2012) where learning is a process of developing and maintaining connections and human-to-human interactions mediated by digital technologies.

- ***Design level***. This level refers to to an appropriate learning design that can promote both individual and social aspects of learning. Learning design refers to pedagogically informed processes of planning and creating supportive conditions for learning with considerations from learning theories that make effective use of appropriate tools and resources (Conole & Fill, 2005; Pata, 2013). Instructional designers and learning technologists envision new opportunities for the use and implementation of emerging technologies in designing learning environments that will make online/blended learning more participatory, engaging, and self-directed (Veletsianos, 2011). The increasing development in pervasive and interconnected technologies has the potential to integrate learners with their physical, social and digital worlds; this would allow them to link their experiences across multiple locations and networks (Luckin, 2010a). Luckin (2005, 2008) discusses the considerations from technological developments, the availability of resources, and learners' role; it is useful to describe learning contexts as "learner-centric ecology of resources" (Luckin, 2005, 2008). As discussed earlier, connectivist MOOCs are based on an ecological design perspective that represents a dynamic and adaptive ecology for learning where learners' autonomy and connectivity are promoted with the integration of a range of appropriate tools and resources. The cMOOC design, which is based on the pedagogical underpinnings of social constructivism and connectivism, underlines a learner-centered approach and learners' abilities for self-organizing a learning environment and forming interest groups and networks (Guardia, Maina, & Sangrà, 2013). Understanding learners' needs and their roles is important in technological and pedagogical designs of emerging learning contexts such as MOOCs (Veletsianos, Collier, & Schneider, 2015). Due to the distributed environment of cMOOCs, educators must pay attention to their instructional design and to participants' voices. The cMOOCs investigated in this study represent a kind of open networked ecology of self-organized learners (Pata & Bardone, 2014) who create and utilize their personal learning environments in the process of seeking information, remixing and sharing content, and being engaged in the network formation processes.

Discussing the abovementioned aspects associated with MOOCs, theoretical implications resulted from the literature review, and the analysis of the design aspects of open online learning environments and technological affordances, the conceptual framework of the study is illustrated in Figure 1. Using an ecological approach on learning design, the study builds on the conceptualization of learning

in cMOOCs as personalized and networked, and that technological affordances can promote these processes both on the individual and social level.

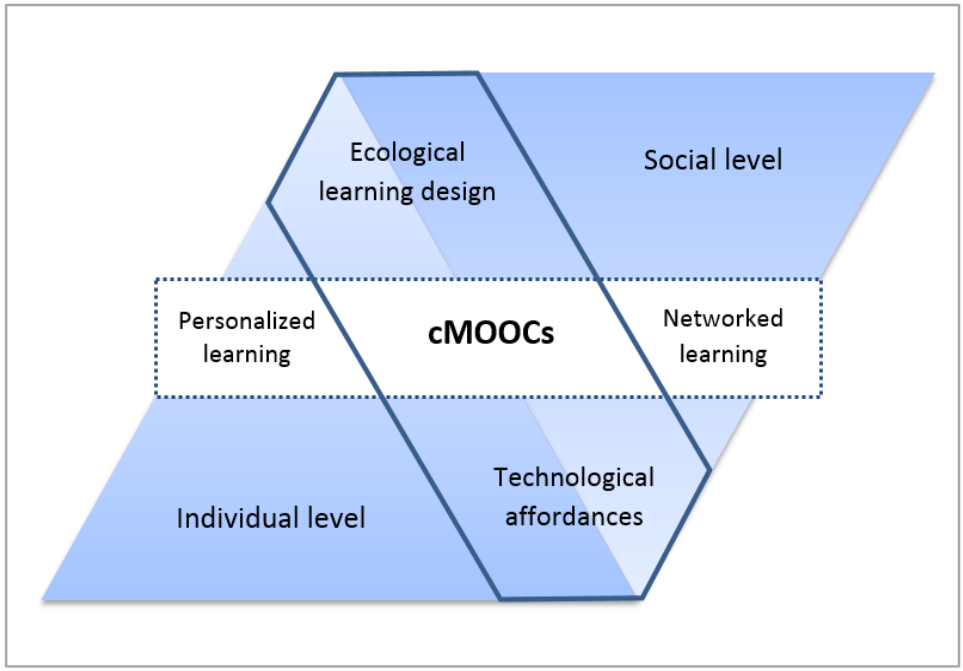

Figure 1. Conceptual framework of the study

1.3 Aims of the study

This study investigates the dynamics of learning in cMOOCs as a new learning ecology in online education. The thesis is a response to the need of better understanding of how learning experiences offered by MOOCs are perceived by participants. By analyzing ethnographic data gathered from several MOOCs over a five-year period, the study describes participants' experiences and perceptions of learning and networking in connectivist MOOCs, and how they utilize online tools and resources.

The overarching research question of the study is:

How can the learning ecology of cMOOCs be conceptualized and how it is perceived by participants?

The sub-questions of the study are:

- What characterizes participation and learners' experiences in cMOOCs?
- What networking activities and interactions are taking place in cMOOCs?
- What is the perceived value of participation in cMOOCs from the perspectives of learners?
- How do participants in cMOOCs utilize and personalize online tools and resources?
- What underpins the pedagogical and design configurations of cMOOCs?

2 OPEN EDUCATION AND MOOCS

> Nowhere has openness played such a central role as in education. Many of the pioneers of open movements have come from universities. The core functions of academics are all subject to radical change under an open model; from the Massive Open Online Courses (MOOCs) that are challenging teaching to prepublication repositories that undermine the traditional publishing and review model of researchers, openness affects all aspects of higher education. (Weller, 2014, p. 2)

2.1 Open educational resources (OER), open educational practices (OEP) and MOOCs

"Openness is the only means of doing education: if there is no sharing there is no education" (Wiley, 2010b). OECx [12] by noting that sharing is the most basic characteristic of education enabling people to build new knowledge, skills, ideas and understanding states that "open Education seeks to scale educational opportunities by taking advantage of the power of the Internet, allowing rapid and essentially free dissemination, and enabling people around the world to access knowledge, connect and collaborate." The notion of open education is not new, however, and it goes few decades back when there were efforts to change institutional practices to eliminate barriers and expand access to learning. In fact, open education promotes the idea that knowledge is a *public good* and that technology can provide extraordinary opportunities for everyone to reuse, revise, remix and share educational resources (Smith & Casserly, 2006; Wiley, 2010a). Open education is designed to promote participation and to remove the barriers to access and ownership of learning resources (Blessinger & Bliss, 2016). The authors state that "open education is not a substitute for traditional higher education provisioning . . . The *desire-to-learn model* of open education supplements the *ability-to-pay model* of higher education" (p. 19). Open education is an encompassing concept including a variety of movements around openness such as open content, free software, open access, opens source, open license, and so-called Open Educational Resources (OER) (Conole, 2013a; Peltonen & Väänänen, 2016; Stallman, 2002; Weller, 2009; Weller et al., 2015; Zimmermann, Höfler, & Ebner, 2016). MOOCs largely

[12] Open Education Consortium: https://www.edx.org/school/oecx

came about as results of open movement and OER in education and the possibilities of technological innovations in online learning (Yuan & Powell, 2015). Mulder (2015) explains that the term "open" in open education can have different attributes: open entry, freedom of time and space, open sourcing, open curriculum and most importantly open to all people and target groups. While the history of open education dates back even before the advent of computers, the real breakthrough of open education started by establishing open universities (e.g., Open University in the UK, Athabasca University in Canada) (Hollands & Tirthali, 2015; Mulder, 2015b). What makes the current conceptions of open education different is the potential of Web-based technologies and open source software to provide widespread accessibility to learning and instruction (Bonk, Lee, et al., 2015). In this respect, early initiatives towards opening education and providing free access to learning opportunities originated from developments in free software movement (Stallman, 2002), open content (Wiley, 2006), and a tendency to use, create, edit, and share content under open licenses and through social and digital tools (Couros, 2006; Lee, Bonk, Reynolds, & Reeves, 2015; Morgan & Carey, 2009). Initiatives such as MIT Open Courseware[13] and endeavors towards open content (Wiley, 2006) progressed towards open educational resources. OER broadly includes many forms: open courseware, open content, open license, and free software. Wiley (2015) refers to Hewlett Foundation's definition of OER as the most widely cited.

> Open educational resources are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. OER include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge. (Hewlett Foundation., 2014)

Although open educational resources are considered mainly as learning materials that are freely available to all, UNESCO (2002) deliberated a movement of *Education for All* to refer to educational opportunities equivalent to traditional classroom for anyone who has access to the Internet and the necessary tools to benefit from it (Krause & Lowe, 2014). In fact, open educational resources created drives to further open educational practices (OEP) such as MOOCs, which are based on the philosophy of openness in education. OEP refers to learning and teaching approaches that build upon the affordances of technology and benefit from open educational resources in order to create open, accessible learning opportunities.

[13] https://ocw.mit.edu/index.htm

Open educational resources gradually developed to be augmented with the concept of OEP through the work of EU-funded project (Mcandrew, 2011). As Ehlers (2011) clarifies, OEPs are practices that reuse and reproduce OER through institutional policies and innovative pedagogical models in combination with open learning architectures "that could transform learning into 21st century learning environments in which universities, adult learners, and citizens are provided with opportunities to shape their lifelong learning pathways in an autonomous and self-guided way" (p. 3). The OpenEducationEuropa[14] initiative is an example of combining both OER and OEP where a range of courses and MOOCs are offered along with an abundance of learning resources that are freely accessible. Developments in both OER and OEP and technological advancements engendered the emergence of the novel learning format of MOOCs, which open distributed learning opportunities to a massive number of geographically-dispersed learners. The open education movement has further expanded global opportunities for education primarily through OER and MOOCs in the past decade (Farrow, 2016). From open access to OER and the recent development of MOOCs, there is a growing momentum among higher education institutions to join the open movement and the promises of MOOCs to provide free access to innovative courses from high-profile universities (Yuan & Powell, 2013). Such open learning offerings, which make learning happen outside the boundaries of formal classroom, challenge mainstream higher education to adapt and develop appropriate strategies and to change the learning culture of today's learner towards more personal, self-directed and network-based learning. All these changes blur the boundaries between formal and informal learning, promote lifelong learning, changes in learning spaces and infrastructures, and new ways of interaction and collaboration (Saadatmand & Kumpulainen, 2014).

Bonk (2015) identifies three distinct waves of the influence of Web technologies on education and learning practices. The first phase (1994-2000) is the creation of pages and Web-based instruction; the second phase (2001-2007) open course ware and OER emerged and were developed, and the third phase (2008-2014) is the age of massive-like derivatives and MOOCs. From now on, the trend moves towards massive customization of learning MOOCs (Bonk 2015), learning analytics and the impact of big data on learning. Open movement in education and the evolution of online learning have conveyed some alternations in the learning landscape and created new models and trends in open and distance education. Bonk (2016) elaborates on the openness surrounding today's learning experiences and states that due to prevalent Web technologies, educational practices are open, global, and highly collaborative. Furthering the conception of e-learning from the

[14] https://openeducationeuropa.eu/

so-called *e-learning 2.0* (Brown & Adler, 2008; Downes, 2005; O'Hear, 2006), which underlines the participatory aspects of learning and user-generated content, Bonk (2016) introduces *Education 3.0* "where learning is about playful and highly engaged design, and where learner creation of products is the new norm, often with the use of digital media" (p. 8). He then explains three mega trends in the current generation of e-learning about pervasive exploitation of learning technologies (Bonk, 2016):

Mega trend #1: **learner engagement**

- learning is more mobile
- learning is more social
- learning is more digital and resource-rich
- learning is more immersive
- learning is more game-based
- learning is more collaborative

Mega trend #2: **pervasive access**

- learning is more open
- learning is more free
- learning is more online
- learning is more global
- learning is more ubiquitous
- learning is more informal

Mega trend #3: **customization**

- learning is more massive
- learning is more personal
- learning is more self-directed
- learning is more blended
- learning is more modifiable
- learning is more competency-based

Similarly, Downes (2017) characterizes the models and trends in open and distances learning as follows:

- *From passive to active:* Although this is not new, in online education, learners are no longer considered anymore solely recipients of learning packages delivered online or from a distance. Rather, learners are seen as active collaborators and contributors in online learning environments, who regulate and control their learning process; therefore, learners' perspectives must be considered in the design of learning environments.
- *From formal to informal:* Learning is not only managed by educational institutions and inside the formal borders of classrooms, but it is also created outside the traditional learning infrastructures and in online networks and communities.

- *From centralized to open and distributed:* Due to developments in open-source software and technological infrastructures, learning opportunities have expanded across contexts and beyond the time and spaces barriers; learning resources are widely available online in different forms and delivery modes.
- *Open licensing:* This is a major development not only in accessing content, but also in reusing, remixing, and sharing it. Nowadays *Creative Commons*[15] is a familiar term in distributing content and materials and accessing online repositories. Thus, an enormous number of high quality educational resources (OER) are available to be reused and incorporated by learners, teachers, and educators.
- *Personalized learning and PLE:* Personalization has always been important in online learning, but, the combination and customization of Web 2.0 tools and open source applications and open educational resources now provide learners with an opportunity to create their own personal learning environments (PLE) and networks beyond the capacity of learning management systems (LMS).
- *Social learning:* An increase in informal learning could be found in numerous communities and distributed networks, wiki-based initiatives (e.g., Wikipedia, WikiEducator, Wikiversity) and Edublogging, and many other online forums that all manifest social learning informally outside the conventional learning spaces.
- *From open courseware to MOOCs:* Open content and open course initiatives paved the way for the emergence of MOOCs as the very latest model in online learning. In fact, MOOCs combine many forms of open and distributed learning, open teaching, open course and OERS to create a novel learning model for the current digital age.

These trends and development encapsulated above for the current teaching and learning practices in digital era indicate more informal, personalized and distributed learning opportunities outside the boundaries of established educational institutions which embraces learner's preferences in one hand and the affordances of technology on the other. MOOCs, as such are learning environments that "make it possible to pursue the scalability of courses and the connectivity of social networked learning beyond institutions" (Yuan, Powell and Olivier, 2014, p. 7). While online learning is moving toward open sourcing in many ways, MOOCs offer obvious advantages: they eliminate geographic and economic barriers to education, allow students access to multiple learning opportunities, promote lifelong

[15] https://creativecommons.org/

learning, and augment traditional education with novel learning formats (Clobridge, 2012). However, as I will discuss in the next section about different types of MOOCs, accessibility and scalability of education as it happens in case of xMOOCs and openness in terms of free access and learner-centered pedagogical model as in case of cMOOCs are two distinctive trends in online learning.

2.2 The emergence and development of massive open online courses: cMOOCs vs xMOOCs

MOOCs as a new learning format in online learning have emerged and proliferated in recent years. MOOCs have received a great deal of attention and interest from many stakeholders in higher education. The surge of MOOCs created such a hype that The New York Times called 2012 the "Year of MOOCs" (Pappano, 2012). Since then, MOOCs have generated heated debates, considerable media coverage, significant discussions from, researchers, educational developers, educators and even entrepreneurs at start-up companies on how to embrace this disruptive innovation and how to adapt to the challenges and promises (Conole, 2013b, 2014; Hollands & Tirthali, 2014; Siemens, 2013). The term "MOOC" was devised by Dave Cormier in response to a Connectivism and Connective Knowledge (CCK08) course that was originally offered by the University of Manitoba by George Siemens and Stephen Downes to 25 tuition-paying students, but more than two thousand learners also took the course without payment (Bonk et al., n.d.; Cormier & Siemens, 2010; Daniel, 2012; Fini, 2009; Fournier & Kop, 2015; McAuley et al., 2010; Ossiannilsson, Altinay, & Altinay, 2016; Rodriguez, 2013; Stewart, 2013; Weller, 2014). CCK08 is considered to be the first MOOC (Siemens, 2013) and Siemens and Downes have been frequently credited for pioneering the learning format, though they have also acknowledged the role of David Wiley and Alec Couros in influencing the design of the course (Knox, 2016).

The first examples of connectivist-informed MOOCs that emphasize self-directed and community-based learning and on the use of social media and networked technology included: Personal Learning Environments and Networks and Knowledge (PLENK10), CCK09, CCK11, Change: Education, Learning and Technology (Change11), Learning Analytics and Knowledge (LAK11), Online learning for today and tomorrow (EduMOOC 2011), MobiMOOC, and Digital Storytelling (DS106) (Knox, 2014b). Although, early MOOCs have appeared since 2008 with the above-mentioned courses, they did not receive public attention and media coverage until the open course "Introduction to Artificial Intelligence" from Stanford University (which attracted 160,000 participants) catalyzed a buzz around the topic (Moe, 2015). MOOCs may have originated in Canada, but the initiative quickly spread to the United States, the United Kingdom and the

rest of the world (Bonk, Lee, Reeves, Reynolds, & Reynolds, 2015). MOOC business platforms include: *Coursera*; *EdX*; *Udacity*; and *Udemy* (US); *FutureLearn* (UK); *Eliademy* (Finland); *iVersity* and *OpenHPI* (Germany); *Open2study* (Australia); *Miríada X* (Spain); *Schoo* (Japan), and *JMOOC* (China). Since the hype of MOOCs in 2012, massive open online courses (MOOCs) have expanded worldwide, shaking up the higher education landscape and potentially disrupting the model of brick-and-mortar universities (Patru & Balaj, 2016). Figure 2 shows the evolution and trajectory of the development of MOOCs.

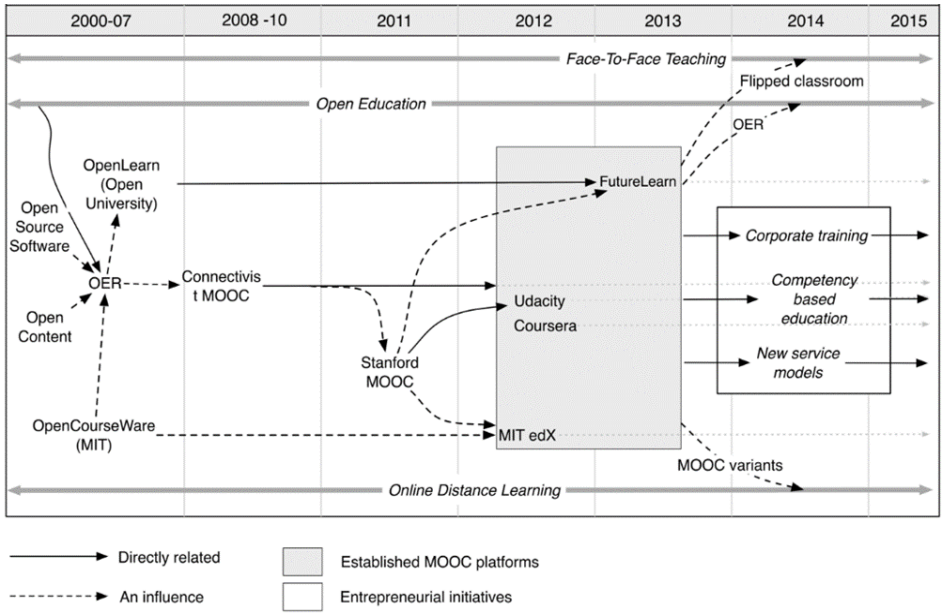

Figure 2. Timeline of open education and evolution of MOOCs (Yuan & Powell, 2015)

MOOCs are "platforms" (Siemens, 2012a) that efficiently exploit the potential of social Web and networking technologies to create learning opportunities for a massive number of learners. Today, MOOC is a term of everyday lexicon related to online learning in higher education. The MOOC phenomenon has risen largely because of the shortcomings of traditional learning models and the potential of technology to provide informal learning opportunities outside the formal classroom boundaries, and the desire for open and distributed learning environments (Saadatmand & Kumpulainen, 2014). The development of MOOCs is basically rooted within the ideals of openness in education to open learning opportunities and access to university-level education as economically as possible and the notion that "knowledge should be shared freely, and the desire to learn should be met without demographic, economic, and geographical constraints" (Yuan & Powell, 2013, p. 6). Ferguson and Sharples (2014) argue that a massive course, as an innovative learning environment, can go far beyond a traditional course in providing ubiquitous access to a huge range of resources in various online forms

and supporting a wide range of other learners with diverse cultural perspectives. Mulder (2015b) mentions that MOOCs have their roots in two major developments: first, the notion of openness and OER, and second, the use of new technologies and Internet applications in educational practices.

The term MOOC may still be a buzzword. It does not convey a unified definition and meaning to all. In a very broad definition, Ferguson, Sharples and Beale (2015) define MOOCs as a form of technology-enhanced learning based on the vision of 'massive-scale open learning' to open education and "widen access to world-class universities to fulfill the global demand for higher education" (Clifton, 2013, quoted in Ferguson, Sharples, & Beale, 2015). Mulder & Jansen (2015) define MOOCs as "online courses designed for many participants that can be accessed by people anywhere if they have an Internet connection and offer a full/complete course experience online for free" (ECO p. 133). Perhaps the most common and relevant definition of MOOCs is one offered by McAuley et al., (2010):

> A MOOC integrates the connectivity of social networking, the facilitation of an acknowledged expert in a field of study, and a collection of freely accessible online resources. Perhaps most importantly, however, a MOOC builds on the active engagement of several hundred to several thousand 'students' who self-organize their participation according to learning goals, prior knowledge and skills, and common interests. Although it may share in some of the conventions of an ordinary course, such as a predefined timeline and weekly topics for consideration, a MOOC generally carries no fees, no prerequisites other than Internet access and interest. (p. 5)

The above definition is well manifested in early connectivist-informed MOOCs where the emphasis is on networking and active engagement of participants. Basically, a MOOC is an open online course that attracts a massive number of participants from dispersed geographical locations; course materials are distributed and usually freely accessible across the Web. In contrast to conventional online courses, two main features characterize MOOCs: ***accessibility***—any interested learner can participate, usually for free or at a low cost, and ***scalability***—the course can accommodate a massive (and basically unlimited) number of participants (Yuan & Powell, 2013). In a more expanded vein, the four dimensions and the words encapsulated in the MOOC acronym can be operationalized as follows: (e.g., Mulder & Jansen, 2015; Jansen & Goes, 2016; Littlejohn, Hood, Milligan, & Mustain, 2016; Ossiannilsson, Altinay, & Altinay, 2016; Reeves & Hedberg, 2014; Siemens, 2013).

- ***Massive:*** Perhaps this is the most prominent aspect of MOOCs that gained them attention; the term refers to the scalability of online courses to attract a

large number of participants. The massiveness of MOOCs is represented in the offerings from major course vendors such as Coursera, Udacity, and EdX. The original MOOCs, such as CCK08 and PLENK10 also attracted a relatively sizable number of participants (some thousands of students compared to Stanford's AI2011 that drew 160,000 students). Ferguson, Sharples, and Beale (2015) argue that massiveness is more than just opening; rather it affords opportunities for increased access to a wide range of resources, communities and content that are beneficial for learners, educators, and society. Here is their vision

> By 2030, the systems that develop from MOOCs will be meeting needs of societies by educating millions of digital citizens worldwide. They will open up access to education and enable people all over the world to enjoy the benefits of learning at scale. This can only happen if there is persistent intent not only from MOOC providers, but also from policy makers and educators. (p. 316)

- ***Open:*** The combination of OER and OCW improvise MOOC offerings that were founded on the notion of openness in education. Primarily, it means that access to free courses and open-licensed resources (e.g., Creative Commons) must be implied. However, open access is different from free access; business model platforms such as Coursera provide open access courses, but most of them are not free of charge.
- ***Online:*** This aspect of MOOC refers to how a course operates on online platforms and how it is situated within and across institutional contexts and the platform provider. Being online (content and interactions) is an exclusive feature of MOOCs and no attachment to a specific physical location may be required for a MOOC (Downes, 2013; Siemens, 2013). However, recently on a local level, some blended types of MOOCs have been offered.
- ***Course:*** A MOOC as a course has a structure and informed timetable; it also has learning goals and some forms of assessment. Along with having structure, which is in favor of institutions, some level of freedom and self-paced learning are in favor of participants (Jansen & Goes, 2016). However, MOOC structure may vary: the structure and pedagogy of connectivist MOOCs (based on interactions and networking) is distinct from xMOOCs (based on behaviorist pedagogy and content transmission).

As described, openness (opening up learning opportunities) and massiveness (providing learning opportunities for a large number of participants) are two main features of MOOCs. However, accessibility in MOOCs implies lowering the threshold of taking part in learning possibilities regarding financial and institutional barriers. Large course vendors such as Coursera may ease accessibility at scale, but they lack interactivity, which was the main idea behind the original MOOCs. This brings the discussion here toward presenting a classification of

MOOCs based on underlying pedagogies, and instructional and design approaches. As Stewart (2013) states, as long as the MOOC hype grows, the conceptions and configurations of MOOC offerings will be varied and contested. MOOC conceptions and formats have evolved and become polarized over time. Conole (2013a) says that when it comes to a new disruptive innovation, describing the terms and concepts are always tricky. Although, there might exist various types of MOOCs, within the current configuration of MOOCs, two major types of MOOCs can be classified: connectivist MOOCs (cMOOCS) and xMOOCs (Conole, 2013a; Daniel, 2012; Downes, 2015; Hollands & Tirthali, 2014; Rodriguez, 2013; Siemens, 2013). The cMOOCs are the original MOOCs based on connectivist pedagogy that views learning as a process of developing and creating network connections (Siemens, 2013). The cMOOCs establish many-to-many interactions and interconnectedness using multiple spaces, tools, and technologies in which course content and activities are distributed across a Web of connections; furthermore, social construction of knowledge is facilitated through learner-driven interactions and co-creation of content. These cMOOCs emphasize learning through community building, self-directed and autonomous learning, and connectedness (Rodriguez, 2012). Downes (2009) has suggested these key characteristics of cMOOCs: autonomy, diversity, openness, and connectedness and interactivity. Learner control and autonomy are emphasized in cMOOCs and numerous tools and technology platforms (e.g., wikis, blogs, tweets, Webcasts, and discussion forums) are used to run the courses and facilitate activities and interactions (Bates, 2014; Siemens, 2013).

Downes (2015) states that a cMOOC "is based on connection rather than content, which looks more like an online community than a course, and doesn't have a defined curriculum or formal assignments. These were the original MOOCs, and they posed a much greater challenge to both the educational institutions that offered them and the participants who studied in them" (para 1). Wiley's "4Rs" of central characteristics of openness: reuse, revise, remix and redistribute, are manifested in cMOOCs. Absar & Gruzd (2016) also explain that learning processes in cMOOCs are reinforced through these four tasks:

> 1) Aggregate: Participants were given access to a wide variety of things to read, watch or play with. 2) Remix: Participants were then encouraged to keep track of their in-class activities using blogs or others types of online posts. 3) Repurpose: Participants were asked to not just repeat what other people have said, but create their own content. 4) Feed Forward: The last step was to share their work with other people in the course or outside the course to spread the networked knowledge. (p. 458)

The distributed nature of cMOOCs enables learners to build their own learning pathways on the capacity of digital technologies to aggregate, curate, and repurpose content and encourages participatory work and networking among peers

(Stewart, 2013). These cMOOCs have a less predefined curriculum and provide a minimal structure, content, activities, and resources; they build on the learner's personal learning environments (PLE) more than learning management systems (LMS) to deliver the course. Bali, et al., (2015) noted, "Participants are expected to connect, interact, and collaborate openly with each other to develop, extend, and amplify the content of the course" (p. 101).

In contrast to cMOOCs, xMOOCs (e.g., course offerings from edX, Coursera, Udacity) have a different structure and pedagogy. Whereas cMOOCs encourage networked learning and participation through creating and contributing, xMOOCs are based on a behaviorist pedagogical approach, and are primarily designed to deliver course content in a more structured transmission of teacher-chosen content, usually through video lectures and quizzes present via a learning management system (Conole, 2014; Hollands & Tirthali, 2014; Rodriguez, 2013; Skrypnyk, Joksimović, & Kovanović, 2015). The pedagogical underpinning of xMOOCs is based on knowledge transmission. Instructors are the knowledge experts and "learning is primarily a process of the learner duplicating the knowledge structure set by the course designer and the instructor teaching the course." (Siemens, 2013, p. 7). This type of MOOC design was applied to an "Artificial Intelligence" course offered by Stanford University in 2011. It is argued that whereas the original MOOCs were based on a more emancipatory philosophy through a constructivist and connectivist pedagogy and learner engagement in discursive communities, the current MOOCs are based on proprietary platforms and strongly driven by instructivist pedagogy and behaviorist style to massively duplicate a traditional model of online learning (Weller, 2014; Daniel, 2012). While most of the existing MOOCs are xMOOCs, they are not all the same. For instance, the MOOCs offered by Coursera and Udacity center more on delivery of course content and they are for profit, while those of edX and UK's FutureLearn are non-profit platforms and offer more interactive courses (Stewart, 2013). Table 1 summarizes the different aspects and differences between cMOOCS and xMOOCs.

Table 1. cMOOCs vs xMOOCs (Adapted from Reeves & Hedberg, 2014)

	cMOOCs	xMOOCs
Learner role	Active	Passive
Instructor role	Facilitator/ co-learner	Guide on side/ sage on video stage
Learning theory	Connectivism/ socio-constructivism	Behaviorism/cognitivism
Pedagogy	Knowledge construction	Knowledge duplication
Delivery of instruction	Personal learning environment (PLE)	Learning management system (LMS)
Assessment	Self-assessment/ peer assessment	External assessment/ instructor assessment
Certification	Rarely	Usually
Business model	Non-profit	For profit

Yuan, Powell and Olivier (2014) present another useful analysis of MOOC typology as shown in Table. 2.

Table 2. MOOC typology

xMOOCs		cMOOCs
Scalability of provision	**Massive**	Community and connections
Open access - Restricted license	**Open**	Open access & licence
Individual learning in single platform	**Online**	Networked learning across multiple platforms and services
Acquire a curriculum of knowledge & skills	**Course**	Develop shared practices, knowledge and understanding

2.3 MOOCs as disruptive innovation? Technological, pedagogical, and Institutional aspects

The potential of emerging technologies to transform teaching and learning practices on all levels of education, both formal and informal, disrupts conventional teaching formats. Conole et al., (2008) note, "They seem to offer the potential for 'pedagogical innovative' or are suggested as acting as 'catalysts for change'" (p. 511). Technology affordances and the abundance of information 'disrupt' formal learning practices and environments (Selwyn, 2013). MOOCs have been postulated as being disruptive innovations in education that change the education system and unbundle educational services (Anderson, 2003; Anderson & McGreal,

2012). Unbundling of educational services refers to the idea that traditional degree programs will not be dominant models of instruction in the long-term and the future of higher education will undergo a transformation to online degrees; the possibility of disaggregation and outsourcing of components of education systems to decentralized services (Anderson & McGreal, 2012; Craig, 2015). It is argued that MOOCs as "disruptive innovation" or "disruptive technologies" (Anderson & McGreal, 2012; Gillani & Eynon, 2015; Conole, 2016a; Haggard, 2013; Jacoby, 2014; Yuan & Powell, 2013a) can challenge the existing higher education provisions, represent an unbundling of educational services, and force universities to make their curriculum delivery models and courses more flexible and accessible in response to demand from learners (Yuan & Powell, 2013). This disruption demands that higher education institutions understand such changes and adapt appropriately. Siemens and Tittenberger (2009) state that higher education is under the pressure of some emerging trends and changes that require a holistic response that includes institutional, technological, and societal aspects. MOOCs have been tested as vehicles of innovation in teaching and learning, and they prompt HE institutions to revisit online learning and prepare for an uncertain future (Hollands & Tirthali, 2014; Yuan & Powell, 2013). Ossiannilsson, Altinay and Altinay (2016b) postulate that increased digitization and open education can promote equality in access, equity, quality learning, and entrepreneurship education "in the digital society of the twenty-first century" (p. 161).

Stewart (2013), while emphasizing the importance of massiveness in education, believes that MOOCs challenge the conventional role of universities as purveyors of knowledge and credentials. Ferguson & Sharples (2014a) argue that a massive course, as an innovative learning environment, can go far beyond a traditional course in providing ubiquitous access to a huge range of resources in various online forms and to support from a wide range of other learners with diverse cultural perspectives. The availability of MOOCs from top universities which can be accessed from everywhere in the world through the Internet appears to promise better access to high quality education. MOOCs have the potential to improve the productivity of higher education (Kassabian, 2014). Given the fact that the costs of higher education are increasing and a huge burden on students, it would be reasonable to expect a greater investment in developing MOOCs so that they would expand access to higher education. Yuan and Powell (2013) discuss the disruptive potential of MOOCs in that they promise free access to cutting edge courses that could drive down the costs of university-level education and potentially shift the costs from students to institutions or lower the costs of access to higher education. Siemens (2015) argues that there is a need to "re-architect higher education" so that large traditional universities would not remain as the dominant model of higher education and a heterogeneous, mixed model of academics, venture capital firms and governmental bodies would emerge to provide new learning solutions to better serve the needs of modern learners.

MOOCs can trigger higher education institutions to assess and re-evaluate their current online learning provisions, and prepare and adapt their global engagement strategies to the new demands created by open online learning by examining new pedagogical and business models (Yuan & Powell, 2015). Conole (2013a) urges higher education institutions "to reposition themselves and develop new business models in a context where free resources, expertise and whole courses are now becoming more commonplace" (p. 222). Hedberg (2011) discusses how technologies and digital content might change learning practices and cause disruptive pedagogy. "These combinations of innovations and technologies enable alternative ways of learning about the world that no longer require the industrial organization of the classroom wherein learning and teaching activities and processes are achieved through the teacher-centric control of pedagogy, knowledge and technologies" (Hedberg, 2011: p. 2). Massive open online courses have the potential to open higher education to the masses by providing learners with more choice of learning resources and allowing them to create personalized learning experiences outside the formal education structure. Thus, MOOCs have stimulated discussion around pedagogical approaches and caused "pedagogical disruption" that contest the established roles of instructors and put more emphasize on learner-centered approaches and user-generated content models of learning (Yuan, Powell, & Olivier, 2014). They further discuss that while the current dominance of MOOCs (e.g., xMOOCs offered from Coursera, Udacity) represents the established model of distance and online learning models, but at scale, the original MOOCs (cMOOCs) accentuated the social nature of learning and valued learners' active role and autonomy, which can be considered as an innovative online pedagogical approach. While the intention of cMOOCs is to harness the power of social and participatory media to enable participants to communicate and collaborate through a variety of channels, Conole (2013b) indicates that xMOOCs are criticized as being a 'step back' pedagogically and some say that does not translate well into the online learning environment.

Although MOOCs may represent innovation in higher education, they will not transform educational practices nor revolutionize higher education fundamentally if the interrelated components including, technological and pedagogical consideration are neglected (Kim & Chung, 2015). Many observers in online learning might have predicted that MOOCs would revolutionize higher education and would repair the issues of inaccessibility, but, while a small percentage of higher education institutions still offer MOOCs and are cost-effective, pedagogy is also important; MOOCs cannot catalyze a shift without some significant changes to the status quo (Hollands & Tirthali, 2015; Hollands & Tirthali, 2014). Some have questioned how learning offerings by MOOCs can be authentic and how thousands of students would be taught by one or just a few professors along with a few facilitators and assistants (Siemens, 2015). Course design is a fundamental factor in the success of MOOCs and the quality of learning they can provide. While

cMOOCs build on connectivity and interactivity through leveraging a rich array of tools and social media such as Facebook, Twitter, Blogs, online forums, and Google apps to create a distributed learning environment, xMOOCs are lacking in course design that fosters participants' engagement and improved interaction (Kassabian, 2014).

The current trends of MOOC offerings from Courser and edX, which are based on behavioristic approach, do not offer any disruption to educational practices unless scaling up higher education would be the issue. For instance, Knox (2014a) contends that massiveness in education is unprecedented and whether MOOCs offer anything innovative or transformative can be reflected in terms of MOOC pedagogy. In this sense, xMOOCs massify education by centralized and instruction-informed teaching to unprecedented number of learners. On the other hand, however, cMOOCs offer different technological and pedagogical configurations of learning environments. They represent open, decentralized and distributed learning opportunities to self-directed learners "as means to construct knowledge independently of teachers and institutions" (Knox 2014a, p. 165). Daniel (2012) suggests that in a world of abundance of content, the original MOOCs (cMOOC model) can draw from a pool of OERs and more varied teaching practices to offer a new pedagogy. Figure 3 summarizes the discussion in this chapter on the development of open education over time (OER and OEP) that led to the emergence and evolution of MOOCs (cMOOC and xMOOCS), and technological and pedagogical aspects.

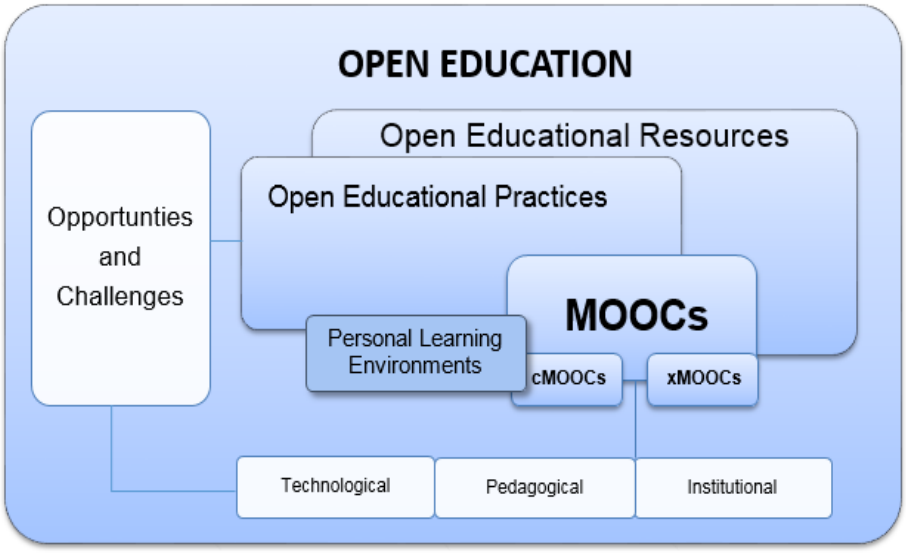

Figure 3. Development of open education the MOOC impact

3 AN ECOLOGICAL APPROACH TO LEARNING DESIGN WITH TECHNOLOGY

3.1 The changing contexts of learning

Designing for learning with the potential of technology is arguably one of the key challenges facing educators today (Conole, 2013a). She defines learning design as:

> a methodology for enabling teachers/designers to make more informed decisions in how they go about designing learning activities and interventions, which is pedagogically informed and makes effective use of appropriate resources and technologies. This includes the design of resources and individual learning activities right up to curriculum-level design (p. 7).

Learning design informs educational professionals to make appropriate pedagogical choices in creating learning interventions harnessing the potential of available technologies (Gros, Kinshuk, & Maina, 2015). Designing for learning in the flux of constant change requires both the adaptation of learner's needs and pedagogically-informed integration of technologies to create a dynamic and adaptive learning ecology that links learners' physical, social and digital worlds across multiple locations and networks. Due to ever changing educational contexts, "traditional approaches to the design and delivery of learning interventions are being challenged and may no longer be appropriate to meet the needs and expectations of today's learners. New pedagogies and innovative use of technologies seem to offer much promise in terms of providing new, exciting educational experiences for learners" (Conole, 2013a, p. 3). She further reports that because of the networked and globalized nature of modern society (Castells, 2000; Giddens, 1999), the impact of modern technologies, and the shortcomings of traditional standardized educational systems, there is a need to re-design learning interventions; a shift from behavioristic approaches to a more authentic, contextual and holistic approach to learning design that equip today's learners with necessary skills and competencies to be able to participate in a constantly changing societal context. The flow of emerging digital tools adds new dimensions to learning contexts and technology is the driver for changing the contexts of learning; learning is no longer restricted to fixed locations such as classrooms, but is distributed across contexts (Westera, 2011). For instance with regards to the potential of emerging technologies for learning, concepts of "pedagogy 2.0" or "eLearning 2.0" are conceptualized on the themes of openness, personalization, participation, user-generated content, and networking (see Dabbagh & Kitsantas, 2012; Downes, 2005; Mcloughlin &

Lee, 2007). Consequently, learning environments today are different than learning environments of the past (Veletsianos, 2016) and they demand appropriate pedagogies and design considerations to make effective use of technological affordances. Moreover, new technologies bring new types of interactions that are distributed, ubiquitous, and networked. All such developments have implications for designing technology-rich learning activities. For instance, Cisco improvises novel approaches to learning. Disruptive innovation can improve and transform formal and informal learning because it can:

- adopt more open, flexible and engaging learning
- deploy a range of technologies for learning
- extend formal learning beyond the classrooms and provide community–based learning (Leadbeater & Wong, 2010)

While infiltration of technology in educational practices spans the boundaries between formal and informal learning, a pedagogically-informed learning design with affordances of technology and involvement of learners is a solution to overcome some of the shortcomings of traditional learning settings. Socio-cultural perspectives underline the importance of contexts and define learning as social processes of participation and interaction with an active role of learners in creating knowledge. From this standpoint, designing learner-centered environments that foster interaction and learners' engagement is challenging, particularly with the complexities of socio-technical configurations of emerging technologies. As such, an ecological approach (Barron, 2006a; Brown, 2000; Luckin, 2010a; Thomas & Brown, n.d.) illuminate understanding of learning design that emphasizes learner involvement in the design process as a "learner-centered ecology of resources" (Luckin, 2008). In a seminal work, "growing up digital: how the Web changes work, education, and the ways people learn," Brown (2000) adroitly employs the metaphor of ecology for learning environment. He further introduces the concept of a 'new culture for learning' and postulates how digital and Web tools change how people learn. Viewed this way, a learning ecology is an environment for learning that is open, complex, adaptive, and partially self-organized. It is constantly evolving providing students, teachers, and communities with immediate access to information and resources. Similarly, Barron (2006b) provides an approximate definition of learning ecology as a "set of contexts found in physical or virtual spaces that provide opportunities for learning.." and they may include formal and informal settings (p. 195). An ecological approach emphasizes design in a constantly changing and dynamic environment and assumes a learning system as open and adaptive which is not fully predesigned and adapts learners' perspectives in the design and modification of learning environments and activities (e.g., Brown, 2000; Conole, 2016c; Fischer, 2000; Nardi & O'Day, 1999; Pata, 2013). Fischer (2000) called this idea meta-design: facilitating learner involvement and

control in the design of their own learning environments. A learning ecology perspective invites educators and researchers to understand individual differences in the emergence and trajectories of learning activities and the dynamics of learning across and within settings (Barron, 2006a). It includes all components in an education system: learners, teachers, pedagogical activities, interactions, tools, and resources (Kim & Chung, 2015).

Similarly, Luckin (2005, 2008, 2010a, 2010b) discusses a 'learner-centric ecology of resources' model for designing technology-rich learning environments that foster interaction among learners and a variety of interrelated resources. This framework is inspired by Vygotsky's sociocultural philosophy that identifies the important relationship between learner and context (Luckin, 2008). By defining learner-centric ecology, Luckin (2010a) encapsulates a conceptualization of context that engenders the development of technology-rich learning activities encompassing online, mobile, and hybrid learning approaches that allow learners to link their experiences between and across multiple physical, social and digital locations. She states, "Context matters to learning. . . . It is dynamic and associated with connections between people, things, locations and events in a narrative that is driven by people's intentionality and motivations. Technology can help to make these connections in an operational sense" (p. 155). Other researchers note that the metaphor of ecology "sheds light on the entangled facets of sociocultural activities and educational contexts" (Esposito et al., 2015, p. 331) and provides a useful framework for conceptualizing learning and teaching across online platforms and analyzing learners' interactions and experiences across different contexts and communities (Greenhow et al., 2009; Maina & González, 2016).

In an era of pervasive information and communication technologies (ICTs), the ecological approach is conceptually useful. Frielick (2004) notes, "The juxtaposition of an emergent ecological philosophy together with the information technology explosion poses some fascinating issues for education" (p. 328). The ecological approach to learning design assumes adaptive functions of human learning by emphasizing technological affordances (Goodyear & Carvalho, 2013; Timberlake, 1984). With the emergence of social and participatory tools, the landscape of learning has changed from structured, brick-and-mortar classrooms to distributed and networked learning ecologies such as MOOCs. Today, the ecological perspective on learning design is reflected especially in the development of connectivist MOOCs (Dillenbourg, 2016) where there is no fully pre-determined curriculum and participants are invited to be involved in an ongoing process of shaping the learning environment and communities. CMOOCs are characterized as open, dynamic, and evolving learning ecologies of self-organized learners, digital resources, and learning networks that promote distributed cognition (Normak, Pata, & Kaipainen, 2012; Pata & Bardone, 2014).

3.2 Technological affordances

"*We shape our tools and thereafter our tools shape us"*

Marshall McLuhan

Futurists such as McLuhan (1964) argue that technologies are extensions of human functions and technological tools and artifacts can be harnessed in order to extend human capabilities (Lawson, 2010). Technological tools are both "communicative acts" (Vivitsou, 2016), and "cognitive tools" (e.g., Jonassen, 1994; Jonassen & Reeves, 1996; Lajoie, 1993) that support cognitive power of human beings and enhance people's cognitive processes. This has become ever more relevant as ubiquitous technologies and social media infiltrate all aspects of people's lives and have become part of educational practices transforming the ways in which learners communicate, work, and interact (Conole, 2013a; Maina & González, 2016; Selwyn, 2013). The digitization and technology subversion in educational practices and users' increased access to information and participatory media have shifted the landscape of education and altered the nature of scholarship and collaboration and provides opportunities for wider access to learning resources (Conole, 2010; Ponti, 2014; Veletsianos, 2010; Weller, 2012). Of course tools have always been part of pedagogical activities. But in modern technological cultures, digital technologies have emerged uniquly with mediating functions (Säljö, 2008, in Lantz-Andersson, 2009). Technology provides affordances for educational actions that can be considered in designing online collaborative learning environments. Such technological affordances as proposed by (Conole & Dyke, 2004b) include: accessibility, communication and collaboration, interaction, reflection, diversity, multimodal and non- linear, surveillance and immediacy. More recently, Conole (2013 a) has identified a set of "positive affordances" of technologies with regards to "the design of learning interventions: collaboration, re flection, interaction, dialogue, creativity, organization, inquiry and authenticity" (p. 88). Gaver (1991) posited that "tools afford different actions" (p. 79) and that those affordances can provide a rationale of design that suggests ways to improve usability of artifacts, and interactions between technologies and users. Similarly, Conole (2013a) argues that the concept of affordances provide a useful means of describing the relationship between technologies and users in a particular context. Salomon, (1993) defines affordance as the link between perception and action and "the functional properties that determine how the thing could possibly be used" (cited in Conole & Dyke, 2004). Tella (2005) reflects on Gibson's notion of affordance which is "a reciprocal relationship between an organism and a particular feature of its environment" and that an affordance may prompt some action but is not automatically triggered. Rather it depends on how the person chooses to "act, react or simply do nothing" (p. 18).

Although the term "affordances" is potentially rich and has been used a lot in various contexts but it is also contested (Boyle and Cook, 2004, cited in Conole 2013a). Norman (1988) appropriated the concept of affordances from Gibson's (1979) ecological context to HCI community (McGrenere & Ho, 2000). While Gibson's affordances refer to actual properties of an object that are relevant for an actor's capabilities and actions, in Norman's view, however, affordances are salient to usability and user's perceptions (ibid). Thus, when talking about technological affordances, Norman's perspective refers to the usability of an environment and how tools and artefacts are designed to create possibilities for action.The affordances "must be perceivable and meaningful so that they can be used and must support or anticipate an action" (Kirschner et al., 2004, p. 2), and they must be appropriately designed (usability of the objects). In other words, technological affordances should support educational and social interactions. Addtionally, appropriate technological affordances and efficient usability promote social and educational functionalities in online collaborative learning environments (Doering et al., 2008; Kirschner et al., 2004). On the other hand, utility, that is determined by educational and social functionalities (Kirschner et al., 2004), do not have to be overlooked at the expenses of usability (Doering et al., 2008). Conversely, as Kirschner et al. (2004) argue, neglecting usability criteria risks creating online collaborative learning environments that contain all educational and social functionalities (utility) but that cannot be handled by learners due to difficulties to learn, access, and/or control.

In ecological-based approaches to learning design, the concept of affordances provides links between pedagogy and the design of the learning environment and activities with an appropriate choice of tools and resources (Conole, 2016c; Conole & Dyke, 2004; Doering et al., 2008 Gibson, 1977; Pata, 2013; Tella & Harjanne, 2007). Luckin (2010b) believes affordances of technology in designing learning increases availability of digital tools and ubiquitous technologies thereby offering choices for self-designed learning, enabling cross-contextual communication and socialization. The notion of affordances as essential to the ecological metphor has been used across fields and contexts, including human-computer interaction (HCI), computer supported collaborative learning (CSCL), technology-enhanced learning (TEL), and other technology-rich activities (e.g., Anderson & Elloumi, 2004; Barron, 2006b; Brown, 2000, 2009; Conole, 2013; Norman, 1988; Tella & Harjanne, 2007; Turner, 2005; Webb, 2005). The ecological approach emphasizes the design of a learning system as open and adaptive that is not fully predesigned and adapts learners' perspectives in the design and modification of learning environments and activities (Brown, 2000; Conole, 2016c; Fischer, 2000; Pata, 2013). The focus is on learners' involvement in many settings; they create activity contexts for themselves within and across settings and "new technologies can help make boundaries more permeable and allow for new kinds of agency in learning" (Barron, 2006b, p. 200). Therefore, when designing CSCL and online

environments, a good design that warrants appropriate usability is grounded in learner-centered design.

A cMOOC epitomizes the learner-centered approach and acknowledges self-paced and self-directed learning by designing the environment in such a way that stimulates active participation in which learners can follow their personal learning trajectories (Guardia et al., 2013). This learner-centric design is conceptualized in personal learning environment (PLE) as an approach and conceptual framework on the affordances on technology and learner autonomy as I will explain in the following section. I agree with Downes (2017) who states that the design and development of MOOCs and PLEs have caught much of the attention in online learning in the past recent years. Unsurprisingly, both trends have their roots intertwined in the philosophy of open education and the affordances of emerging technologies.

3.3 Learner-centered design and personal learning environments (PLE)

As discussed, the discourse on learning design has placed much consideration on pedagogies that acknowledge learner autonomy and multimodal learning. A learner-centered approach situates learning in authentic contexts. Bonk & Cunningham (1998) in their analysis of collaborative tools emphasize the opportunities that the blending of technological and pedagogical advancements can offer in elevating students' participation and collaboration. Some higher education institutions employ institutionally-managed virtual learning environments (VLE), content management systems (CMS), or learning management systems (LMS). Nevertheless, there is a need to create more room for learners and to exploit the pedagogical affordances of social technologies to create personal and social learning spaces to support more learner-centered personalized learning systems (Dabbagh & Kitsantas, 2012; McLoughlin & Lee, 2010). Williams, Karousou, & Mackness (2011) call these new learning systems "personal learning ecologies" in Web 2.0. The development of so-called personal learning environments (PLE) based on the idea of a user-centered learning approach and using social software tools is a kind of counter-concept to centralized and institutional-controlled learning management systems (Fiedler & Väljataga, 2010; Schaffert & Hilzensauer, 2008).

Accordingly, the personal learning environment as a pedagogical approach to address issues of learner control, self-directed learning, and personalization has been discussed increasingly and developed in e-learning and TEL area (e.g., Brown, 2010; Dabbagh & Kitsantas, 2012; Taraghi, Ebner, & Till, 2009; van Harmelen, 2008). Conversation and research on PLE in the current conceptualization based on the potential of Web 2.0 and participatory media is rather new; it

dates back not even a decade. Due to the increased exploitation of a variety of Web technologies in learning and teaching practices, and the changing role of teachers, we can observe a shift from teacher-defined learning spaces to learner-directed environments where learners can follow their personal learning paths and be simultaneously autonomous and collaborative in an evolving environment (Normak et al., 2012). Schaffert & Hilzensauer (2008) have identified seven aspects of the shift from LMS to PLE: (1) learner's active role in creating content (from consumer to prosumers); (2) self-directed learning; (3) unlimited learning resources (as an infinite "bazaar"); (4) social involvement; (5) ownership of learner content; (6) personalization, and (7) social software tools and aggregation of multiple sources.

PLE has been discussed as both a conceptual framework and a technical solution to fulfill the assumptions of learner control in shaping their learning processes, linking informal and formal learning across contexts and promoting lifelong learning (Attwell, 2007; Rahimi, van den Berg, & Veen, 2015; Sclater, 2008; Behnam Taraghi, Ebner, et al., 2009; Wilson, 2008). Attwell (2007) who was among the first scholars to explain the concept of PLE and its characterizations, believes that PLE is more a philosophical and pedagogical approach than a technical approach to learning design. However, he does underline the affordances of ubiquitous technology and social software in creating an open ecology, which he maintains is of value for enhancing the role of individual learners, specifically in the production of their learning materials and formulation of their learning environments. Vuojärvi (2013) analyzed different conceptualizations of PLE and also concluded that PLE is a conceptual framework rather than a technical tool. The technical view of PLE is that it is a technical tool or an application that can be used to manage information or tools that students use for learning (e.g., Schaffert & Hilzensauer, 2008; B Taraghi, Ebner, Till, & Mühlburger, 2010; Mark van Harmelen, 2006; White, 2011; Wilson, 2008; Wilson et al., 2007). The conceptual view of PLE acknowledges it as an abstract framework that combines all devices, applications, information, people, communities, contexts, and previously adopted knowledge that relate to learning activities in which students engage (Attwell, 2007; EDUCAUSE, 2009; Johnson & Liber, 2008). The technical definition of PLE considers it as a tool or application consisting of tools and resources for managing learning and information (e.g., Chatti, Jarke, Specht, Schroeder, & Dahl, 2011; Taraghi, Mühlburger, Ebner, & Nagler, 2009; van Harmelen & Harmelen, 2006; Wilson, 2008), while PLE as a conceptual framework combines all tools, communities, people, networks and everything that surrounds a learner, including physical objects and invisible meanings (Attwell, 2007; Dabbagh & Kitsantas, 2012; EDUCAUSE, 2009; Rahimi, Van den Berg, & Veen, 2014; Schaffert & Hilzensauer, 2008a; M. van Harmelen, 2008; Vuojärvi, 2013). EDUCAUSE's (2009) definition of PLE is more conceptual: "Tools, communities and services that constitute an individual educational platform that learners use to manage their

own learning and pursue their goals. The term does not refer to a specific service or application, but rather to an idea of how individuals approach the task of learning."

Whether a metaphor or a learning ecosystem, we have defined PLE as one's own knowledge-management tools, services, resources and connections that shape an individual's learning platform and links individual and social aspects of learning by taking advantage of participatory media to gain knowledge and competency (Saadatmand & Kumpulainen, 2012). In both conceptual and technological approaches to PLE, social media and Web 2.0 tools (e.g., blogs, wikis, YouTube, Facebook, LinkedIn, and social bookmarking tools such as Delicious, Diigo) are incorporated in order to promote processes of information management, content aggregation, social interactions; and scaffolding self-regulated learning skills and learner autonomy (Chatti et al., 2011; Dabbagh & Kitsantas, 2012; Schaffert & Hilzensauer, 2008a; Taraghi, Ebner, et al., 2009). In this view, the personal learning approach encourages an autonomous learner to adapt, customize, and personalize a variety of self-combinable Web tools, RSS, mash-ups and APIs, and continuously develop and change the design solutions to support his or her learning (Normak et al., 2012; Pata, 2011). Anderson and Dron (2012) describe PLE as both an application or environment in which tools are utilized for sorting, creating, aggregating and publishing content, and as a social space providing means to enquire, interact, and reflect upon topics with others.

PLEs epitomize pedagogical approaches of constructivist and connectivist learning that put a learner at the center of learning processes and give more autonomy and control over learning experiences. It is especially true in the digital age as learners have access to a vast number of learning resources and online networks. They can self-organize without reliance on organized curriculum, teachers or classroom structure (Brown, 2008; Livingstone, 2006 cited in Ponti, 2014). Personal learning ecologies (e.g., PLEs) can sustain the articulation of different types of personal pedagogies, create a balance between individual and social aspects of learning, and connect formal, informal and non-formal educational contexts to orchestrate lifelong and life-wide learning (Maina & González, 2015). Talking about the significance and various development of PLE, it is important to note that PLEs supplement LMS, but are not a substitute for them (Attwell, 2007). Weller (2007) puts it this way: "The idea behind a PLE is that users amass or create a collection of tools for themselves, which constitutes their own learning environment . . . The PLE provides a way of linking these together for the user and then integrating them with institutional systems" (p. 114). Thus, PLEs and LMSs have their own advantages and disadvantages; they cannot replace each other. But a better solution would be to integrate their informal and formal learning elements. In an optimized mode, some components of a PLE may be integrated with an institutional LMS, or vice versa. For instance, Jones (2011) mentions "networked learning environments" and states that while "VLEs perpetuate a walled

garden of provision" the PLEs allow for resources to be sourced from outside the academy. Brown (2010) argues that while VLEs primarily tended to institutional functionalities, VLE developers have recently responded to the challenges of Web 2.0 by integrating more "personalized and student-centered features into 'traditional' VLEs" (p5). Anderson (2006) compared advantages and disadvantages of LMS versus PLE and argued that ownership, personalization and customization with the spirit of lifelong learning can be advantages of PLE, purposeful design, ease of use, safety, security, institutional support, and various configurations are advantages of LMS. In their book on emerging technologies for learning, Siemens and Tittenberger (2009) also discuss the aspects of LMS and PLE and posit that a number of tools including wikis, blogs, Google docs, Google groups, social networking sites and social bookmarking sites can be considered to add more functionality to LMS or replace them.

4 ONLINE AND NETWORKED PEDAGOGIES

The implications of emerging technologies for education are immense and significant:

> Educators have explored the role of the Internet as a research and learning tool for several decades. Since the late 1990s… we've experienced a decade of amazing innovation in social networking sites (Facebook, Twitter), in openness movements (open source, open access), in mobile technologies (mobile phones, iPads), in the growth of broadband, in gaming, in multimedia (YouTube, podcasts), and in new tools that blend the physical and virtual worlds (location-based services such as Foursquare and Groupon, augmented reality, "Internet of things") (Siemens & Conole, 2011, *Connectivism: design and delivery of social networked learning*, Editorial).

4.1 Networked learning and connectivism: the pedagogy of cMOOCs

Various terms have been identified to describe theoretical approaches and the emergence of new pedagogies related to the use of computer technologies and online tools in education: from computer supported collaborative learning (CSCL) (Stahl & Hesse, 2007, 2010) to networked learning (NL) (De Laat, 2006; Goodyear, et al., 2005; Jones & Esnault, 2004), technology enhanced learning (TEL) (Balacheff, Ludvigsen, Jong, & Lazonder, 2009; Goodyear & Retalis, 2010), and connectivism (Downes, 2009; Siemens, 2014). Nyvang & Bygholm (2012) state that CSCL, NL, and TEL are examples of (and usually overlapping) genres in learning design that stipulate ways of thinking about ICTs and technology integration in learning practices. Networked learning is a concept and research area that has been developed especially with the increased exploitation of networked technologies for supporting teaching and learning (De Laat, 2006; Nyvang & Bygholm, 2012). de Laat, Lally, Lipponen, & Simons (2007) describe NL as a European (and UK) term used in place of CSCL and they define CSCL and NL synonymously and interchangeably. I argue that NL is more comprehensive than CSCL, and it includes the theoretical approaches and learning design perspectives with regards to the latest advancements of online and networked technologies that cannot be inhibited in the definition of CSCL. As Gros (2015) contends, the definition of networked learning is beyond merely online learning or CSCL, and it is rather an encompassing theoretical assumption about learning and methods that

can be used to design for learning. In this view networked learning, which inherently implies the use of new technologies, contemplates design for learning in a blended, online, offline, and networked world which allows greater autonomy and flexibility for learners and promotes informal and non-formal learning (Gros, 2015; Kop, 2010). Czerkawski (2015) expounds that networked learning has its roots in the open learning movement that has been influenced by the work of numerous educators. For example, Paul Freire wrote about the need to eliminate barriers to access educational opportunities, while Ivan Illich was concerned with improving informal learning outside the closed structures of schools, and John Dewey advocated a participatory and learner-centered approach. Particularly, Illich (1971) promoted the idea of "learning webs" as means of learning through networks and connections to knowledge points.

A broad and commonly used definition of networked learning has been presented by Goodyear, Banks, Hodgson, & McConnell (2004): "Learning in which information and communication technology . . . is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources" (p. 1). The core of this definition is the role of ICTs in making connections and promoting not just human interactions, but also interaction with materials and resources mediated through digital networks (Jones, 2011). In this study, we define networked learning as a "genre of technologically mediated learning in which social media and Web technologies are used to promote connections between individual learners, human resources, content resources, and learning communities, and to continuously deal with the ever-increasing amount of digital information" (Saadatmand & Kumpulainen, 2014, p. 20). Networked learning shares some views on networks presented in connectivism (Siemens, 2005a), and network society, and networked individualism (Castells, 2000, 2011). However, in describing his network society, Castell did not elaborate on learning in contrast to connectivism, which focuses on the role of ICTs and technologies as core drivers for learning (Nyvang & Bygholm, 2012). Connectivism and networked learning share too much in definition and characteristics and both emphasize the importance of networks and developing connections in the learning processes (Gros, 2015; Nyvang & Bygholm, 2012).

Connectivism, which is called "a learning theory for digital age" (Siemens, 2005), addresses learning in complex, social, networked environments (Siemens & Conole, 2011). It was developed based on networking affordances of technologies and the nature of knowledge growth in an overwhelming digital world by considering the elements involved in the learning design process and how they can be facilitated within a networked ecology (Conole, 2016c). According to connectivism, knowledge is distributed across information networks and can be stored in a variety of digital formats (Kop & Hill, 2008). They write, "Networks are not just comprised of digitally enabled communications media, nor are they exclusively based in neurological brain-based mechanisms. As Siemens suggests, the

learning is the network" (p. 10). Connectivism views knowledge and cognition distributed across networks (Siemens & Tittenberger, 2009). Furthermore, "Networks can serve as cognitive agents where intelligence is 'distributed across minds, persons, and the symbolic and physical environments'" (Pea, 1993: 47 as cited in Siemens, 2012b, p. 55). From the connectivist perspective, learning can happen through different networks, contexts and digital platforms, and knowledge is distributed across networks and connections. Hence, networked learning occurs and is fortified through external social spaces and tools (e.g., Twitter, Facebook, mobile advices etc.) and social and technology systems are parts of human cognition now. Connectivism also explains that knowledge resides not only in human structures, but also in non-human appliances and Siemens (2006b) refers to networks as non-human appliances. Anderson and Dron (2012) explain that connectivist models of online education heavily rely on ubiquitous network accessibility: "Connectivist pedagogy explicitly relies on the ubiquity of networked connections—between people, digital artefacts, and content, and thus can be described as a network centric pedagogy and thus may be the first native distance education pedagogy, without previous instantiation in classrooms" (p. 8). The connectivist approach recognizes the influence of technologies on human cognition, and the ways in which they reshape the ways how humans create, store, and share knowledge (Couros, 2008). Connections are the key to network learning and for networks to form, something/somewhere is needed and that is "ecology" (Siemens, 2005c). Networked learning an ecological approach, and affordance are closely related. From an ecological perspective, learning is grounded not only in community and social relations, but also in natural, biological, and cultural contexts and people's lived lives (Fenwick, 2005, cited in Kop, 2010). Siemens (2006) argues that learning is distributed within social and technologically enhanced networks, and knowledge is advanced and transformed by the contribution of connectedness to specific networks that are also connected to other networks.

Bell (2010) argues that although connectivism may not be considered as a successor to earlier learning theories (e.g., behaviorism, cognitivism, and constructivism), but it informs and is well-represented in the practices of MOOCs (my emphasis: cMOOCs). She states, "Thus connectivism is perceived as relevant by its practitioners but as lacking in rigor by its critics" (p. 98). Here, I do not intend to elaborate on learning theories as they are usually discussed and compared in relation to the position of connectivism; neither do I elaborate on the criticisms raised towards connectivism as a learning theory (cf. Anderson & Dron, 2011, 2012; Ally, 2004; Bell, 2010; Downes, 2012; Kop & Hill, 2008; Verhagen, 2006). However, Goldie (2016) believes that although connectivism provides a useful lens to understand teaching and learning using digital technologies, no single theory can explain learning complexities in a networked world. Similarly, Anderson and Dron, (2011) argue that the inherent fuzziness of the connectivist approach

does not often fit with formal education contexts where courses are based on constructivist and cognitive-behaviorist models. Thus, connectivism promotes self-organized learning and informal learning experiences. Downes (2009) describes characteristics of learning in connectivist learning environments as openness, autonomy, diversity, and interactivity/connectedness. These characteristics are design principles in connectivist MOOCs. Arguably, MOOCs were developed by individuals with a vision for promoting open education and fostering connectivist learning approaches through the use of social and participatory media (Conole, 2014). Couros (2008), who was one the first educators to design and offer a connectivist MOOC (EC&I 831) in 2008, states that the connectivist approach to course design acknowledges "the complexities of knowledge management and learning in the digital age in which course facilitators and students can leverage learning networks for personal knowledge generation, sharing, and collaboration" (p 63). Couros (2008) further mentioned some principles of connectivism (adapted from Siemens, 2005) that were applied in development and facilitation of the EC&I 831 MOOC:

- Learning and knowledge rests in diversity.
- Dynamic learning is a process of connecting "specialized nodes" (people or groups), ideas, information and digital interfaces.
- Capacity to know more is more critical than what is currently known.
- Fostering and maintaining connections is critical to knowledge generation.
- A multidisciplinary, multiliteracy approach to knowledge generation is a core tenet of connectivism.
- Decision-making is both action and learning; Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. (p. 63)

Downes (2015) contends that self-organization, navigating the chaos and making learning decisions, as emphasized in connectivism, are indeed the lessons in cMOOCs. MOOCs are really platforms that foster such networked activities by deploying a rich array of tools and resources to help learners create their own learning pathways. Learning in the open networked environments of cMOOCs is a process of making connections with people, resources, and creating networks between individual learners, human resources, content resources, and learning communities. Participants have to continuously deal with the ever-increasing amount of digital information. Therefore, cMOOCs translate the principles of connectivism to course design in which the focus is more on learners' capacities for self-organizing and co-participating, and aggregating content through learners' networks and learners' PLEs (Guardia et al., 2013).

4.2 Community of Inquiry: presence and interaction in online environments

Interaction has been emphasized as an important factor of the effectiveness of online learning environments (Anderson, 2003; Gillani & Eynon, 2014b; Moore, 1989; Su, Bonk, Magjuka, Liu, & Lee, 2005a; Siemens, 2005; Dyke et al, 2007). Previous research in distance education and online learning has identified and examined different types of interactions and provided empirical evidence of how instructional design can improve interaction (e.g., Anderson, 2003; Bernard et al., 2009; Kanuka, 2011; Moore, 1989; Smyth, 2011; Swan, 2004). That is because interactions between learners, instructors, and content is presumed to play an important role in both formal and informal education (Abrami, Bernard, Bures, Borokhovski, & Tamim, 2011); and particularly with the potential of social and networked technologies in fostering increased forms of interactions seamlessly and ubiquitously. Conole (2016a) remarks on the affordances of ICTs and new technologies for multi-modal approaches to learning and their potential for promoting a range of interactions. Recognizing the vast range of possibilities that emerging technologies might offer for promoting interaction, distance learning researchers and designers argue that challenges can be faced in implementing these technologies unless appropriate instructional design models and purposefully chosen tools are integrated (Beldarrain, 2006, 2008). Due to a growing trend in offering open online courses in higher education (such as ONL as was described in study IV), designing online learning environments to optimize learner interaction by the affordance of emerging technologies is extremely important. Interaction has been discussed extensively in research on distance education. Moore (1989) has defined three types of interaction in distance and online education:

- *Learner-instructor interaction* (L-I) refers to dialogue between learners and instructors and instructor's efforts organizing activities and content that stimulate learners' interactions and enhance students' motivation and interest during the course.
- *Learner-learner interaction* (L-L) is the interaction between individual learners or in groups and communities with or without the presence of instructors.
- *Learner-content interaction* (L-C) is the process of intellectually interacting with subject matter that results in construct meaning and change of learner's understanding and cognitive structure.

Three types of interaction are equally important in online courses but what can make them improve is the designing interactions treatments in distance education courses. For instance, the results of a study by Bernard et al. (2009) highlight the importance of each type of interaction. They conclude that designing for interaction, whether learner-learner, learner-instructor, or learner-content in online environments, can have a positive impact on students' learning (Cited in Abrami et al., 2011). Presence is a concept that has been used to understand interaction in an

online learning environment. The concept of 'presence' has been defined in connection with network-based learning environments (Tammelin, 2004) in which Garrison, Andesron and Archer (2000, 2001) developed a community of inquiry model that explains educational experiences as interaction between learners, teachers and content. The community of inquiry (CoI) explains that learning within communities occurs through the interaction of three interconnected elements: teaching presences, cognitive presence, and social. Garrison, Anderson, and Archer, 2000, 2001) indicate that in fact, presence indicates a type of interaction that occurs in online settings. They state that learners should be actively engaged with the instructor, other learners and the course content in order to make learning meaningful. Presence is described as "a sense of having active participation" and focusing on learner creation and contribution through multi-mediated forms of communications. It is one way to assess learning experiences in distance and online education (Mckerlich et al., 2011). The CoI was originally developed to evaluate the effectiveness of traditional online courses, but it was later progressed to examine learning activities and pedagogical design in other emerging learning environments such as virtual worlds (Mckerlich et al., 2011) and MOOCs (Damm, 2016; Kilgore & Lowenthal, 2015; Skrypnyk et al., 2015). Researchers (e.g., Swan, 2004) have connected the three presences in the CoI framework to Moore's three types of interaction i.e., teaching presence to learner-instructor interaction, social presence to learner-learner interaction, and cognitive presence to learner-content interaction. Moore (1989) states that it is important for distance educators to plan carefully for all three types of interaction in relation to the potential of new technologies. Anderson (2003) also explains that emerging forms of technology provide a variety of alternatives to be deployed for creating content in different forms that can promote learner-content interactivity in educational contexts.

5 RESEARCH DESIGN

5.1 Online Ethnography: a pragmatist research method to study the dynamics of online learning

Choosing an appropriate research paradigm, methodology, and design seems to be challenging in educational science particularly in research on online environments. Research should be ontologically, epistemologically, and methodologically congruent; researchers should employ the most proper research paradigm that fulfills the requirements of the research problem. Qualitative and quantitative methods have been widely used in educational sciences, but mixed methods that combine the elements of both methods are also trending (Creswell, 2009; R. B. Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 1998; Teddlie & Tashakkori, 2009). Johnson and Onwuegbuzie (2004) report that at this time mixed methods research should use a philosophy and method that attempts to "fit together the insights provided by both qualitative and quantitative research into a workable solution" (p. 16). This workable solution is a "pragmatist paradigm" that adapts multiple methods that form an optimal research strategy to answer the research questions. From a pragmatist paradigm, the best methodology is the one that works, and that can use mixed methods of qualitative and quantitative, and design-based research techniques to conduct the research in actual contexts (Anderson, 2013). For instance, he mentions some pragmatic research questions that can be investigated through mixed methods (pragmatic strategy): how can collaborative online learning increase learner satisfaction and completion rates? Does using Web 2.0 tools and blogging increase learning outcomes? As there is no single way or best research methodology, the choice of the paradigm is based on the researcher's worldview, research questions, resources, and the nature of the research problem (Anderson, 2013; Creswell, 2009). Like interpretative paradigms, mixed methods also require the researcher to look for meaning, understanding, people's views and the "lived experiences" of subjects (Anderson, 2013).

Creswell (2009) describes ethnography as the processes through which a researcher can become immersed in the community under study to observe and identify characteristics, behavior, and group culture group. Hammersley & Atkinson (1995) believe that ethnography involves participating in "people's lives for an extended period of time, watching what happens… and collecting whatever data are available to throw light on the issues that are the focus of the research" (p. 41). Thus, in this study I opted to employ online ethnography as a proper research strategy that enables immersion in the culture and community of the study in order to observe, identify, and provide a rich account of characteristics, behavior, and

interaction in natural settings (Creswell, 2009; Coffey, Renold, Dicks, Soyinka, & Mason, 2006; Denzin & Lincoln, 2011; Hammersley, 2006; Murchison, 2010). Ethnography is a bottom-up and interactive methodology that draws on multiple data collection methods and uses inductive, immersive, and recursive analytical strategies (Lucas 2005, p 51 as cited in Charnet & Veyrier, 2008). In ethnographic study, the researcher is not just a participant-observer that is detached from the context, but she or he interacts with other human beings through conversations, interviews, and even emotional experiences, and becomes a primary research instrument through which information is collected, recorded, and interpreted (Murchison, 2010). The role of the researcher in ethnographic research, whether as an active participant or as an observer (in this study, lurker) create an auto-ethnographical account resonating the living life of the self (Ellis, 2004). Ellis (2004) calls it *Ethnography I* to provoke the role of the researchers in wanting to "genuinely engage in self-reflexivity" and be a "speaking subject" (Maguire, 2006) in ethnographic study. He writes:

> Is the 'I' only about the eye of the researcher standing apart and looking? What about the 'I' of the researcher, the part that not only looks but is looked at, that only acts but is acted back upon by those in her focus. Is ethnography only about the other? Isn't ethnography also relational, about the other and the 'I' of the interaction? Might the researcher also be a subject? Might the 'I' refer to researcher who looks inward as well as outward? (p. xix)

In ethnography, the researcher situates the self within the culture being studied and he or she may not remove personal experiences from the research process so that the elements of autobiography are consciously combined with ethnography and the personal is connected to the cultural (Keefer, 2010). Ethnography has become popular and been extensively used in e-learning research: technology-mediated communication, networked learning, HCI, and social studies of technology (Becvar, 2007; Conole, 2010; Conole, 2013a; Hine, 2005). However, as ethnography goes online, its epistemological principles remain the same (Murthy, 2008). Technology provides new contexts and methods for research. The terminology of using ethnography as applied to research online cultures and communities has been multifaceted depending on the contexts. Hine (2000) among the first ones, used "virtual ethnography" to refer to investigation of online interactions and communities. Another term mainly used in business research is "netnogprahy" (Bowler, 2010; Kozinets, 2009). Kozinets stated, "Ethnography conducted on the Internet; a qualitative, interpretive research methodology that adapts the traditional, in-person ethnographic research techniques of anthropology to the study of online cultures and communities formed through computer-mediated communications" (Kozinets, 2009,135). Similar terms used to refer to these trends in online research methods are digital ethnography and cyber-ethnography. Whatever the terminology, all assume the application of ethnographic research techniques to

study cultures and communities online and the complexities of technologically-mediated social worlds.

In this dissertation, I have employed and developed "online ethnography" as a proper research design (from a pragmatist paradigm) to study the dynamics of learning in connectivist MOOCs. The scope of the study, which focuses on an emerging area in online learning, has necessitated employing an appropriate research approach that is exploratory in nature, and can provide procedures and techniques to accumulate a detailed account of learning experiences and activities in the context of cMOOCs. Although ethnography is traditionally understood as a qualitative research method employing strategies such as participant observation, interviews, and document analysis, in a pragmatist paradigm it could be extended to include some quantitative measures such as questionnaires and surveys. That is what I did in this study. In this sense, it is rather a "research approach" than a "research method" with intensive process in studying social networks and online communities both by lurking and active participation that provides a tremendous insight and longitudinal knowledge of participation in MOOC online communities (e.g., Nonnecke, 2000). These methodological assumptions led to the choice of online ethnography as a wide-ranging research design that provides means of triangulation.

Online ethnography transfers the ethnographic tradition of the researcher as an embodied research instrument to the Internet-based spaces; this process entails developing an appropriate level of technical skills to be able to effectively participate in the context of study (Hine, 2005). The value of doing ethnography on the Internet is not only as a research tool, but also as a conceptual and methodological bridge to other research traditions (Androutsopoulos, 2008). Hine (n.d.) states that conducting online ethnographic research is an exercise that entails taking seriously the account of the socio-technological worlds by moving back and forth between conventional and virtual ethnography and having the ability to question the taken-for-granted nature of technology. In the ethnographic design of this study, technology plays an important role both as context and as tool. As context, it includes online spaces, social networking platforms, blogs, wikis, and all other related technologies used in MOOCs by participants and instructors for learning activities, collaboration, and networking. As a tool it includes those technologies that I have exploited as an online ethnographer to explore online behaviors and interactions, and learning activities by observation and lurking in different forums and social networks, making connections, collecting online artifacts, and engaging in the context (Spinnaker, 2011). For instance, as an analytical tool, social network analysis (SNA) has often been used to analyze patterns of interaction and networking in online environments and MOOCs. Although, in this study I did not use SNA but, I have used quite a lot of research using SNA which have been quite helpful in understanding networked activities in MOOCs (e.g., Bozkurt et al., 2016; Gasevic, Kovanovic, Joksimovic, & Siemens, 2014; Gillani & Eynon,

2014a). Lipponen (2001) suggests that a combination of ethnographic methods and social network analysis could be developed as an appropriate methodological approach to analyze participation and discourses in the context of CSCL.

As discussed in earlier sections, tools have affordances, and while I have been researching the affordances of emerging technologies for learning and networking, I have also tried to examine their potential as an integral part of ethnographic research. As Murthy (2008) argues, conducting research using new technologies raises its own challenges which need the development of methodological and analytical procedures to capture the imbrications of technology and society. As presented in sub-studies, different tools in a personal learning environment are used for different processes (study II, III). The online ethnography of this study is hugely informed and supported by the roles that online tools and networking technologies can play in the research process to seek, collect, store, manage, and report data and content, and to become connected with participants and other peers in MOOCs. As a researcher and learner in online settings, I have experienced the ways in which tools and technology can afford and scaffold various actions that helped develop research skills and advance professional connections. Here, I briefly present an account of the tools that I employed and used throughout the study (both as a MOOC learner and researcher):

- *Annotating tools:* I started using Evernote when I attended the first MOOC in 2010. Since then, I have used it quite extensively for different purposes in my research. For the first two years of attending cMOOCs, I kept notes of my learning, reflections, and interaction in MOOCs (see Figure 8). I used it as main annotation and management tool for organizing research notes and documents (interviews, survey, forms, and shared notes).
- *Microblogging and blogging tools:* Twitter was a very effective tool during the course of my study and my engagement in MOOCs. It was widely used by most of MOOC participants as a tool for sharing resources, distributing information, asking questions, and getting connected with other peers and instructors. As an open learner and researcher, I found Twitter tremendously helpful as I was kept informed about the news and resources on the topics of my research, and connected to experts and scholars. I used #hashtags to aggregate content and stay updated on topics of interest. I also kept blogging (e.g., BlogSpot)[16] to reflect on my learning in MOOCs. However, I was more active in writing blogs when I first began attending online course than I have been lately.
- *Curation and aggregation tools:* One way of keeping updated about the topics and receiving content was RSS readers (Rich Site Summary). Another very useful tool that I have used in this study for collecting resources was Google Alerts. I defined the topics and labels for aggregation to receive the updates and relevant resources including the key people in the area of my research and their research. Some of the labels included: MOOCs, online ethnography,

[16] http://saadatm.blogspot.fi

open education, PLE, networked learning, connectivism. One important challenge, however, was how to determine how to go through, organize, read, and analyze such huge accumulated clusters of content (e.g., more than three thousands Google Alret updates on these topics).

- *Social bookmarking tools:* These tools were excellent to curate the resources that I was using during my participation in the MOOCs and my research. They included: Diigo, Delicious, Scoopit, and Google bookmarks.
- *Social/ professional networking tools*: These tools are parts of our daily lives and used for many purposes. In this study, as a researcher I have used and benefited enormously from using Facebook Groups, Google+, and LinkedIn. For instance, in many of the MOOC studied, participants and facilitators created Facebook groups that were used as online communities to share information and content. Google+ is another resource that is widely used for educational purposes. In study IV, Google+, which is widely used for educational purposes, was used as a main online community for participants to share their assignments, interact with others, ask questions, and make comments.
- *Collaborative writing tools:* Google Docs, Microsoft tools, and Etherpad were used for collaborative writing for my research notes and text, and to share content with study participants.
- *Citation and referencing tools:* I used Mendeley (online and desktop) as an efficient tool to keep, collect, and organize all research papers (PDF files, Word files and online URLS etc.). It is useful for research citation, creating automatic bibliographies and references with reduced possibilities of errors and helps with maintaining the accuracy of citations in research writing.
- *Asynchronous and Web-conferencing tools:* Among the many other tools used in cMOOCs for online synchronous discussion, Elluminate (Blackboard Collaborate), AdobeConnect, Google Hangout, and Skype were used frequently and on a weekly basis to connect with experts remotely and present their lectures and connect interactively with the participants. The content of these asynchronous sessions was usually available for researchers to use. I used Hangout and Skype to conduct interviews with MOOC participants.
- *Online survey-making tools:* For creating and delivering online questionnaire for the three first MOOCs under study, I used SurveyGizmo. In Study IV, I used Google Forms to create the survey. Both tools provided some analytical and visualization features that I used for analyzing the data.

5.2 Lurking: a way of participation in MOOCs and an online ethnographic strategy

One of the notions that has grown along with MOOC development and the ways of participation is *lurking*. Although lurking and lurkers have been recognized by many researchers as an important and integral part of online communities, the topic has received less research attention because of the methodological deficiency and difficulties in tracking lurking in online and technology-mediated environments (Rafaeli, Ravid, & Soroka, 2004). From this view, the focus is on lurking as a peripheral way to participate in online environments and MOOCs. I assert

that lurking is both "learner participation" and "researcher participation." Lurking as a learner, refers to the way I have been following many MOOCs in the past six years. The level of lurking, however, has varied depending on the course and my goals and preferences at the time. In online environments, lurking can vary on the level of activity, participation, and contribution (Isomäki et al., 2012; Nonnecke, 2000). Methodologically speaking, I consider lurking as a method of observation and data collection in this ethnographic study. Ethnography is considered as a preferred approach to study participation as well as lurking in online spaces (Nonnecke, 2000). Therefore, it has enabled me as an ethnographer to immerse myself in one way or another in the people's lived experiences by watching what happens, asking questions, interacting and communicating as needed, and collecting whatever data are available (Lambropoulos, 2016). Isomaki, Pohjamo, and Silvennoinen, (2012) discuss a research method that provides conceptual means to bridge the relevant methods and the interplay between researcher and interacting subjects in online settings. Then they suggest online ethnographic sensibility as a research approach to fulfill the demands of a valid inquiry and consider lurking as a notable e-learning strategy in this approach. First, it would be helpful to define lurking as it is understood in e-learning and online contexts. Generally, lurking can be defined as passive participation in online environments; this can be somewhat regular visits without a contribution (Rafaeli et al., 2004). In other words, lurking is a way to participate in a community peripherally (Fuller, Hodkinson, Hodkinson, & Unwin, 2005), and still feeling a sense of belonging.

With the infiltration of Internet in human communication and technology-mediated interactions, it is much easier to lurk on the Internet; online communities become the "ethnographer's paradise" (Mason as cited in Nonnecke, 2000). The first generations of the Web, however, did not provide many interactive opportunities and tools for participation (Rafaeli et al., 2004). Currently, the participatory potential of Web 2.0 and social media diminishes the threshold for contribution in online forums and networks. Still, with such chances to participate and contribute, many participants in online learning environments, particularly in cMOOCs, remain passive and follow some patterns of lurking. Lurking on the Web and online environments is growing and there are far more lurkers than participants on most Websites who are kind of invisible so that may not be seen or heard (Katz, 1998). One reason might be that people think, based on their preferences, browsing and reading is enough and probably they have nothing or little to contribute or they just want to learn about the community (Nonnecke, 2000). The literature on MOOCs shows that the dropout rate is quite high and many participants just jump in and remain inactive, continue lurking or totally withdraw. Due to the lack of methodological procedures, it is difficult to determine how lurkers learn in online environments and if they intentionally opt for being lurkers or do so for some other reasons.

There might be different person or social reasons for lurking: learning goals, personal learning style, motivation, responsibility issues, or a different sense of belonging to and social relation to the community (e.g., Katz, 1998; Rafaeli et al., 2004). Lurking can even be defined from the perspective of learners. Some learners see active participation in terms of just reading, browsing, and reflecting on the contribution of other community members and in this sense, lurking is "a strategy to create a personal learning approach"(Isomaki et al., 2012, p. 249). Depending on the personal and social motives of individual learners, the reason and level of lurking can be defined. For instance, Rafaeli et al., (2004) quote from Jay Cross about the reasons for lurking: "In some conferences, I'm 100% lurker. These are generally places like Usenet or Telecommunications where I'm a total novice, just there to try to figure out what's going on" (p. 3). This position explains my choice of lurking and the level of contribution in MOOCs and other online communities, professional networks, seminars and conferences thought this study. When I started my journey as a learner in a MOOC in late 2010, I was so willing to take part in as many MOOCs as I could and learn more about the phenomenon. Over time, my level of engagement reduced from more active participation to more of a lurker. Both ways provided me with understanding and valuable insight of learning experiences and interactions in MOOCs. As Knox (2014) elaborates on active and passive participation in MOOCs, active participation in MOOCs does not necessarily give more knowledge and insight than passive participation (lurking), so both are important for understanding the MOOC. Substantial proportions of participation in MOOCs are measured as lurking. The question of being an active member of a community or passive and lurking in an ethnographic research design is challenging. The idea that ethnography in its nature is often characterized as "non-interventionist." To what extent can an ethnographer involve him- or herself immerse in the settings of the study in a "non-disruptive and non-interventionist manner" and not inform or shape the structure and still record the events naturalistically (Becvar, 2007, 14)? This depends on research objectives and research design.

In this section, I will explain how I chose to participate and contribute in MOOCs based on my personal preferences, research needs, and course requirements. At the beginning, my intention was to participate in connectivist MOOCs (at the time: *ECI& 831, PLENK10; CCK11*) in a more engaging way. That was inspired by both personal goals, research objectives, and methodological orientations of the study. After finishing these three MOOCs and collecting data, I became a lurker in MOOCs. Adapting this strategy was also based on personal preferences that I wanted to jump in and out of MOOCs and online networks and learn this way. Figure 4 presents the online ethnographic design of the study. As I said earlier, the level of my lurking in any of these MOOCs varied: for some of them I just registered then did not post or contribute; for others, I followed the topics and activities, attend synchronous sessions, watched video lectures as much as I

could, based on my preferences. I registered for many MOOCs over the period of the study whether as a learner, where I was more active in discussion and networking activities, or as a lurker where I was less active and observed. I believe observation and lurking in MOOCs was very important and informative to gain a deep understanding of the actual learning activities and interactions that occur in MOOC contexts. As the role of the researcher in ethnography is crucial (Creswell, 2009) and a researcher becomes an instrument him- or herself, I planned to have participated in and lurked in many MOOCs (mainly cMOOCs) from 2010 to 2015. Below is a list of (but not exhaustively reckoned) the MOOCs in which I have participated and lurked. In the first four MOOCs on the list, I actively participated; they were the main empirical contexts of the study in which I conducted interviews, questionnaires and surveys. The rest is a list of those MOOCs in which I have been lurking (see Figure 4).

- ***#EC&I831:*** Social Media and Open Education—University of Regina, Canada (Autumn 2010).
- ***#PLENK10***: Personal Learning Environments, Networks, and Knowledge—Athabasca University, Canada (Autumn 2010)
- ***#CCK11:*** Connectivism and Connective Knowledge—University of Manitoba, Canada (Spring 2011)
- ***#ONL151:*** Open Networked Learning—Karolinska Institute, Lund University and Linnaeus University, Sweden (Spring 2015).
- ***#LAK12:*** Learning and Knowledge Analytics, Society for Learning Analytics Research (Spring 2012)
- ***#PLEK12:*** Personal Learning Environments for Inquiry in K-12—University of Florida, US (Spring 2011)
- ***#DS106:*** Digital Storytelling—University of Mary Washington, US (Spring 2010)
- ***#CHANGE11***: (Autumn 2011-Spring 2012)
- ***#CFHE12:*** Current/Future State of Higher Education, (Autumn, 2012)
- ***#MOBIMOOC:*** Mobile Learning—Europe (Autumn 2012)
- ***Google Power Searching***- An xMOOC by Google Education (Autumn 2012)
- ***#ETMOOC:*** Educational Technology and Media—University of Regina, Canada (Spring 2013)
- ***#OLDS MOOC:*** Learning Design for a 21st Century Curriculum—Open University, UK (Spring, 2013)
- ***#EDCMOOC:*** E-learning and Digital Cultures—University of Edinburgh (xMOOCs by Coursera), (Autumn 2014)
- ***#RHIZO14/15:*** Rhizomatic Learning, (Autumn 2014/Spring 2015)

Most of these MOOC have been (are being) iterated. I have followed some of the iterations for instance: EC&I831 (2012), CCK12, ONL152, ONL161.

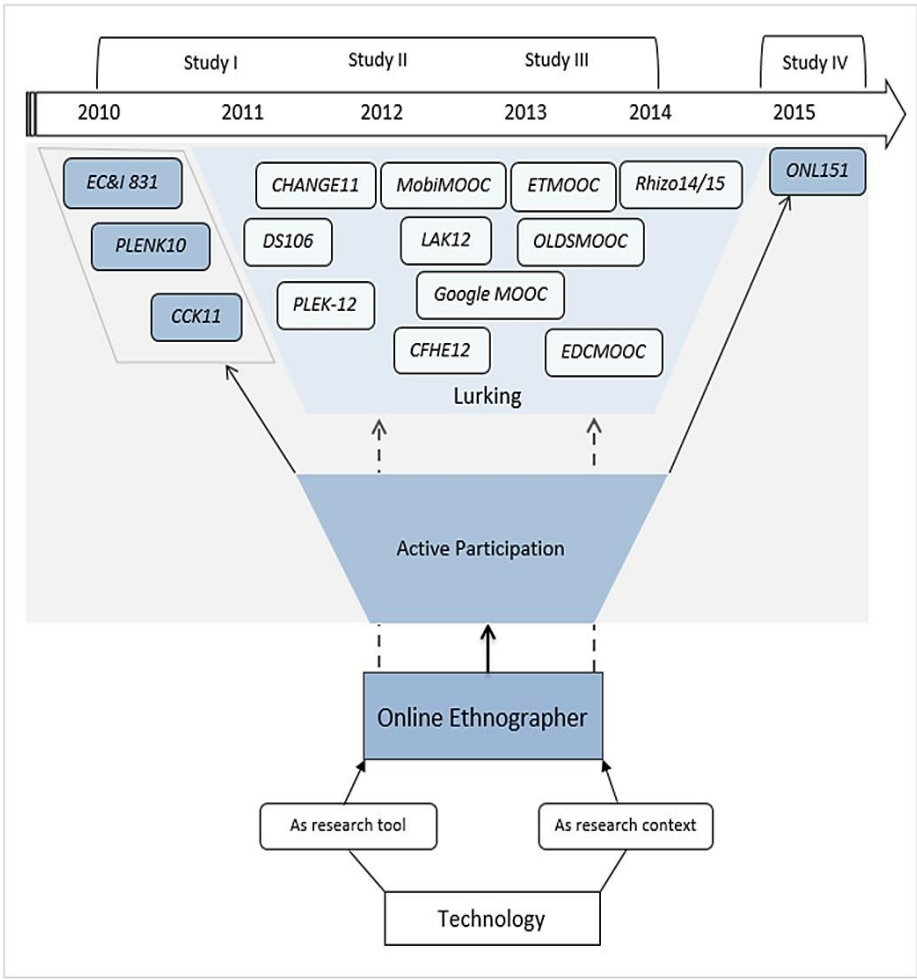

Figure 4. Online ethnographic design of the study

5.3 Context and participants

This study was empirically situated in connectivist MOOCs as the research context. Four cMOOCs were the main sites of the data collection; they were augmented with lurking in a number of other MOOCs. First, I present here the study context and participants. In the next section, I will describe data collection and analysis. I began to participate in three connectivist MOOCs in autumn 2010 and spring 2011 (the first phase of data collection as shown in Figures 4 and 7). From September to November 2010, I took part in EC&I 831, an open access graduate course from the Faculty of Education, University of Regina. This was a graduate-level course available for both credit and non-credit participants. In addition to for-credit students, the course facilitator opened enrollment to anyone interested

for free from anywhere in the world. As reported by the course facilitator, in addition to 25 for-credit students, a few hundred participants joined the course from all over the world. The course content and activities were all distributed across online platforms and participants were encouraged to use a set of collaborative and communicative tools. The course was run from August through November 2010. This course was the first MOOC that I attended and it was the starting point of my research endeavor. Due to the very illuminating learning experiences I gained, I decided to continue my journey as an open learner in other MOOCs as well.

Later in autumn 2010, I attended PLENK2010, a 10-week course from Athabasca University in Canada. It was another connectivist MOOC facilitated by those MOOC pioneers: George Siemens, Stephen Downes, Dave Cormier, and Rita Kop. The course topics included the issues of learner-centered approaches and the pedagogical design of PLE. My participation for EC&I831 and PLENK10 was parallel. In spring 2011, I continued my MOOC journey in CCK11, a 12-week MOOC that explored the concepts of connectivism and connective knowledge and their application as a framework for theories of teaching and learning. CCK11 was a Masters-level course offered by the University of Manitoba as a Certificate in Emerging Technologies for Learning (CETL). CCK11 was an iteration of CCK08, which was among the first connectivist MOOCs that adapted a format of open and distributed content and interaction. Like other cMOOCs, in this cMOOC a variety of tools and social media adapted for interactions and delivery of instructions such as: Facebook, wikis, blogs, Twitter, Moodle, RSS social bookmaking tools. One of the very useful tools that was developed and used in CCK11 and PLENK10 and other MOOCs facilitated by Stephen Downes was gRSShopper. Participant's postings and interactions on blogs, Twitter and other online artifacts were harvested through gRSShopper, aggregated, and shared with participants in the form of "The Daily."

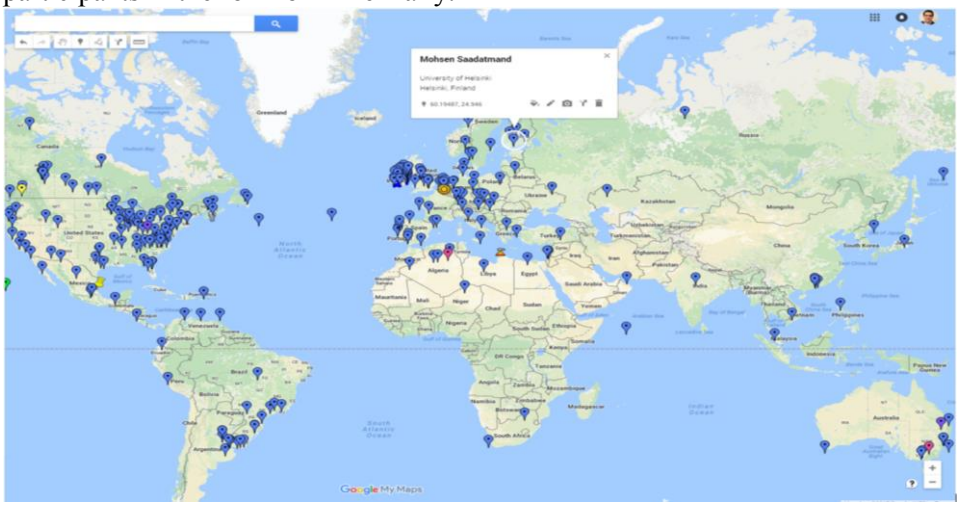

Figure 5. Google map of PLENK10 MOOC participants

The PLENK10 and CCK11 were popular cMOOCs at that time; they attracted a couple of thousand participants including graduate-level students, educators, teachers, instructional designer, and educators. This two cMOOCs were also used as the main research sites of open learning formats and many research papers on MOOC literature emerged from these two courses. CCK11 and PLENK10 substantially contributed to my understandings of open online learning, theoretical underpinnings, and definitions; they paved the way to my research orientation. The format, structure, and processes of these three connectivist MOOCs followed the pedagogical configurations of connectivism and networked learning. They were all free to access, distributed openly online, and exploited a rich array of social media and networking tools. Figure 6 represents the format and structure of a cMOOC:

PLENK2010 will be offered as a connectivist course, therefore offering participants to acquire the experience of developing and working within a learning network while studying the body of relevant research. In a connectivist course, course materials and course content are defined by participants as the course progresses, rather than prior to the course by instructors. Though the course outline defines a set of selected topics, these function as signposts for an iterative process of search, practice and reflection, as described here: http://connect.downes.ca/how.htm

To facilitate this process, course facilitators will maintain the following levels of course support:

- a course wiki, which may be edited by participants, describing the course outline
- a daily newsletter, which will aggregate student blogs, Twitter posts, and discussion posts
- each Sunday readings and resources will be posted to the wiki and (on Monday) to the Daily
- a Moodle discussion forum, read and responded to by course facilitators
- Wednesday Elluminate session, usually featuring a relevant guess speaker
- Friday Elluminate session, as a weekly review with course facilitators

The course may not be limited to this level of support as course participants are encouraged to develop their own course supports and to share those supports with other participants. Examples of such supports in previous courses have included concept maps, Google groups, Second Life sessions, in-person meetings, course-meetups, and more. Facilitators will participate in these additional supports as possible given time and facilities constraints.

Figure 6. Description of a cMOOC

In spring 2015, I began to attend another MOOC: ONL151, a professional development online course at three Swedish universities: Karolinska Institute, Lund

University and Linnaeus University. The primary target group was university teachers, educational technologists, educational developers, and course designers; educators from other educational sectors both public and private also joined the MOOC. In terms of massiveness, it was not as massive as the previous MOOCs in which I took part had been, and it was more of a local MOOC in a Scandinavian context that was available to all. ONL151 was also largely informed by connectivist pedagogy in the design and delivery of the course content and activities. The online learning environment was distributed on the Web where participants were free and encouraged to use a variety of technologies to seek, create, and share information and content. Course activities were designed both synchronously (e.g., weekly Webinars, tweet-chat sessions, and small group hangouts) and asynchronously (e.g., interactions in the course community on Google+, comments on blogs, and tweets). The social and collaborative tools utilized in this course included: Google tools (Hangout, Google+), Twitter, blogging tools (e.g., WordPress, Blogger), social bookmarking (e.g., Diigo), presentation tools (e.g., Padlet and Prezi), and Wikispaces. Weekly synchronous sessions were conducted on Google hangout.

After collecting data in the three aforementioned cMOOCs in 2010 and 2011 (questionnaire, open-ended questions, and interviews used in Study I, II, and III), I continued mainly as a lurker in MOOCs, collecting notes and accumulating my ethnographic insight of MOOC participation (see Figures 4 & 7). The second phase of data collection was conducted in ONL151 in spring and summer 2015 (see Study IV for a detailed description of the course participants, instructional design, and materials). With reference to Anderson's notion of pragmatist research strategy (Anderson & Shattuck, 2012; Anderson, 2013) that can adapt design-based research principals, Study IV was design-based research in which the authors of the paper were the designers and facilitators of the course. In the following sections I will explain the process of data collection and data analysis.

5.4 Data collection and analysis

Data were collected in two phases (see Figure 7) with different means using a multi-method approach that allowed for triangulation. In the first phase of data collection, an online questionnaire was developed and distributed in EC&I831, PLENK10. When the end of EC&I831 and PLENK10 was approaching, I conducted a literature review of the previous research on open online learning, social media, networked tools, MOOCs, and PLEs to identify the areas for development and build the questionnaire. The questionnaire contained items in these categories: 1) use of tools and resources by MOOC participants; 2) learning and networking activities in MOOCs 3) creating and developing PLEs; 4) experiences and perceptions of learning in MOOCs, (5) their challenges, motivation and inspirations. The

questionnaire also included a few open-ended questions for each section. The purpose of the questionnaire was not to be used for inferential statistics, rather for a descriptive analysis, therefore its validation was based on the researcher's analysis of the literature and relevant concepts, expert's views, and similar questionnaires that were used at the time for research on MOOCs. The questionnaire was created on Google Forms and SurveyGizmo, and administered via Twitter and Facebook to participants of EC&I831, PLENK10 in spring 2011. After the responses from the questionnaire were collected, they were scanned, categorized, and prepared for analysis. A preliminary investigation was done on the questionnaire data in order to develop further themes and questions for interviews.

I posted my intention for conducting interviews on the MOOC's Facebook group page and on Twitter. Altogether twelve semi-structured interviews were conducted in spring 2011. The interviews, in fact, were planned to provide participants with an opportunity to reflect on their experiences and use their voices to describe their own learning journey in the ecology of cMOOCs. The interview questions were developed based on insights elicited from the literature review, the researcher's experiences in participating in MOOCs, and the questionnaire. Similar to questionnaire subjects, the focus of the interviews was on the experiences of online learning, networking in MOOCs and online environments, and the choice and use of tools throughout their participation in the course. However, the themes and questions covered in the interviews were not limited to participation in a MOOC, but they rather also included their experiences with using tools for their professional development and other purposes as a learner in an open and networked world. Each interview lasted between 45 and 75 minutes. The interviewees (nine females and three males) were between 25 and 54 years old. The interviews were conducted online using Skype and Google Hangout and were audio recorded. Five interviews were also video recorded. Two interview were conducted using "epistolary interview" (Debenham, 2007; Ferguson, 2009a) by sending interview questions to participants that they could answer and elaborate on the questions in their own free way of writing. Participants were from six countries: Finland, Sweden, Canada, United States, United Kingdom, Australia, Turkey, and Egypt.

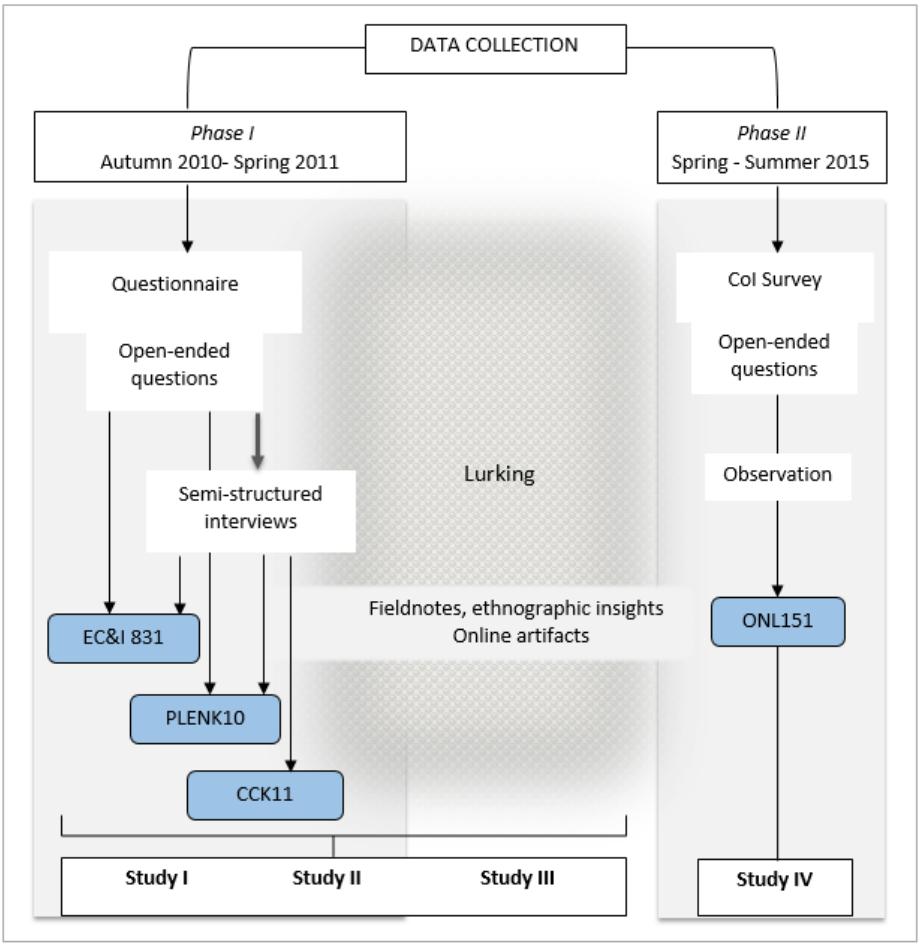

Figure 7. Data collection process

Note taking and lurking memos were part of the data. During my participation in the first three cMOOCs in 2010-2011, I was keeping a journal of everyday learning activities, readings, interactions, and reflections. Figure 8 (Spring 2011) shows an example of my MOOC experiences and reflections in the form of "daily" notes. This reflects the use of tools in the process of doing online ethnography (tools as research means). These notes and memos were used in the analysis processes in combination with interview and survey data in Study I, II, and III.

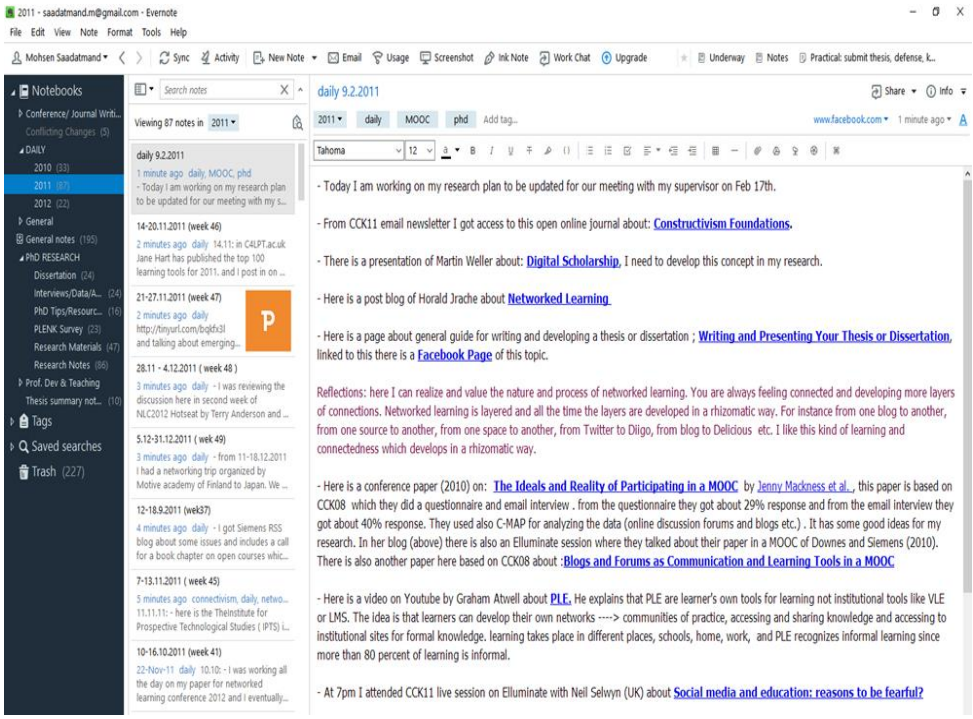

Figure 8. Snapshot of notetaking and researcher's memos

All methods of inquiry in this study were entangled so that the observations and lurking were not detached from interviews and they provided bases for interpretations of the interviews. Questionnaire data were analyzed using descriptive statistics. The interviews were analyzed using content analysis. Data gathered in the first phase were analyzed using an analytical induction and abductive analysis (as shown in Fig. 9). Abduction (Coffey & Atkinson, 1996) is a suitable interpretation strategy in the pragmatist view that allows a researcher to connect the observations and participants' perceptions to theoretical understandings that account for the observation. In this manner the researcher moves between observed data and descriptions and prior theoretical knowledge to form or conform the meanings and conceptions and form new categories of meaning. In this framework, the broad and existing categories and the initial definition of the phenomenon of study are examined through preliminary observations and a small-case data collection process (e.g., questionnaire). They then undergo continuous refinement throughout further data collection and analysis (Goetz & LeCompte, 2009; Hammersley, 2006). The process is modified and themes are refined themes through further data collection processes (e.g., interviews, participants' artifacts, lurking). Different sources of data are scanned for categories of the phenomenon and relationships among them.

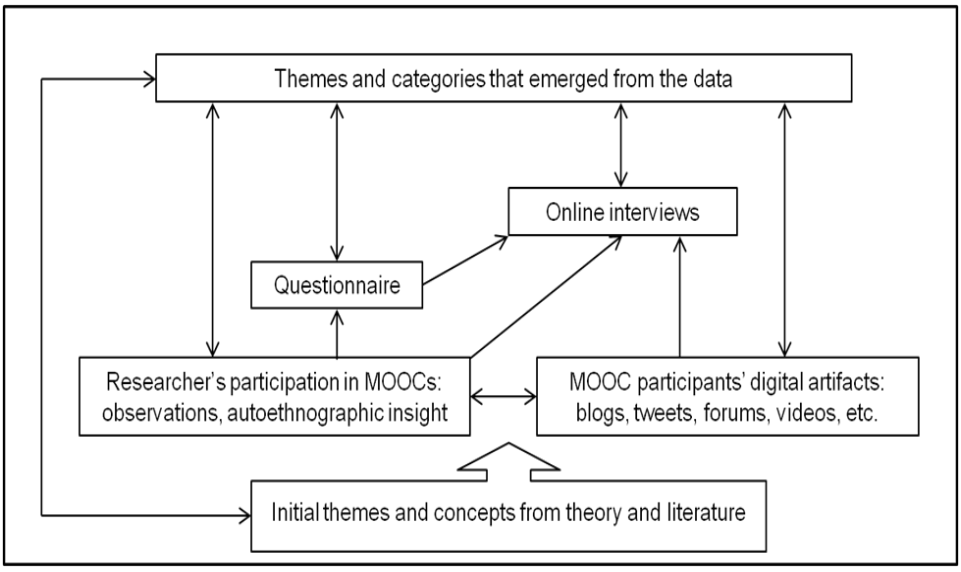

Figure 9. The analytical framework of data (*phase I)*

The second phase of data collection (ONL151 course) included a survey and a few open-ended questions. This study employed the community of inquiry as a framework to study learners' presence and interactions in an open online course. The CoI survey instrument (Arbaugh et al., 2008) was used as the primary source of data collection. The instrument consists of three main presence elements: teaching, social, and cognitive. I slightly modified the CoI survey instrument. We added one open-ended question to ask participants to write their comments and reflections regarding each presence. The survey was built on Google Forms and at the end of the course a link to the survey with a consent form was sent to participants who had completed the course. Statistical analysis was conducted for the survey data. The responses to these open-ended questions were used as qualitative data to supplement the survey data. In addition, the researchers' observations throughout the course were another source of qualitative data, which provided remarkable insights to complement and interpret the data and helped understand the presence and interaction in the course. A more detailed description of instrument, data collection, and analysis is presented in Study IV.

5.5 Ethical considerations in research on open online contexts

Online research designs such as online ethnography developed in this study raise critical issues and possible risks related to human subjects that online researchers may encounter conflicts between research requirements and human subjects'

rights, privacy, consent, and security (Ess, 2002). New ethics issues emerge in the current era of a rising amount of data (Vivitsou & Saadatmand, 2016) where online learners leave numerous kinds of data and artifacts on different platforms and the boundaries between personal and social spaces are becoming permeable. The fact that there can be much data available in social networks that should be considered as public domain and there should be no ethical issues in collecting and analyzing them, but it does not mean that they can be used without any conscious criteria (De Abreu, 2014). Those early MOOCs were open-learning environments and participants created a tremendous number of artifacts including their profiles on many social platforms, and through their blogs and tweets. Many researchers used such public data and artifacts as empirical data. Facilitators addressed some of the issues of privacy and security in their course introductions where they provided guidance on participation and online safety. For example, in the MOOC, CCK 11, the "your privacy" page familiarized participants with some issues of privacy including: collecting IP addresses, logs, cookies, public forums, and subscription to the RSS feed aggregator and email list.

The amount of big data in online spaces, and the role of an online ethnographer as a lurker to be "covertly present" (Murthy, 2008) to observe without being observed in an unobtrusive manner created an ethical dilemma (Robinson & Schulz, 2010) that an online ethnographer should apply rigorous procedures and guidelines to overcome. There are some procedures to overcome such ethical issues; Kozinets (2010) suggests that the online ethnographer should reveal his or her identity and intentions; ensure the confidentiality and anonymity of subjects; obtain consent, and credit them when necessary. The Finnish national advisory board on research ethics (2009) also suggests three main ethical principles of research in social sciences: the autonomy of research subjects (voluntary participation); - avoidance of harms to subjects (avoiding social, mental, financial), and privacy and data protection (anonymity, data protection, reporting). In a position paper regarding ethical considerations in the era of big data, we addressed some of these issues (Vivitsou & Saadatmand, 2016). To conduct responsible research in online environments, a detailed account of informed consent and guidelines respecting privacy and ownership of data throughout, and anonymization in reporting the results should be developed before beginning the research (ibid).

I addressed these issues by sending the participants a consent form explaining the objectives of the study, procedures of data collection (for interview and for surveys), possible risk and rewards (if any), the process of data protection and reposting the results, and their rights of withdrawal and dispute throughout the course of study. I ensured participants that all data were collected for research purposes and were not disclosed to third parties and that I am the only researcher who had access to data. Data files, interviews audio and video files, and transcripts were stored in my personal computer and password protected. They were also stored on cloud storage applications with password. Ethical issues pertaining to

online data retrieval were addressed through “Creative Commons” wherever appropriate; otherwise, each participant provided direct permission to use these data. Anonymity was maintained in data analysis and presenting the results by using pseudonyms in quoting the interview data. I was not aware of any harm (emotional, financial or any kind) during the course of study or in reporting results and publications, nor, there were any disputes with regards to my relationship and communications with participants.

6 OVERVIEW OF THE SUB-STUDIES

6.1 Emerging technologies and new learning ecologies: learning in open networked environments *(Study I)*

Study I discusses how emerging technologies and networked tools have transformed educational practices and bring new ecologies for learning. The aim was to report the learners' activities and experiences that resulted from participating in open online learning environments. In light of the literature review, in this paper some of the main concepts and theoretical orientations of the dissertation were introduced and discussed. One main theoretical framework discussed in this paper was networked learning, which was defined as a continuous process of seeking, sense making, and information sharing that requires an open attitude toward learning and finding new things for personal and professional development (de Laat et al., 2007; Drexler, 2010; Goodyear et al., 2004, 2005; Jarche, 2010; McConnell, 2004; Siemens, 2006a). The paper elaborates on the notion of rhizomatic learning driven from Deleuze and Guattari's (1987) concept of *rhizome* to explain the multimodal and multidirectional nature of learning and interactions in open networked world. With regard to pedagogical design of connectivist MOOCs, the rhizomatic approach considers curriculum as not predefined and structured but rather formed by the contributions of engaged learners in a community: "community as curriculum" (Cormier, 2008).

The paper reported the preliminasry findings of interview data and researcher's auto-ethnographic experiences. The analysis revealed different attitudes toward participating in MOOCs: they were said to be challenging, but inspiring. Participants expressed that it is somewhat overwhelming to keep up with the demanding nature of MOOC participation: dealing with new tools during the course, being open, and accomplishing assignments, and organizing learning activities take a great deal of time. On the other hand, however, the majority of participants believed that learning in cMOOCs is motivating and inspiring because they learn how to use different tools and enhance their technology competency, and at the same time, they can get connected to many people and peers.

The study concludes that learning in the open format of connectivist MOOCs is:

- *Largely self-organized*: Learners must deal with a huge amount of information and multiple resources that they have to make sense of and develop in their own personal way.
- *Disruptive*: that it challenges the conventional way of learning and interaction. Learners found it to be confusing and frustrating at some point to

manage various learning processes because it challenges the conventional way of learning and interaction.

- *Emergent:* Learners perceived the patterns of networking and outcomes of learning in the dynamic of MOOC environments as unprecedented and unpredictable. Participants were immersed in the diversity of people, resources, and networks which made for unpredictable forms of connections and encounters. The notion of emergence is reinforced by a rhizomatic approach to learning in networked environments.

6.2 Content aggregation and knowledge sharing in a personal learning environment *(Study II)*

Study II describes the concept of personal learning environment (PLE) as understood and used by cMOOC participants. This study discusses the pedagogical and technological configurations of PLE. The aim of this study was to explore what constitutes a personal learning environment and how MOOC participants use their PLEs to seek, aggregate, create, and sharing content. This paper elaborates on the discourse of changing the context for learning on the affordances Web 2.0 and social technologies that create the avenue for moving from LMS to PLE as learning ecologies which value learner's autonomy in the process of learning. Autonomy allows learners to take control of their learning by regulating the mechanisms of what, how, when, and, with whom they will learn. In this conceptualization, social media and participatory Web 2.0 tools are integral parts of PLE that afford pedagogical possibilities for more flexibility and personalization for learning processes. Through the analysis of interviews, the study solicited participants' understanding and use of a PLE and how they defined their PLEs. Another source of data was the researcher's experiences of participating in MOOCs and the choice of tools as a PLE. In this sense, the findings of the paper reflect the researcher's ethnographic insights and lurking. Based on the analysis of interviews, the researcher's personal learning experiences, and ethnographic insights, a mash-up PLE framework was developed that combines tools and processes that enable users to aggregate, remix, repurpose, and redistribute content from different sources.

One particular interest in this study was to discover how serendipity might occur in the processes of aggregating, creating, and sharing content in MOOCs. The findings suggest the serendipitous nature of content aggregation in a PLE and provide evidence of serendipity as a valuable and unexpected source for learning. I presented examples of tools from my own experience in MOOCs that foster emergent learning and serendipity in the abundance. For example, Twitter was observed as a tool that fosters serendipity through aggregating feeds through subscription to different #hashtags. Other examples included RSS feeds and Google

alerts that provide learners with opportunities to find valuable resources for their learning, or connect to peers and people in their professional work. A quote from a participant reinforces the assumption of serendipity using Twitter: "I have TweetDeck. I use Twitter because I connect with a teacher in ESL in the whole world and we tweet things we have weekly discussions on. I attend one of the teacher's Webinars because of Twitter, I mean that Twitter introduced me to many things in this world in my career as a teacher." This study argues that serendipity encourages unexpected discoveries and connections as valuable sources for learning. However, the unpredictability of serendipitous learning makes it difficult to plan for and foresee its effects; some researchers suggest that could be fostered through design. For instance, Kop (2012) indicates that it is useful to examine how to increase serendipity in information flows and how it could be fostered and heightened in information streams to help learners in their personal self-directed online learning.

6.3 Participants' perceptions of learning and networking in connectivist MOOCs *(Study III)*

Study III was aimed at exploring participants' perceptions of learning and networking in connectivist MOOCs. This paper, builds upon and extends the findings from the two previous sub-studies in more details by reviewing the development and classification of MOOCs, the pedagogical underpinnings of cMOOCs, and previous research on different aspects of MOOCs. Connectivism as the pedagogy of cMOOCs integrates principles of chaos, network, ubiquity, and complexity; it assumes that the key characteristics of learning in connectivist learning environments are: openness, autonomy, diversity, and interactivity/connectedness (Downes, 2009; Siemens, 2005a). Connectivism, like other networked-based pedagogies, accentuates the customization of learning in the networked world and promotes the exploitation of the affordances of technology to facilitate personal learning and informal learning opportunities. The cMOOCs are examples of learning offerings based on the fuzziness of a connectivist approach, which often poorly fits within formal and traditional contexts in contrast to behaviorist or constructivist approaches.

The data set for this study includes an online questionnaire, semi-structured interviews, lurking, and observations. The questionnaire contained 5-point Likert items in three main categories: use of tools and resources by MOOC participants, learning and networking activities in the MOOCs, and participants' experiences and perceptions of learning in MOOCs. The questionnaire also included a few open-ended questions for participants to elaborate more on their responses. The

responses to the open-ended questions in the questionnaire were analyzed qualitatively along with the interview data. Questionnaire responses, interview data, the researcher's autoethnographic insights, and participants' public online data in the form of tweets and blog posts were analyzed and compared. The interviews were analyzed using content analysis. The questionnaire response rate was low, so descriptive analysis was used to analyze the data.

The results suggest a high extent of technology deployment for learning and interactions by the participants in cMOOCs. In terms of using tools, Twitter, Facebook, and course RSS aggregator were used more frequently by participants. For example, Tweeting was reported as one of the main activities during the MOOCs; 43% tweeted frequently. As for learning activities and networking in CMOOCs, many respondents found participation to be challenging, but motivating in MOOCs. The results indicate that a high level of autonomy, self-organized learning competency, and adequate technological competency are needed to create the learning pathways that best suit the learner preferences in cMOOCs. A great majority (87.5%) believed the cMOOC environment helped enhance student autonomy and improve self-directed learning by allowing them to define their learning goals and organize learning activities and interactions. Creating networks and developing professional connections through networking technologies are advantages of participating in cMOOCs. The paper concludes that participation in MOOCs challenges learners to develop self-organization and self- motivation; they must learn to manage the abundance of resources and a more open format. Another interesting finding of this study was that lurking is considered as a way of participation in MOOCs, which means that it is not seen as wasting time or not learning. It suggests that it is worth investigating participants who just sign in and remain unmotivated in the MOOCs, to see if they are more likely to drop out than continue as lurkers in MOOCs.

6.4 Presence and interaction in open online courses *(Study IV)*

The results from the second phase of data collection were reported in Study IV. This study discusses while MOOCs on a large scale are trending globally, other forms of open online courses are becoming more prevalent at the local level and for professional development objectives. The study was conducted in an eight-week open online course titled “Open Networked Learning” offered as a professional development course at three Swedish universities: Karolinska Institute, Lund University, and Linnaeus University for university teachers, educational technologists, educational developers and course designers. The course was also free and attracted participants from other countries. This study aimed to examine learners’ interactions through the Community of Inquiry (CoI) framework, which assumes that learning in an online environment occurs through the interaction of

three main presence elements: teaching, social, and cognitive. This framework provides opportunities for researchers to evaluate learners' interaction and experiences in online learning environments. Presence is described as "a sense of active participation" and a focus on learner creation and contribution through multi-mediated forms of communications (Mckerlich et al., 2011). In this study, the three presences of the CoI model were matched to the three types of interactions (Moore, 1989) i.e., teaching presence to learner-instructor interaction, social presence to learner-learner interaction, and cognitive presence to learner-content interaction (as shown in Figure 10).

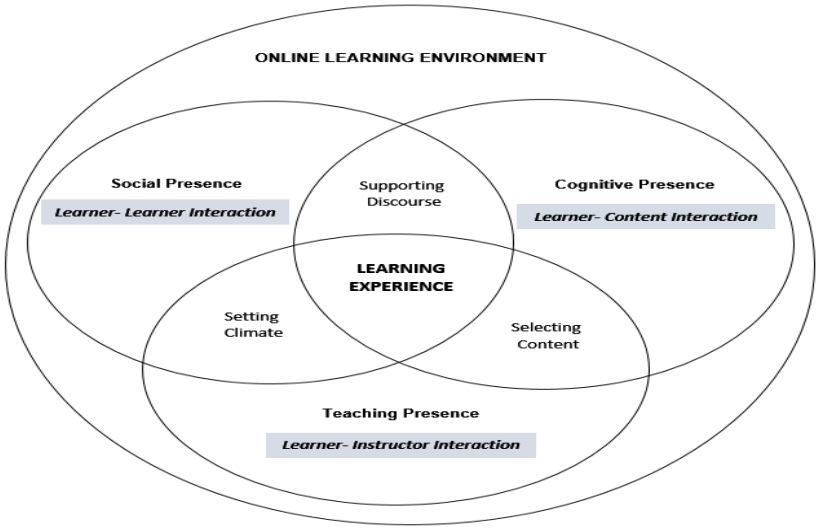

Figure 10. Relationship between interaction and presence in an online environment (adapted from Swan, 2004).

A slightly modified version of the CoI survey instrument was used as the primary source of data collection. One question was added to the 'design & organization' section (course online environment and tools supported my learning) to explore how course instructional design and learning environment can support learners' interaction. Three open-ended questions were also added to each presence in the survey to collect students' reflections as qualitative sources of data. Descriptive statistics of means were conducted for the survey data. After conducting the statistical analysis of the survey data, participants' responses to open-ended questions were analyzed in order to discover and interpret how qualitative data correspond to the results from the survey. Pearson's correlation coefficient was conducted to examine relationships among the three presences and their subcategories. The analysis yielded positive significant relationships between teaching presence and cognitive presence ($r = .67$, $p = .000$) and between social presence and cognitive presence ($r = .56$, $p = .001$). The results indicate that participants who perceived higher level of teaching presence and social presence also perceived

higher level of cognitive presence. The survey results demonstrated high scores for the three presences in the CoI, which correspondingly indicate that learners had adequate interactions with instructors (L-I), with peers (L-L), and with content (L-C). However, the social presence received the highest score (M = 4.12, SD = 0.53). The results indicate the importance of teaching presence (design, organization and facilitation) and show how designing learning environments and facilitating learning activities can enhance cognitive presence in online courses.

The study suggests that in order to design a stimulating online learning environment for interaction, proper instructional design mediated by appropriate tools and pedagogical approaches should be implemented. Both asynchronous interactions such as forums, emails, blogs, and synchronous interactions such as Webinars, hangouts, and Tweet-chat can foster learner interaction especially learner-content interaction and cognitive presence. For example, in this study it was explained how online environment of the course combined with an appropriate instructional design (e.g., problem-based learning approach) could foster interactions especially learner-content interaction and cognitive presence. This is what Abrami et al (2011) call "guided, focused, and purposeful" designing and using strategies and techniques for interaction.

7 DISCUSSION

This study provides a detailed account of the dynamics of learning in connectivist MOOCs, a new learning ecology in online education. In this section I will summarize the main findings of the study with regard to the main concepts and theoretical structures of the investigation. This is to be accomplished first through a general discussion on research sub-studies, second by presenting a framework of a learner-centric open networked learning ecology of cMOOCs based on the theoretical understandings and empirical implications of the sub studies, third by querying the impact of MOOCs on practice and pedagogy. Beyond this, I will recap my journey as a MOOC learner-researcher and reflect on methodological choices and provide suggestions for future research, and close with concluding remarks.

In this study, cMOOCs were defined as learner-centered, open networked ecologies that elevate learners' roles in forming their learning experiences and encourage them to be more autonomous and self-directed while participating in open networked learning environments. In the general discussion in the first three chapters, it was argued that new technologies offer ways to transform educational practices and combine such assumptions with the philosophy of open education to liberate learning opportunities as conceptualized in the form of OER, OEP, and the latest open learning format of MOOCs. This study sought to understand how learning ecology in cMOOCs is conceptualized and how participants perceive it. To answer this and to explain pedagogical and design configurations, the issues were divided and discussed on three levels: individual, social, and design. The individual level is discussed with regard to personalization of tools and resources in the participants' process of learning and creating their personal learning environments, managing the abundance of information and resources, and finding their optimal pathways for learning (Study II and Study III). The social level dealt with learner engagement in networks and communities and the social interactions that takes place in cMOOCs (Study I, III, and IV). Presence in online environments was described as an indicator of active participation that occurs through learner interaction with instructors, other learners and peers, and the content (Study IV). Finally, the design level articulated the design configurations and pedagogical underpinnings of MOOCs informed by the ecological approach and technological affordances: learners' role in controlling learning processes and involvement in designing and forming their own learning environments.

Combining the relevant conceptual constituents, the premises of connectivism and networked learning, and an ecological approach to learning design provided lenses through which I was able to examine the empirical evidences presented in the sub-studies to come up with an open networked learning ecology of cMOOCs.

7.1 cMOOC: an open networked learning ecology

As discussed in Chapter 3, an ecological approach provides conceptual constructs in designing learner-centered and adaptive technology-rich learning environments. Based on the conceptual framework of the study and the empirical results of the sub-studies cMOOCs are conceptualized as *open networked learning ecology (ONLE)* as presented in Figure 11. This conceptualization acknowledges technological affordances in learning design to promote social and pedagogical affordances that help learners shape their learning experiences and interactions. In this learning ecology, learners are positioned at the intersection of personalized and networked situations where they are encouraged to be autonomous and self-directed in managing their learning activities in the diversity of resources, and to develop and sustain connections and interactions. In other words, learners are also co-designers (Jonassen, 1994) of their learning environments to mindfully think about the choice of technologies as cognitive tools.

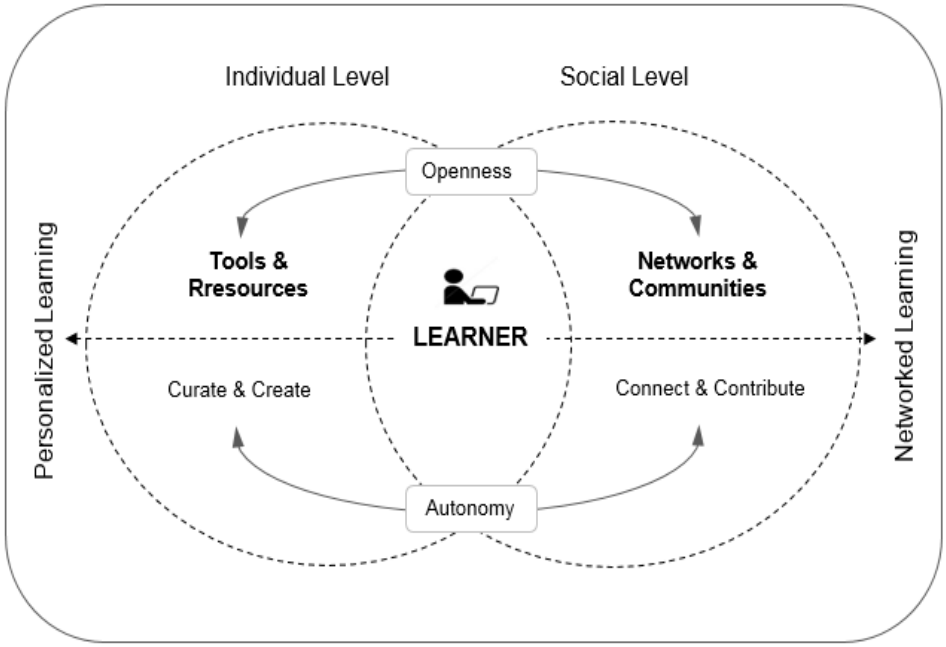

Figure 11. The open networked learning ecology of cMOOCs

In the open networked learning ecology of cMOOCs, openness, learner autonomy, tool-rich, and interactivity are essential characteristics. Particularly, autonomy and openness are important in this learner-centric model in that more autonomous learners who are taking initiative and are willing to share their learning experiences are becoming more connected and more active members of the networks and communities. In essence, in cMOOC learning environments, autonomy and

openness are enablers of social affordance and facilitate the process of moving from lurking to active participation. Autonomy is found in learners' ownership of content and control of learning processes; openness is the attitude to share and contribute to the knowledge community. As concluded in Study I and II, autonomous learners take advantage of technology to develop design solutions to support their learning (for example developing their PLEs); use social media and online tools extensively to amplify connectedness and interactivity. One key feature of learning in cMOOCs as discussed in Study III is the development of connections and network creation beyond the context of the course for professional purposes. In the development of CCK MOOC, Downes (2013) elaborates on characteristics of an open learning ecology, including open access to educational resources, open access to curriculum (learners are involved in curriculum planning, community as curriculum as described by Cormier 2008, see Study I), open assessment (self- and peer assessment), and open credentials.

The technological tools in cMOOCs ONLE support what Kirschner et al., (2004) call "social affordances" that promote the social dynamics and collaborative interactions (e.g., learner-learner, and learner-instructor interaction) designed with appropriate pedagogical support (Doering et al., 2008; Saadatmand, Uhlin, Hedberg, Abjornsson, & Kvarnstrom, 2017). Interactions in cMOOCs ecology are distributed and multi-spaced; thus, learning is a process of navigating, growing, and pruning connections and interactions within distributed networks (Siemens, 2012a). As technological tools afford various actions and carry social meanings (Nardi & O'Day, 1999), in the cMOOCs open networked learning ecology they are used in the hands of learners to apply in different activities, relationships, connectivity, and engagement (on both an individual and a social level). The cMOOC ONLE nurtures personalization and content syndication (on learners' demands) and foster learning through network creation and community engagement. I underscore the potential and importance of tools that facilitate social interaction because in relation to the ecological approach, the affordances of the tools with appropriate usability enable connections among learners, peers, instructors, communities, and learning resources.

Adapting from Wiley's (2010a) 4Rs (reuses, revise, remix and re-distribute) applied to open educational resources, I have come up with 4Cs: *curate, create, connect, contribute* to describe the main processes in cMOOC ONLE. Curation and creation are mainly on the individual level, and connection and contribution belong to the social level. Curation is the process in which learners seek and aggregate information, make sense of it and prepare it for creating new content. The curated and aggregated contents are remixed and repurposed by learners to create new artifacts (e.g., blog posts, video, tweets, imagery, and reflective notes) that are facilitated in a personal learning environment (Study II). These processes extend to a social level by expanding connectedness and engagement in networks and communities to share and re-distribute content and contribute to the flow of

distributed knowledge. These personal and social processes of learning occur in cMOOCs as the results showed that participants demonstrated a high level of exploitation of many tools for curation, creation, developing connections and engagement in different networks and communities (Study II and III). For example, in the case of EC&I 831, CCK11, and PLENK10, course activities and interactions were distributed over many tools and platforms such as Moodle, Google Groups, Twitter, Facebook, blogs, wikis, and YouTube. Learners incorporate such tools into their personal learning environments to curate content and create artifacts, connect with others in networks and communities, and contribute to the flow of knowledge. It is important to note that the processes of curation, creation, connection and contribution are not separate, but interrelated and can take place simultaneously. When a learner curates content through social bookmarking tools or RSS, and creates learning artifacts such as blogs, tweets or video clips, he or she becomes connected through these means to other people or resources (Study II, III). Interaction between learner and content (individual level), between learners and learners and course facilitators (social level) is supported through incorporating a rich array of social media platforms and collaborative tools in the design of the course (Saadatmand, Uhlin, Hedberg, Åbjörnsson, & Kvarnström, 2017).

The richness of connectivity stimulates drivers for emergent learning and serendipity (Saadatmand & Kumpulainen, 2013). In such distributed cognitive processes of learning, learners might encounter a series of emergent incidents based on the ecological unanticipatedness that opens ways to new knowledge (Pata & Bardone, 2014). As described in Study II, serendipity occurs in the process of information aggregation and content creation in MOOCs when participants use social media and networked tools such as Twitter. Participation in an open networked learning environment like a cMOOC is not always very structured and might be deviated to other unintended and unanticipated directions through lurking and/or engagement in distributed networks that are abundant and develop triggering some emergent and serendipitous events (Study II, III). As Study II reveals, the value of curation and aggregation in a PLE and being engaged in open online networks is the prompt for serendipity and unplanned discoveries as valuable sources for learning leading to the generation of new ideas and of new connections. Serendipity and emergent learning are two closely-related notions that are discussed as outcomes of learning and interaction in open online environments and are likely to occur when many "self-organizing agents" (Williams et al., 2011) interact (see Study I).

One major pedagogical distinction of cMOOCs versus xMOOCs is how they create possibilities for authentic contextually-situated learning. This refers to the usability aspect of affordances that demands course designers to integrate appropriate pedagogies for social and educational interactions. In relation to the ecological approach to learning design, I argue that cMOOCs are representations and conceptualization of modern learning spaces from classrooms to ecologies that

take advantage of technology affordances. Designing and implementing authentic e-learning environments requires the proper combination of technologies with pedagogical models that contain authentic learning tasks, learning supports, and learning resources (Herrington, Reeves, & Oliver, 2010; Herrington et al., 2010; Herrington, 2009, Kirschner et al., 2004). Siemens (2008) discusses the future model of learning design including a "broad-spectrum of learning situations and recognizes the value of different modes of cognitive and social development that arise outside of institutional structures" (p. 9). This prompts authentic learning situated at both the individual and social levels of learning and takes place instantaneously through the interconnectedness of learners' everyday informal activities and formal learning. In an ecological framework, technology-rich learning activities are designed to promote authenticity and consider learner's wider context (Luckin, 2010a). This is true for cMOOCs as self-organizing ecologies of autonomous learners, digital contents and resources (Pata & Bardone, 2014) where learning activities are meaningfully designed to get participants engaged in authentic learning tasks including interactions in and out of the course context.

The results of Study III demonstrated that participation in cMOOCs requires engaging in a variety of activities through social media and online networking tools to keep up with the course objectives. Such engagement needs a certain level of technological competence and an open attitude to actively create and share knowledge in learning networks. Reflection is also an important characteristic of authentic learning (on the individual level) and online learning environments should provide tools and tasks enabling learners to reflect on their learning. In cMOOCs, tools that are used for creating artifacts, such as blogs, video clips, images, were shown to improve reflective learning in online environments (Study III). In an open networked learning ecology, interaction within and across contexts is important. In contrast to so-called structured within boundary learning environments such as formal classrooms or traditional structured courses that often resulted in information delivery rather than fostering authentic learning (Herrington, 2006), cMOOCs instructional resources and content are distributed across platforms and co-created by learners, peers, facilitators, and instructors in a collaborative fashion. A learner is both the owner of the content and artifacts and a contributor to the knowledge creation and flow of information.

7.2 Recapping my journey as a MOOC learner-researcher: personal and methodological reflections

I consider this dissertation as research requiring deep reflection and questioning of my journey as a MOOC learner-researcher. The "personal" in an ethnographic research can be understood as both a standpoint of where to begin and as a means of how to proceed in the process of inquiry. In fact, the epistemological orientations illuminate the methodological decisions. As is true in this study, often personal experiences and current understanding of the topics of interest are determinants to "what" a researcher aims to know and "how" to fulfill such aims. As I described in the introduction, choosing MOOCs as the topic of this study was a personal interest of technology applications, and my background in educational technology as a professional. Inspired by the work of those open educators who pioneered MOOCs in their original form (cMOOCs), I began pondering on open education as a philosophy, and technology as enabler in emancipation of educational opportunities. In doing so, my research journey began when I took a MOOC as the first open online course. The convictions and endeavors of those early connectivist MOOC facilitators (e.g., Cormier, Couros, Downes, and Siemens) to promote the ideals of open education and running such great MOOC initiatives were inspirational sources for me in this study. Their pedagogical thinking was learner-centered and engrained in promoting authenticity in learning in online environments through interactivity and connectivity. Bonk (2015) clarifies authentic learning in MOOCs:

> The types of MOOCs that would seem to be authentic and can transform higher education are the original ones (cMOOCs) developed by Canadian open educators and then trapped into commercialized lines of business by American stakeholders. The initial MOOCs represent authentic learning and are based on collaboration and creativity that create opportunities for sharing and creating new content, generating ideas, reflecting, but Americans (e.g., AI from Stanford, Coursera) turned it into an enterprise business based on video lectures, quizzes, and standardized assessment" [my transcription from the video[17]].

This personal standpoint lead to the methodological decisions of online ethnography as a pragmatist method (as explained in the method section) that serves at its best possible merits to explore the dynamics of learning in the ecology of cMOOCs. In educational sciences, especially when it comes to examining and understanding a new learning practice or technology-mediated learning intervention, one way is to opt for an exploratory lens through which a researcher can

17 A web conference delivered to Tampere University of Applied Sciences, January 2015. https://www.youtube.com/watch?v=M4Kf1xPl-eY

experience and touch the issues along with participants in the context. The choice of online ethnography was strong and useful, congruent with epistemological orientations of the study in which knowledge and cognition is distributed and connected (networked learning, connectivism). I believe the combination of the theoretical and methodological orientations are well-suited to address the questions of this study. Research into open online learning spaces, networks, and communities should have a holistic, multimethod, and pragmatist approach to explore, excavate, and understand the dynamics of learning in open networked learning environments and MOOCs. As discussed in the methodology section, no single approach (method) would suffice to account for the multidimensional complexities (Tammelin, 2004) of socio-technological environments.

In ethnography, a researcher is part of the research and is a source of evolving data. As explained in methodology section, I have been a participant observer and lurker in MOOCs but a MOOC learner as well. This account has resourcefully provided the study with the adequate means to explore and understand the nature of learning in MOOCs. The issues of confirmability were addressed in this study by triangulation (Denzin & Lincoln, 2003; Goetz & LeCompte, 2009) through combining multiple methods, materials, and data sources (both methodological and data triangulation). Methodological triangulation permitted various ways of collecting data. In addition to researcher's ethnographic insights, other sources of both qualitative and quantitative data were used: interviews, questionnaire, and survey instrumentation. As for the data analysis approach, the interpretative rigor of abductive analysis was used to move back and forth among empirical evidence and theoretical understandings to build and confirm the findings.

Despite the many advantages ethnography has for researching the "lived experiences" and realities of open networked learning environments (in-depth understanding and rich narratives), it has some challenges as well. For example, it is time consuming and a researcher needs to devote an ex-tended period of time to set the configurations. Researcher as participant observer presents some dilemmas and ethical issues that require orchestra-tion of resources and much reflection, note keeping and, when possible, discussion (as I explained in methodology chapter). Online ethnographic research design developed in this study is considered a pragmatist strategy to combine both qualitative sources of data with quantitative measures that improve the confirmability of the study. Like ethnographic studies, obser-vations and interviews have been major qualitative data sources. In addition, I have included questionnaires and surveys (Study III, IV) as quantita-tive data for the purpose of triangulation. However, the quantitative data do not contribute to the validity of the study by inferential statistical analysis; rather such quantitative data were analyzed by descriptive statistics.

Hopefully, this investigation demonstrates the appropriateness of the methodological contributions, online ethnography, for delivering on the meaning of the learning process in cMOOCs and the propensities in various contexts both large

and small. I have used the "researcher self" as a data source and an analytical lens through which I could interpret the phenomena under investigation. The "self" as a learner and researcher was not separated from each other in this research endeavor.

This research was quite a learning journey that helped me better understand open educational practices and develop enormously as a profes-sional in online learning and open education. Throughout this rather long research course, I "learned to network and networked to learn." Being a "connected" learner-researcher is for me quite personal. Social presence in online spaces is essential for an online researcher. As Esposito et al., (2015) note, doctoral researchers should adapt social software in their research efforts and build new forms of academic socialization. Murthy (2008) ex-amines the potential impact of four new technologies: social networking tools, blogs, digital videos, and online questionnaire and discusses how so-cial researchers may best utilize new technologies for research. As a learner, getting to know MOOCs and participating in many of them since 2010 have helped develop my digital competence, extended my professional networks, and assisted the acquisition of knowledge and skills in applying online tools and technologies for both personal purposes and research. As presented in Study II about content aggregation and connectivity though a PLE and the possibility for serendipity, in my personal experience, due to the intercon-nectedness in social and professional platforms, I have experienced many serendipitous incidents that brought invaluable resources in the course of this journey. Particularly, I found Twitter (#hashtags) an excellent tool that helped me as a MOOC learner to be notified about updates and trends about my research and academic interests and develop my professional connections.

7.3 The impact of MOOCs on practice and pedagogy: current and future status

Stepping away from the main focus of this study, namely learning ecology and learners' experiences in connectivist MOOCs, I want to elaborate on the general issues and societal impact of MOOCs as a whole, including cultural aspects, technical issues, current practices, and future trends. Arguably, the MOOC phenomenon has caught interest as a desire for power change in education meaning that MOOCs were conceived to act as enablers to education emancipation. The movement was amplified by the needs of today's learners and the potential of technology to open access to learning opportunities. I agree with Siemens (2015) that MOOCs perhaps have not been about higher education, but they are responses to larger societal needs for free access to education in all levels. The MOOC upsurge was so overwhelming it engendered a tremendous number of conversations and

speculations about its various impacts in terms of pedagogical, institutional, design, and accessibility changes/disruptions. Perhaps few trends in education could match MOOCs in having received such remarkable attention from different stakeholders, including academic communities, educational institutions, policymakers, education vendors, and media. The MOOCs were hyped in 2012 and generated hot debates, but the wave built toward a more realistic examination of their actual potential through research and different MOOC experimentations. As discussed in Chapter 2, although MOOC is a subject of speculation of disruptiveness in higher education, and possibly trigger some forms of learning innovation, I argue that with the currents trends and exponential surge of xMOOCs, such disruption potential has yet to be actualized. According to Christensen, Horn, Caldera, & Soares (2011), for a disruption to truly occur, it should grant people access that was not previously available and change the business model accordingly.

Even if the MOOC movement has created potential for people to gain access to courses from high profile universities (mostly xMOOCs), the disruptive assumptions are not truly realized when it comes to pedagogical designs. MOOCs disruptive potential cannot transform online learning and higher education practices unless appropriate pedagogies are integrated (e.g., learner-centered approach and interactivity in cMOOCs). It would be sensible to say that if MOOC design adapts an ecological approach, both in terms of technological affordances and learner's role and autonomy in learning design such as what cMOOCs are claimed to be based, a pedagogical disruption will be a likely outcome or consequence. For instance, Fischer et al.'s (2004) ecological meta-design framework in designing adaptive learning ecosystems could be one solution to empower learners to be actively involved in co-designing and continuously developing learning arrangements. As Reeves and Hedberg (2014) argue, most MOOCs have not taken advantage of the affordances of technological advancements and combined sophisticated pedagogical designs that can promote learning innovation; rather, they seem to duplicate traditional instructional approaches. In other words, as Kirschner et al., (2004) discuss, when designing online learning environments, the technological affordances and the appropriate pedagogies should support educational and social interactions (usability of the environment as Norman discusses).

This is what I see in the case of xMOOCs that technological affordances are not properly designed to facilitate social interactions. The xMOOCs are criticized for their design and pedagogical approach that do not prompt learners to engage in community activities. The behavioristic pedagogy of Coursera-based MOOCs that rely on information transmission, computerized tasks, video lectures and quizzes preclude the possibility of pedagogical innovation. (Bates, 2014). On the other hand, the design of experimental cMOOCs seems to offer innovative pedagogical models that can escalate online learning practices. For instance, ONL (Study IV) which was a small-scale MOOC that employed a "problem-based

learning" approach in the pedagogical design of the course. Students were encouraged to actively collaborate with peers through small PBL groups on topics of the course. In terms of instructional design of the course, it integrated tools and collaborative technologies (e.g., Google+ and Twitter) to trigger social interactions (refers to usability of technological affordances). Doering et al., (2008) argue that: "An online learning environment rich with educational and social functionalities is useless to teachers and learners if the usability aspect of the design was disregarded or overlooked by designers" (p. 255). In this sense, as Jacoby (2014) contends, cMOOCs might have the potential to be disruptive to higher education in that they are democratizing the models of access and de-commercializing knowledge means "by transforming the expensive and inaccessible higher education sector into one that is open, accessible, and affordable" (p. 77).

The question of how MOOCs might fit within formal higher education practices and how universities adapt themselves remains to be seen. Despite the many advantages that the MOOC model might offer, the applicability to formal education is a fundamental challenge (Saadatmand & Kumpulainen, 2014). Bates (2014) argues that MOOCs are forcing higher education institutions to think carefully about both their strategy for online teaching and approaches to open education. The evidence shows that many universities have been influenced by the MOOC movement and tried to adapt it in one way or another, either by offering MOOCs or being part of the movement.

While many observers expected that MOOCs could revolutionize higher education and repair the issues of inaccessibility (Hollands & Tirthali, 2015), the question remains whether MOOCs will really revolutionize higher education. Daniel (2014) believes that they will not, because MOOCs do not fulfill all the functions of higher education. However, MOOCs have shown to be one significant step forward in promoting openness in education, but as Weller (2014) notes, they are complementary to formal education rather than a replacement. While MOOCs promote the ideals of access to learning, empowering learners, and community building, they are not adequate to address the challenges of quality of learning, accreditation, and engagement of those learners with weaker technology competency and networking skills (BIS, 2013, in Hollands & Tirthali, 2014). Eisenberg & Fischer (2014) describe these issues of controversies of MOOCs' impact: whether they really improve learning experiences or denigrate them; how their impact vary across dimensions of demographics (e.g., level of education from primary to tertiary, age), disciplines (e.g., computer science dominated?); geography (e.g., Europe and North America dominated?)

In addition to pedagogical concerns and instructional design of MOOCs, some criticisms that have caught much attention regard the high dropout rate and low completion rate (e.g., Fournier & Kop, 2015; Stein & Allione, 2014; Stewart, 2013). A considerable amount of debate on MOOCs to date has been concerned with MOOC's attrition and why students are becoming demotivated, remaining

inactive or withdrawing from the course and do not complete them. While it is argued that MOOCs are opening up learning opportunities for all those who are interested, if they cannot intice huge numbers of participants from across the spectrum to continue and complete the course, they will have failed a prime objective of MOOCs, namely inclusion. Some argue, however, that dropout and completion rates in MOOCs are of minimal importance. For instance, Gee, (2012) contends that if the MOOCs are considered as opportunities of access to free and high-quality courses from elite universities then a low retention rate is to be expected (as cited in Yuan and Powell 2013). In a counterpoint, Liyanagunawardena, Williams and Adams (2013) argue that high dropout rates of the two strands of MOOCs represent risks and challenges of openness and inclusion of MOOCs. It is important to note the distinction between dropout and lurking (Koutropoulos et al., 2011). As discussed in this study, lurking is a way of participation and following the course activities in a less active manner but drop out is a kind of losing motivation to continue or withdraw.

One important area that came out from MOOCs development is learning analytics (LA). This line of research was developed to analyze students' interaction, performances and learning logs to improve the quality outcomes in online environments. Reeves & Hedberg (2014) state that the development of learning analytics can provide real-time data and formative feedback to improve learning processes. Today big data sets in education and learners' traces left on online platforms provide researchers with a tremendous measures to understand and optimize learning environments (Duval, 2012; Siemens, 2011). With large datasets on learner activity and digital footprints, learning analytics can provide useful insight on student engagement in courses and other online learning contexts (JISC, 2017).

In addition to the abovementioned issues, socio-cultural constraints in accessing MOOCs must be considered essential in evaluating their global impact. Despite a sizable diffusion of MOOCs in Western countries (e.g., Europe, US, and Canada) there are still infrastructural barriers (both technological and cultural) in creating and accessing MOOCs in developing countries (for instance Africa and parts of Asia). Language is part of the cultural constraints in accessing MOOCs since the vast majority of MOOCs are offered in English (Godwin-Jones, 2014). Learners who are non-English speakers may not benefit unless local MOOC providers establish and develop models to fulfill their needs. These issues raise questions about whether MOOCc can democratize education on all levels and in the areas that higher education is not universally available.

At this juncture, a personal account of a different kind illuminates some meaning regarding underprivileged learners participating in a MOOC. "The best-known case may be Khadijah Niazi, a Pakistani girl who started taking MOOCs at age 10. At age 12, after successfully completing courses in AI and physics, she was invited to speak at Davos about online learning" (Godwin-Jones, 2014, p. 10).

I came across another example on BBC about an online learner in Aleppo, Syria, a warzone, who is following a business degree offered by the University of the People.[18.] MOOCs and initiatives like this can help open access to education and support people around the world in deprived areas who otherwise would not have access to university.

Although there are challenges in developing countries, MOOCs can help bridge skills gaps, and promote digital competency and employability. Some reports show that there are currently promising initiatives to fill such gaps. India's "Mobile MOOCs" to fill the skills shortage of young people entering the workforce, Tanzania's use of MOOCs provides skills in specific industries are two examples (Calonge & Shah, 2016). At present, different types of MOOCs are emerging including blended MOOCs and MOOCs for professional development. MOOCs for professional development (e.g., Study IV) are trending now, and corporations are interested in how MOOCs could be offered as quick and cost-effective "learn-certify-deploy" modules of interactive continuing professional development opportunities to a geographically-dispersed workforce (ibid). A good innovation in the use of MOOCs is the growth of regional MOOC providers focusing on geographical areas and generally non- English speaking for instance, *XuetangX* in Chinese, *Miríada X* in Spanish, *Edraak* in Arabic, *FUN* in French, *EduOpen* in Italian, and *SWAYAM* in India (Shah, 2016b). Providing MOOCs for credentials and degree programs are other areas that are currently developing.

The majority of MOOCs offered to date (both C and X types) have not been accredited as part of programs or degrees. While xMOOCs provide certification of accomplishment (of which the majority of the certificates awarded are charged) cMOOCs in many cases are community-based learning opportunities that some of them are for-credit operations. Degree MOOCs or accredited programs are envisioned by many as the next phase of MOOC development. For example, FutureLearn has launched course programs and degree programs; EdX is offering some accredited course programs (Shah, 2016a), but "whether other universities will accept the credits" (para. 32) is an issue that has yet to be resolved.

All these developments are promising and advancing to fulfill the philosophy of open education, at least partially (in terms of access, but not necessarily tuition free). Moreover, and more central to this study, MOOCS are lacking pedagogical features. Perhaps the actual disruption in online learning would happen by increasing the development of connectivist MOOCs in many disciplines, globally and from top-tier institutions with possible accreditation that would lead to degrees. Massification and scaling up education (Knox, 2014a; Stewart, 2013) combined with appropriate pedagogical design offer some advantages for both learners and

18 http://www.uopeople.edu/ A tuition-free online university offers accredited four-year degree courses, taught by volunteer academics and retired university staff.

society. They include increasing access to higher education, developing tools and resources for learning, and motivating educators to develop innovative teaching practices (e.g., Ferguson & Sharples, 2014b). On the other hand, massification of learning offerings has challenges and shortcomings. For learners, it requires self-directed learning skills, autonomy and a reasonable degree of digital competency to manage learning activities in abundance and overcome the encounters in the open learning format. The interplay among social collaborative technologies and learning design brings challenges to teachers, learners, and institutions related to learning practices and environments as they seek to integrate them in a pedagogically-informed manner.

The conflict here arises between learner needs and preferences and the formal education structures. As discussed, emerging technologies offer affordances to promote self-directed and design learner-centric ecologies. MOOC experiments can cause some sort of unbundling of educational services by offering scalable provisions beyond institutional structures through the use of online communities and resources (Yuan et al., 2014). However, in the case of cMOOCs, they are understood to be lacking in structured curriculum and more of self-organized communities of learners that may not be easily adapted to the formal education structure. As Downes (2015) states, one major criticism of cMOOC is based on the free-form nature of the course. Students have to manage their own time, find their own resources, and structure their own learning. For this reason, it is argued, students must already have a high degree of skill and Internet savvy in order to be successful. A student who cannot navigate complex Websites, search for and assess resources, or make new friends through a social network may have difficulty succeeding in a cMOOC.

With regards to the future status of MOOCs, Siemens (2015) improvises two possible long-term scenarios for higher education:

- MOOCs are largely a supply-side answer to decades-long demand-side increase in learning;
- MOOCs are not the radical trend; on the contrary, it is the complexification and digitization of higher education and that is the alpha trend" (p. xiv).

7.4 Future research

This study focused on connectivist MOOCs as the empirical contexts of the research. Therefore, the findings are limited to learners' experiences in cMOOCs using small-scaled and mainly qualitative means of data. While there is a growing body of research on xMOOC experiments mainly on aspects such as patterns of interaction, learning analytics and big data, one area of future research might be to capture perspectives of those participants who have successfully taken part in both cMOOCs and xMOOCs to gain comparative insights about what it takes to

accomplish an xMOOC versus a cMOOC. Equally important, future research can also examine unaccomplished participation in cMOOCs and xMOOCs to find out motivation, competencies, requirements and other reasons that might cause low completion rates which is a major concern in evaluating MOOCs. This can be done by qualitative means such as interviews or focus groups, and supplemented by tracking their learning interactions on the platforms they use in the course. This line of research will add knowledge to what Eisenberg and Fischer (2014) posit for MOOCs to understand if they improve learning experiences or denigrate them, and document the differences in participation from people who have experienced both in a complete account.

While the main body of empirical research on MOOCs has been done in more developed societies in which more technologically advanced learners participated in MOOCs, the results of these studies might be disoriented in a way that they do not reflect the experiences of learners with fewer technical skills. As gleened here through observation, interviews, and social profiles of the participants, most of them were digitally literate. Therefore, the findings of this study are limited in this sense and future research can extend it by investigating learners' experiences in MOOCs from less-technologically advanced societies to examine the value and potential of MOOCs in expanding educational opportunities. However, this area is controversial itself because basically, for being able to participate in a MOOC, a learner should have a reasonable amount of digital experience. Thus, the realistic area for research is among those who have dropped out due to lack of technological skills.

Since the movement that MOOCs have created is arguably a disruptive innovation in higher education, much speculation occurs on the future impact, pedagogical development and adaptation of this format of learning as part of university accredited degrees. One area of research could be how universities can design MOOCs as part of their accredited degrees. There are some initiatives, as mentioned in the previous section, but in order for the MOOC viability and applicability to formal education, further research needed to verify the learning outcomes of MOOCs in terms of gaining skills and knowledge to be applicable for further education or employability.

Until now, MOOC research has been mainly (or exclusively) focused on higher education. In the literature, we may not find so much empirical research that has addressed the issues of implementing MOOCs on other levels of education (primary to secondary, continuing education in the professions). It is conceived that primary to secondary education is mandatory in many countries through school or other formal education systems and that online learning offerings such as MOOCs might not fit well with the school curriculum particularly primary education. Nevertheless, it will be worth experimenting with MOOCs in secondary education for some subjects and exploring the students' experiences. One way to address this is blended MOOCs in which MOOCs are used outside the classroom as homework;

then when students are at school, they use class time to have further discussions on the topics, and engage in group projects and problem solving (LaMartina, 2013). Conducting these blended learning experiments that can involve teachers, instructional designers, and educational policymakers in designing and evaluating would contribute to the knowledge of cross-boundary learning and how school can be connected with home.

This study was limited to experiences of learners and did not include course instructors and facilitators. Future studies, however, can combine the issues of both MOOC learners and instructors and their interactions (learner-instructor interaction). Much of the recent MOOC research has focused on learner's perspectives, and no or little research has investigated course the viewpoints of facilitators and instructors. A comparative study on course designers/creators and instructors in xMOOCs and cMOOCs could be conducted to determine what it takes to design and prepare curriculum and content in terms of pedagogical issues and technical considerations. It would also be useful to examine their experiences and perceptions throughout the course of leading and interacting with participants. This would add knowledge to CoI teaching presence and learner-instructor interaction (Study IV).

7.5 Conclusion and implications

This study described the dynamics of learning and participation in cMOOCs and highlighted challenging design considerations and pedagogical issues of MOOCs. The empirical evidence of the sub-studies combined with a detailed analysis of literature on open education, OER and OEP, shed light on the pedagogical conceptualizations and design configurations of MOOCs (with a focus on cMOOCs). Clearly connectivist MOOCs have the potential to trigger disruption in online learning by combining pedagogical models and technological affordances to design learner-centered ecologies. In the ONLE framework of cMOOCs technology and tools provide social and pedagogical affordances that help learners regulate their learning processes on both the individual and social level. Underlining the potential of emerging technologies in fulfilling this, learner autonomy and control in forming their learning experiences, and appropriate learning design that fosters interactivity are essential in open online learning. This means that cMOOCs as a learner-centered ONLE can act as change agents or enablers in transforming the control of learning environments from institutions to learners through creating technology-rich environments that connect informal and formal learning experiences.

The study subscribes and lends support to the knowledge and pedagogy of open online learning. Firstly, the findings are authentic representations of the nature of learners' experiences and interactions in the ecology of connectivist

MOOCs from an insider's point of view. Secondly, the conceptualization of an ONLE that recounts the ecological principles of learning design to promote a user-centric, technology-supported learning environment on the assumptions of personalized and networked learning that facilitates learners' engagement across contexts. In short, the contribution of this study is two-fold: theoretically, it introduces a learner-centric ecology of connectivist MOOCs based on the empirical results and theoretical investigations that promotes autonomy, interactivity and connectivity. Methodologically, its novelty rests in online ethnography as a pragmatist research method that was developed and proved to be a useful method of inquiry to explore the dynamics of open online learning.

Although technology has lowered the threshold for engagement in informal learning, and online learning in higher education is moving towards open sourcing as we can observe in the format of MOOCs, the question of applicability to formal education lingers. Some question how we can effectively teach thousands of learners simultaneously online (Siemens, 2015), keep them motivated to learn authentically and retain the considerations of pedagogical excellence. I argue that while the openness and massiveness aspects of MOOCs are equally important what makes the MOOC format innovative and disruptive is the pedagogies that underpin it. From the connectivist MOOC experiences described in this study, interactivity, learner-centeredness, connectedness/interactivity, and adaptivity are the main characteristics of a learning innovation that might transform learning practices. Pedagogical effectiveness at scale (for instance regarding xMOOCs from Coursera) is an issue that must be addressed through further investigation. As Kalz, Khalil, & Ebner (2017) discuss, for MOOCs the most challenging aspects are scalability of support and the integration of new technologies into instructional design of open learning environments.

Many researchers argue that technology does not merely support learning nor transform educational practices disruptively unless it is pedagogically-sound implemented (e.g., Lipponen, 2001; Säljö, 2010). Technology is not neutral, nor is it automatically enabling or hindering; rather its effectiveness depends on the purpose and application. As said, conversations about the potential of technology are often positioned at either side of the "technophilia and dystopia" spectrum: uncritical acceptance or condemnation (p. 20). Thus, for understanding what technology can afford to transform our teaching and learning practices, we should have a balanced and pedagogically-informed approach that not to be naively passionate about technology nor be too skeptic. Arguably, ecological perspective, at least metaphorically as Nardi O'Day discuss, is a useful approach to learning design that is derived from affordances of technology, and values learners' (users') roles and decisions in utilizing tools in the processes of learning and communication. As such, cMOOCs, meaningfully combine technology and pedagogy to create an ecology that is learner-centric and stimulates social interaction and connectivity.

This study provides implications for the practice and pedagogy of MOOCs in a number of ways. First, it will provide universities and higher education institutions with knowledge of how to consider learners' needs when offering open online courses. Second, course designers, educational technologists, and MOOC developers may better comprehend technical and pedagogical issues in designing open online courses in light of the pedagogical effects of the technologies. Third, higher education students will be helped by understanding the dynamics and requirements of participation in MOOCs, many of which may well enrich their learning experience. Fourth, educational policymakers will learn to contemplate the demands and complexities of today's learners and socio-technological learning provisions in their strategic plans. Finally, this thesis adds another argument in the ongoing theoretical debates and research about MOOCs and the future of open, networked learning.

To close, I want to quote a conclusion made by a symposium of international higher education institutions about the impacts of MOOCs on higher education:

> Higher education is going digital, responding to the architecture of knowledge in a digital age, and MOOCs, while heavily criticized, have proven a much-needed catalyst for the development of progressive programs that respond to the changing world…. As we enter fully into the knowledge age, the relevance of universities will only increase, provided that faculty and leaders are able to create a compelling vision for higher education that serves the needs of all learners in society. The specific tools, services and experiences of a traditional higher education will continue to be unbundled by a range of companies and startups. It's up to colleges and universities—cornerstones of democracy—to rebundle and re-integrate these new elements in a way that embodies the high ideals of education with the practical life-long learning needs of individuals. (Salisbury, 2014)

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