ANALYZING THE IMPACT OF MOBILE ACCESS ON LEARNER INTERACTIONS IN A MOOC

BY

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION (MEd)

CENTRE FOR DISTANCE EDUCATION

ATHABASCA UNIVERSITY

JANUARY 2013

Athabasca University
FACULTY OF GRADUATE STUDIES

Approval of Thesis

The undersigned certify that they have read the thesis entitled

"Analyzing the Impact of Mobile Access on Learner Interactions in a MOOC"

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In partial fulfillment of the requirements for the degree of

Master of Education (MEd)

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Feb. 06, 2013

Abstract

As mobile access and massive open online courses (MOOCs) become a global reality, the realm of potential distance learners is expanding rapidly. Mobile learning (mLearning) as well as MOOCs are based on similar characteristics as shown in the literature review of this study. They both enhance a community feeling, increasing networking and collaboration; they strengthen lifelong and informal learning, they use social media to a large extend and they are ideal for setting up communicative dialogues. The focus on learner interactions is of interest, as research has shown that dialogue is an important element for learning and knowledge enhancement, and mobile access increases the opportunities to enter into such interactions. This thesis study used a sequential explanatory mixed methods approach to investigate the impact of mobile accessibility on learner interaction in a MOOC. The study showed that opening up a MOOC for mobile access has immediate impact on learner interactions, as participants with mobile devices tend to interact more with their fellow learners in comparison to their non-mobile colleagues. This was deduced from the mixed methods approach looking at web-based statistics, an online survey, an analysis using the Community of Inquiry framework and one-on-one interviews with volunteers.

The study formulated a set of 20 strategies and possible consequences deriving from the analysis of the impact of mobile accessibility in a MOOC and more specifically how this affects learner interactions. These strategies might optimize the impact of mobile access on learner interactions in an informal, open, online course. Future research needs to support the findings, embracing a larger learner population from a more varied background. Overall, this research hopes to add to the body of knowledge strengthening the field of distance education.

Acknowledgment

Athabasca University is an inspiring and motivational university. The whole of the Athabasca University community provides all of its learners fruitful, rich learning environment. Special thanks goes out to my supervisor, Dr. Mohamed Ally, for his guidance, as well as Dr. Martha Cleveland-Innes for her clear insights and remarks as a valuable committee member in realizing this research study.

But deciding to move on and explore one's own potential happens long before any academic environments are entered. In spite of a wonderful, inspiring youth, I have given my parents lots of worries and doubts. With obtaining this degree I hope to compensate for a bit of their grey hairs. Thank you mom for always being there even in the toughest of times, and thank you dad for showing me that any wild idea is worth pursuing. My sister Amber has inspired me since she was born, her seemingly introvert yet passionate drive pushed me to live up to her example and push myself a bit further as well. And thank you to my complete, big and diverse family: relentlessly dancing their way through life!

A huge thank you to my online and offline friends stimulating me all the way through and of course a special note to all my MobiMOOC friends: to new and lasting networks. With a special mention to the motivational Adele Botha, the meticulous Lutz Siemer and the inspiring Angie Popova for repeatedly verifying my thought processes and data analysis.

And last but by no means least, I am grateful for all the love in my life. Every day love makes achieving goals so much easier and so much more fulfilling. Thank you Isaak and Ciska. It is an honor to be surrounded by so many talented and warm-hearted people. You inspire me!

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List of Symbols, Abbreviations and Nomenclature

BYOD – Bring Your Own Device

CoI - Community of Inquiry.

mLearning – mobile learning.

MobiMOOC – Massive Open Online Course on mobile learning.

MOOC – Massive Open Online Course.

OER – Open Educational Resources.

Chapter I - Introduction

"We are living through one of the recurring periods in world history when far-reaching changes in economics, culture, and technology raise basic questions about the production, preservation, and transmission of knowledge" (McNeely and Wolverton, 2008, p. 7). Part of the current technological and methodological change affects education and training. Since 2005 the worldwide rise of mobile devices, social media and learning that is facilitated by new mobile and social technologies, has grown exponentially (Johnson et al., 2010). With the recent rise of new educational forms (both instructional and technological) new research is emerging to study the impact and dynamics of these new technologies and ways of instruction.

This mixed methods study combines two types of new educational learning/teaching formats to investigate a possible diversification in learner interactions. The two learning/teaching formats are: 1) the open, online course which embeds social media as a way to enhance peer-to-peer interactions, specifically the Massive Open Online Course (MOOC) format, and 2) mobile learning (mLearning). The reason for combining these two contemporary educational approaches is to investigate whether or not learner interactions are impacted by enabling mobile access to a MOOC. The learner interactions will be investigated making use of an adapted Community of Inquiry (CoI) framework. The learner interactions under investigation using the CoI will be: social presence (personal interactions between course participants) and cognitive presence (cognitive, academic or intellectual interactions between participants). In addition to the CoI, other data will be screened: web analytics, an online survey to get an

idea of possible influences and last but not least one-on-one interviews to build towards a set of meaningful strategies related to the impact of mobile access on learner interactions in a MOOC.

This study will take an in-depth look at the driving factors behind learner interactions in a mobile enabled course which is rich in social media tools. At the end of this study a set of strategies are presented that propose factors to optimize learner interactions in a ubiquitous, open, online course. Never before has a study investigated the impact of mobile access on MOOCs at the learner interaction level. Such a study is of interest, due to the novelty of these types of online learning options, and the fact that these formats are taken up in a variety of online settings. mLearning and MOOCs also share similar characteristics, as will be described in the literature review, which makes them interesting study objects.

Significance of the Research

This study is significant in contributing to the underdeveloped area of mLearning research related to the effect on learner interactions by adding voluntary mobile access to an informal, open online course. Additionally, the conclusions that derived from the study add to the research covering the CoI framework developed by Garrison, Anderson and Archer (2000) as part of the data analysis focused on social versus cognitive/academic learner interactions in an online course environment as they appeared in both sample groups (mobile device users and non-mobile device users). The analysis performed in this study gave rise to strategies suggesting how a MOOC can be optimized to increase learner interactions. The study also formulated future research in this area based upon its findings.

The main significance of this study was in the fact that no existing studies had explored the learner interactions of adult learners that access a MOOC or an open, online course with mobile devices compared to adult learners that do not make use of mobile devices to access a social media enhanced course. Knowledge and understanding of the factors affecting learner participation in ubiquitous learning environments provided additional insight into ubiquitous MOOC design to create an optimal learner course environment.

Research of this kind could be significant to instructional designers and course coordinators contemplating on constructing an informal, open, online course or MOOC that is ubiquitous in access. It can also be significant to adult learners themselves, both with regard to necessary skills to take into account as well as possible options for increased interaction. Knowing the impact of ubiquitous access on learner participation, results in possible guidelines for adult learners to increase their success rate for completing such courses. From the methodological perspective, this study added to mixed methods research by elaborating procedural issues of the sequential explanatory design, and connecting the quantitative and qualitative data within a study and integrating the results of two sequential phases of the study into a set of strategies derived from the research question and consequent research.

Definition of Terms

Community of Inquiry (CoI).

A CoI is an educational community of inquiry which is a group of individuals who collaboratively engage in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding, as described by Dewey (1938).

Learner community.

During this study the idea of community came forward as one of the key elements for learner interactions to take place. In this study the simple, yet spot on definition of Cross (1998) is followed: "groups of people engaged in intellectual interaction for the purpose of learning" (p. 1). The reason for choosing this definition, is because Cross already links the idea of a learner community to connectivity and connectedness. In addition to this she emphasizes intellectual interaction which also act as a core driver for learner interactions as will be seen further down this study.

Learner interaction.

The term 'learner interaction' refers to all interactions that are undertaken by (adult) learners. These interactions can cover any content (social and/or intellectual/academic) and are reflected in written dialogues and or discussions, connecting to other participants via social media commenting, engaging in informal information exchange, or simply communicating.

Massive Open Online Course (MOOC).

The term Massive Open Online Course or MOOC was first mentioned by two separate individuals: Bryan Alexander and Dave Cormier. The concepts behind and the actual realization of MOOCs were first introduced by Stephen Downes and George Siemens as they were building a course format to fit with the theory of connectivism; this course came to be known as Connectivism and Connective Knowledge (CCK) which first ran for the first time in 2008. "In connectivism, the starting point for learning occurs when knowledge is actuated through the process of a learner connecting to and feeding information into a learning community" (Kop & Hill, 2008, p. 2). To date two different types of MOOC are put forward:

connectivist MOOCs and xMOOCs. The difference between these two being that the design and dynamics of an xMOOC (put forward by Udacity, Coursera, a.o., dated 2012) is (currently) more behaviorist in approach, more formal and more oriented towards formal knowledge gains. Whereas connectivist MOOCs or cMOOCs have a more informal dynamic based on enabling the course participants to connect with each other, enter into dialogue in search of their own knowledge needs. The MOOC used in this study is a cMOOC.

A connectivist MOOC uses social media extensively to build the ad hoc learner community and to allow discussions and resulting learning to take place. The fact that a lot of social media are used increases the content that is created, which in turn demands the participants in a MOOC to be more experienced in self-regulated learning or pacing their own learning. This open architecture also allows the course to reshape during the course itself. A MOOC can be seen as a complex system which, in order to survive and develop, is continuously in search of new ways to interpret the events of the external world and which, as a consequence of the feedback it receives from the environment regarding its actions, self-organizes, displaying emergent properties, so as to render its interaction with the environment in which it finds itself (Bertuglia, 2005).

One note needs to be added to the word ‘Massive’ used in the general MOOC description. The principal investigator hesitated to use the term ‘Massive’, as this is an unclear term comprising an indescribable number of participants. However, when thinking about leaving this word in or taking it out, the principal investigator choose to leave it in. This choice was based on the fact that the term MOOC is above all referring to a pedagogical model with independent learners, access to information, opportunity to create emerging, spontaneous, yet not

directed learning communities, etcetera. As such the term MOOC can be seen as an new educational term.

Mobile devices.

This research looked at the difference in learner interactions depending on the devices used to access an open, online course. For the purpose of this research mobile devices are defined as those devices that are personal, portable and are connected to the internet on the go. As such mobile devices are all devices except fixed location computers (e.g. desktops). Any other devices (tablets, smartphones, wifi-enabled portable devices (e.g. iPod), wap-enabled cell-phones, netbooks,… are seen as mobile devices.

Mobile learning (mLearning).

It is only in the last few years that the full capacity of mLearning is starting to take shape and ubiquity has become a reality. This evolution in learning with mobile devices has resulted in different definitions of mLearning which evolved over time taking into account its most recent developments and understandings. mLearning is defined here as "learning across multiple contexts, through social and content interactions, using personal electronic devices" (Crompton, 2012).

MobiMOOC.

MobiMOOC is a MOOC on mLearning that has been organized in 2011 and 2012 and featured 14 mLearning topics. The course was fully accessible online and optimized for mobile access. The course wiki can be visited at http://mobimooc.wikispaces.com .

Ubiquity.

The term ubiquity as used in the study will follow the definition of Cope & Kalantzis (2008): "ubiquitous learning is a new educational paradigm made

possible in part by the affordances of digital media" (p. 2). The term also incorporates mobile learning, or learning with a variety of devices as explained by Caballé (2010) “ubiquity and pervasiveness are essential requirements to support formal and informal learning and to allow all learning community members, from a variety of locations, to cooperate with each other by means of a large variety of technology-enhanced equipment” (p. 39).

Theoretical Foundation for the Proposed Research

While looking for a possible research subject, a literature search was done to get an idea of contemporary challenges with regard to mobile learning and learning aspects. This resulted in a set of challenges put forward by a number of mLearning and Community of Inquiry (CoI) researchers that are relevant to the study at hand.

mLearning challenges.

Peng (2009) indicated the need for researchers “to conduct research on the effects of ubiquitous computing” (p. 11). However this challenge covered too much ground. Clough (2009) focused on informal learning and based on her research she concluded that “future research into mobile learning needs to take account of the role of mobile technology in supporting collaborative and constructivist learning over a wider geographical and social context” (p. 131). Her focus on a wider geographical and social context can relate to the MOOC format as these types of courses have attracted and will attract a global audience with a diverse professional and personal background (Fini, 2009).

Kukulska-Hulme et al. (2009) stated that “research attention should be directed at identifying those simple things that technology does extremely and uniquely well” (p. 9) and they cited Roschelle (2003) adding that it is equally

important “to understand the social practices by which those new affordances become powerful educational interventions” (p.268). In addition Kukulska-Hulme et al. mentioned that “moving the focus away from the mobile technology and towards the social practice it enables, allows for a different conceptualization of mobile learning” (p. 9) and they concluded saying that researchers in mobile and ubiquitous learning will be keen to tackle the new challenges arising from learner activity across multiple virtual and physical contexts, spanning formal and informal learning.

Looi et al. (2010) brought learner curiosity and social spaces together when he mentioned that “the challenge is to enable learners to learn whenever they are curious and seamlessly switch between different contexts, such as between formal and informal contexts and between individual and social learning, and by extending the social spaces in which learners interact with each other” (p. 1). Hence, it will be interesting to look at an informal learning environment that allows different social learner interactions to take place.

Frohberg et al. (2009) screened 1469 publications (570 papers of mobile learning conferences and 887 papers of journals) and categorized 102 mobile projects that were happening up to 2007. They came to the conclusion that “although a significant number of [mobile] projects have ventured to incorporate the physical context into the learning experience, few projects include a socializing context” (p. 1) and they went on stating that “despite the fact that mobile phones initially started as a communication device, communication and collaboration play a surprisingly small role in Mobile Learning projects” (p. 1).

The fact that experienced adult learners would be the target population of the study, also had an added bonus when looking at mobile projects from the past.

Frohberg et al. (2009) concluded that "there is hardly any conventional support for learners that have already reached a trained level and who want to advance. In their continuously evolving context, they have a lack of means and instruments to reflect and process their knowledge, to record and share their insights with others who are not physically present, and to create material to work with in a self-reflecting or cooperative process. To position Mobile Learning in this niche would facilitate an innovative learning support that was not possible before and thus establish an immediate value" (p. 16).

CoI challenges.

Next to the challenges put forward by mLearning researchers, there is also research to be done in the realm of the Community of Inquiry (CoI) framework. The CoI is of interest to analyze and interpret learner interactions, as such the CoI will be used for the purpose of quantitative data analysis in this research for it enables learner interactions that populate quantitative data to be meaningfully analyzed according to the type of interaction taking place. The CoI framework is a process model that provides a comprehensive theoretical model that can inform research on online learning. It assumes that effective online learning requires the development of a community (Rovai, 2002; Thompson & MacDonald, 2005; Shea, 2006) that supports meaningful inquiry and deep learning. Specifically with regard to online interactions that relate to the cognitive presence Swan et al. (2008) mentioned a research gap: "cognitive presence may be the least researched and understood of the three presences: cognitive, social and teaching [covered by the CoI], yet it is cognitive presence that goes to the heart of a community of inquiry" (p. 5). Part of the analysis done in this research looked at both social and cognitive interactions undertaken by course participants that do and do not use mobile

devices to interact in an open, online course. This analysis is part of phase 1 and the results will be taken into phase 2.

Given all these research challenges and suggestions, it is the researcher's belief that this study will add to the overall knowledge of the distance education field.

Chapter II: Review of Literature

The scope of this literature review is to look for similarities between mLearning and MOOC characteristics, especially focusing on learning and communication as these are linked to learner interactions.

The Research Literature Specific to the Proposal

In the following section a selection of the above mentioned literature is analyzed, selected and combined on the basis of its relevance to this research study. The literature review links mLearning and the MOOC course format as an ideal combination to research the learner dynamics, because as mentioned by de Waard, Abajian, Gallagher, Hogue, Özdamar Keskin, Koutropoulos and Rodriguez (2011) a MOOC complements all the educational changes and mLearning offers the devices and characteristics to realize contemporary educational changes.

The methodologies covering the research literature are quite diverse: case studies, conceptual frameworks, grounded theories, and in those qualitative data, quantitative data gathering and sometimes mixed methods are used. In order to find relevant literature, all of the databases made accessible through the library service of Athabasca University were queried on the terms of mobile learning, learner interactions, MOOC, open online courses and mobile social media, in a variety of combinations. This led to numerous results which were then screened on the basis

of their citations in other research journals or publications, and filtered on the basis of the renowned expertise of the authors on those particular subject areas.

The literature review is divided into subsections focusing on a specific parallel characteristics between MOOCs and mLearning.

Drivers for building a community for networking and collaboration.

According to Siemens (2005) learning is now happening "through communities of practice, personal networks" in an environment in which "know-how and know-what is being supplemented with know-where (the understanding of where to find knowledge needed)" (p. 4). mLearning facilitates this know-where understanding of knowledge by connecting learners, information, and tools at a point and time of the learner's choosing.

The strengthening factor of learners being connected has been mentioned by mLearning researchers. From the PDA research conducted by Clough, Jones, McAndrew and Scanlon (2009) "collaboration emerged as a key theme" (p. 110). Alexander (2004) envisioned networked learning and he linked it to mLearning: "the socializing powers of mobility and wirelessness could expand this drive into collaboration" (p. 32). Laurillard (2007) drew up what she called a 'conversational framework' which transcends mLearning as a pedagogical format. When she listed the main characteristics she mentioned peer collaboration and claimed that: "1- learners will be motivated to improve their practice if they can share their outputs with peers; 2- and will be motivated to improve their practice and augment their conceptual understanding if they can reflect on their experience by discussing their outputs with peers" (p. 161). But of course this means that "learners also need to have the necessary reflective skills to be able to identify and understand the

differences between themselves and their dialogue partners" (p. 3) as mentioned by Rajagopal (2011).

Naismith et al. (2004) noted that "mobile technologies are becoming more embedded, ubiquitous and networked, with enhanced capabilities for rich social interactions, context awareness and internet connectivity" (p. 5). In all these cases one can wonder whether these characteristics ascribed to mLearning would not also happen in non-mobile accessible courses or learning environments, as the web - as well as Web2.0 technologies - enables being connected and collaborate with others. For if we look at research into open online courses, characteristic similarities related to time and location independence and contextuality are put forward as well, just like in mLearning research.

So when looking at the characteristics of mLearning and specifically to the added advantages of mLearning the question arises whether these characteristics are really so restricted to mobile learning? And more interestingly, whether the addition of mobile access has an impact on learner interactions. As such it is of interest to see how this networking and collaboration actually works for a mixed group of mobile web and classic web users. And to compare the learner interactions for learners that do use mobile devices for interactions, and those who do not.

How mLearning and MOOCs strengthen lifelong and informal learning.

Lifelong learning is a concept with increased interest in this knowledge age. Mike Sharples (2000) referred to learning as "a process of mental and social change over an entire lifetime" (p. 192). He went on to state that new technology offered the opportunity to communicate with fellow learners around the world, to

interact with rich learning resources and simulated environments. And although Sharples was talking on the subject of mobile learning, at this day and age his conclusions fit a much wider variety of educational technologies.

Bessenyei (2008) considers learning in an open learning environment to be a process in which the role of informal information exchange is organized and supported with electronic tools. With regard to informal learning Bessenyei posed the question "how are students able, independently or organized into networks, through the exchange of thoughts and with the help of the tools of the internet (wikis, blogs, forums), to contextualize and connect according to individual needs, information originating from different sources?" (p. 8). Fini (2009) focused on the technological aspects of a MOOC course, specifically the first Connectivism and Connective Knowledge course (CCK08). Fini investigated lifelong learner's attitudes towards learning network technologies, digging into the participants view towards using a variety of Web2.0 tools.

Bell (2011), looking at Technology Enhanced Learning, mentioned that "online presence also helps us to acknowledge the informal learning that has always taken place outside the classroom, in the workplace and at home… web-enabled learning is undertaken by individuals as independent, informal learners, often within a social setting" (p. 100).

This ability to fit informal learning is also recognized in mLearning. Clough et al. (2009) showed that a "population of mobile device users use their devices to support a wide range of informal learning activities" (p. 109). Clough et al. selected a target population for their research that was already using mobile devices in an advanced way, enabling them to look at the high-end of informal learning that could be supported by mobile devices and not be restrained by people not knowing

all the capacities of mobile devices for learning. Naismith et al (2004) dug deeper into the characteristics of mLearning specifically in lifelong learning settings: "research on informal and lifelong learning recognizes that learning happens all of the time and is influenced both by our environment and the particular situations we are faced with" (p. 3). In her mLearning framework, Laurillard (2007) built a bridge between context and informal learning, as she raised the question of the "extent to which the 'continuity between contexts' feature of m-learning, can provide continuity between formal and informal learning contexts". She went on stating that the idea of a 'learner-generated context' is an important one for giving learners a sense of ownership and control over their learning, but formal and informal learning involve very different 'contexts' for learning" (p. 169).

Informal learning is closely knit to contextualized learning in the above mentioned literature. Mobile learning was set at its center, but again one can doubt the surplus of mobile learning as opposed to web-enabled learning for the subject of informal learning. Does the fact that mobiles are used, really enhance learner interactions, or is this simply due to the all-round accessibility and social media features of an informal, open, online course?

Social media or Web2.0 tools.

"The rapid development of technology and exponential growth in the use of the Internet, along with the Web 2.0 and mobile developments, make new and different educational structures, organizations, and settings a possibility" (Kop & Hill, 2008, p. 9). In their theoretical paper Williams, Karousou and Mackness (2011) situated emergent learning within the broader learning ecology of Web2.0 while linking it to the CCK08 MOOC, emphasizing its unprecedented opportunities and affordances. They added that "the CCK08 course was an experiment in

emergent learning, based on the radically different affordances of Web2.0" (p. 53). But there is a note of attention to be added to the mere availability of social media, for as Ally and Palalas (2011) mentioned: "an important issue that came out of this [our] study is the unavailability of mobile learning materials and models for developing mobile learning materials" (p. 46). So having these types of tools does not necessarily enable content creation, yet within MOOCs the use of social media has led to content creation and as such it is of interest for shared content creation is a learner interaction.

Social media tools are being increasingly used in MOOCs and mLearning courses. The social media tools have a profound effect on pedagogical implications as mentioned by Carsten et al. (2008). The most profound pedagogical changes introduced to the teaching/learning process according are: the social dimension captured by the harnessing of collective intelligence, and the fact that the Web2.0 enables and facilitates the active participation of each user as put forward by Carsten et al. (2008) and Shriram and Warner (2010). Clough et al. (2009) also referred to social media, they wrote that "collaborative activities generally occurred through the sharing of data in some way, usually by uploading it onto a central server hosting a web forum, wiki, or blog" (p. 105). This important shift in pedagogical implications is also mentioned by Downes (2005) "the Web was shifting from being a medium, in which information was transmitted and consumed, into being a platform, in which content was created, shared remixed, repurposed, and passed along" (par.21).

McElvaney and Berge (2010) listed a wide variety of social media tools and linked them to their educational potential. The author's listed the mobile, social media tools as well: "the majority of personal web technologies have mobile–

friendly versions available, allowing individuals to take their learning to go" (p. 8). They add to this by mentioning that "mobile versions of personal web technologies give learners more option on where and when to learn" (p. 8).

Cochrane (2010) outlines a pedagogical framework for mobile teaching and its alignment with web2.0 social software in his reflective action research. He stated that "M-learning (mobile learning) technologies provide the ability to engage in learning conversations between students and lecturers, between student peers, students and subject experts, and students and authentic environments within any context" (p. 2).

As deducible from the above mentioned literature social media tools are now accessible for mobile web as well as classic web devices, as these realms meet in a MOOC, research to see if learning happens across these divides and whether distinctions can be noted, would be of interest.

mLearning and MOOCs: setting up communicative dialogues.

While looking at mLearning and MOOCs, it is clear that even though knowledge can be seen as residing in both humans and non-human appliances, it is what we do with that knowledge, and how we construct new knowledge, that is important. Constructing knowledge is seen by some experts as a social action. Freire and Macedo (1999) expressed it nicely when they stated that: "I engage in dialogue because I recognize the social and not merely the individualistic character of knowing" (p. 48). This is also where a Vygotskian perspective is quite useful. According to Vygotsky (Nassaji & Swain, 2000), knowledge is social in nature and is constructed through a process of collaboration, interaction and communication among learners in social settings. Through a process of collective scaffolding (Lantolf & Appel, 1994) participants in open, online courses expand their

understanding of the subject matter. In order for this to happen, dialogue must take place.

Dialogue is also a distinct part of distance education overall. Garrison (2009) pointed out that "the need to make sense of complexity is compounded in the context of distance education" (p. 13). He continued to write that "this adaptability in designing the educational transaction based upon sustained communication and collaborative experiences reflects the essence of the postindustrial era of distance education" (p. 13). Communication, or dialogue, and living through experiences in a collaborative way are central to the idea of a MOOC.

The same can be said about mLearning. "Mobile technologies are redefining models of learning that often rest on a Socratic or dialogic base" (Traxler, 2010, p. 13). This adds to the idea of Sharples (2005) who said that learning is a conversation in context. de Waard and Kiyan (2010) wrote that with mobile devices the learning environment is enhanced and ability to share knowledge through online discussion is strengthened through social media. The sharing of experiences in a network facilitates the transformation of learning outcomes into permanent and valuable knowledge assets". Ally (2008) added to this by pointing out that "there should be interaction between the learner and other learners, … to collaborate, participate in shared cognition, form social networks, and establish social presence. Learners should be able to interact within their context to personalize information and construct their own meaning" (p. 38). Which adds to the topic of this study. This shift towards learner-centered interactions is not only linked to innovative, contemporary tools, but also to the move towards the cloud. As indicated by de Waard (2013): by using emerging

technologies and pedagogies the course design allows learning to take place in the cloud and being directed by the learners. Ally (2008) also added knowledge creation to this move towards learner-centered courses, when he wrote that "there is a shift toward constructive learning, in which learners are given the opportunity to construct their own meaning from the information presented during the online sessions" (p. 39). Overall adding mobile access to a course environment has the potential to increase learning. Koole, McQuilkin and Ally (2010) referred to this by linking access to dialogue:

> "Mobile devices allow learners to more easily carry reference and communication tools with them into real-world environments. This flexibility permits frequent dialogue with experts and peers, just-in-time retrieval of information, documentation of personal experiences, and integration of course-based knowledge into aspects of the learners' daily lives-all permitting learners to receive feedback and assess their progress" (p. 3).

Both MOOCs and mLearning support dialogues which are an integral part of learner interactions. It is of interest to see if those dialogues have a different dynamic when looking at learners that do or do not use mobile devices to enter the conversations.

Summary of Literature

In the reviewed literature four subsections related to learner interactions were addressed. In each of these subsections parallel characteristics between MOOCs and mLearning were found. It must be said that mLearning has been much wider researched than MOOCs, as such the literature is much more profoundly

rooted in research traditions and methods. Nevertheless it could be concluded that both mLearning and MOOCs are beneficiary for:

- Building a community for networking and collaboration
- Strengthening lifelong and informal learning
- Interactions stimulated via social media tools
- Setting up communicative dialogues

If these four learning interactions are to be found in both MOOCs and mLearning characteristics, it is of interest to research the specific impact of mobile accessibility in an informal, open, online course.

Chapter III: Research Methodology

Research Design

This study uses a sequential explanatory mixed methods design, which is a procedure for collecting, analyzing and "mixing" both quantitative and qualitative data at some stage of the research process within a single study, to understand a research problem more completely (Creswell, 2009). The rationale for mixing is that neither quantitative nor qualitative methods are sufficient by themselves to capture the trends and details of the study at hand. When used in combination, quantitative and qualitative methods complement each other and allow for more complete analysis (Tashakkori & Teddlie, 1998).

In quantitative research, the investigator relies on numerical data. The researcher isolates variables and causally relates them to determine the magnitude and frequency of relationships. In addition, the researcher determines which variables to investigate and chooses instruments, which will yield highly reliable and valid scores.

Alternatively, qualitative research is "means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures, data building from particulars to general themes, and the researcher making interpretations of the meaning of the data" (Creswell, 2009, p. 4).

This study will use the sequential explanatory mixed methods design, consisting of 2 sequential phases that follow each other (Creswell, 2009), the first being the quantitative phase, the second being the qualitative phase.

Purpose of the Research

The purpose of this sequential explanatory mixed methods study was to analyze learner interaction data and to come to a set of strategies deriving from the impact of mobile accessibility on learner interaction in an informal, open, online course or MOOC, provided that making a MOOC mobile accessible has in fact a positive effect on learner interactions. The learner interactions subject to this research are part of the interactions undertaken in an open, online course focusing on mLearning called MobiMOOC. In a first phase quantitative results were collected from surveying a sample of MobiMOOC participants (divided in two groups, one group that used mobile devices to access and interact with the course, and the second group who did not use mobile devices to interact or connect to the course). Web analytics of some of the course locations were included into this study to provide extra insights in the actual use of mobile devices to access course materials. An analysis of the interaction frequency of both target groups was also conducted, using the Community of Inquiry model to see if there was a distinction between the types of learner interactions based on the devices used by the learner. After this first phase the second phase started with purposefully selected

individuals that were interviewed related to their learning interactions in order to come to see if strategies could be distilled from the impact of mobile accessibility on learner interactions in a ubiquitous MOOC. These strategies could then later on be picked up to research how learner interactions in a MOOC can be optimized while using mobile access or mobile learning.

As such this study looked for factors that impacted the mobile and non-mobile learner participation in a ubiquitous, open, online course.

Research Questions

Central question.

How does mobile access impact learner interaction in a MOOC?

In this question ‘impact’ is the central word, which – in this case – refers to whether learner interactions in MOOCs change in any given direction (increase/decrease/stagnate) when a MOOC is made mobile enabled.

Sub-questions.

- Do course participants access a MOOC with their mobile devices if it is made mobile enabled?
- Is there a difference in learner interactions between mobile and non-mobile users in an open, online course / MOOC?
- How do the social versus cognitive academic interactions compare to each sample group?
- Which factors influence mobile access?
- What factors influence adult learners to engage in learner interactions in a MOOC?

Delimitations

There are two delimitations for this study:

1. The study is confined to the participants engaged in MobiMOOC2012 and the pilot project.
2. Participants' responses are reflections of, and confined to their personal experiences in MobiMOOC2012.

Limitations

Four limitations are of importance to this study:

1. Because this study made use of convenience sampling in the quantitative phase of the study and a purposeful sampling for the qualitative phase, the researcher cannot say with confidence the sample is representative of the overall population (Creswell, 2009).
2. There is a risk that part the sample group consisting of participants that volunteered to be part of the group that is not using mobile devices to connect to the course, will have made access to the course with a mobile device at a certain point. This can affect the data sampling.
3. Due to the nature of qualitative research, the data obtained in the second phase of the study may be subject to different interpretations by different readers, especially due to the novelty of both the technology and its definitions.
4. Because of the interpretative nature of the qualitative research, the investigator might have introduced her bias into the analysis of the findings. This could have happened because the researcher is part of the course as it rolled out and happened. To avoid or limit the effects of

bias other researchers were asked to help analyze the results of the qualitative data coding.

Target Population and Sample

The population of this study was delimited to the participants of MobiMOOC2012, a mobile accessible MOOC focusing on the topic of mLearning that lasted for three weeks and used a tree like course sequence (i.e. first week only one module, second week three modules, and during the third week participants will be able to choose between six mLearning topics to focus on). The course ran from 8 September until 30 September 2012.

There were 112 course participants engaging in learner interactions, but there was no way to count the amount of lurkers, or course participants that followed the course without taking actively part in any of the discussion areas. The online survey did however attract lurkers which showed that they were taking part in the course, though be it passively. There were 34 participants who completed the online survey. These course participants were divided into two groups relevant to this study, namely:

- 18 MobiMOOC participants that used a mobile devices to access and interact with other participants during the course.
- 16 MobiMOOC participants that did not use mobile devices to access or interact with materials or other participants during the course (they used desktop computers with an internet connection to connect to the course locations).

The assignment of MobiMOOC participants to either the mobile device using group, or the not-mobile device using group was done on basis of the mobile device definition used for the purpose of this research. In order to divide the sample

group into two groups, an indicative question was put into the survey that allowed the researcher to set-up a mobile and a non-mobile sample group for both phases of the research. The population for this study was approached during the first week of the course (week of 11 September 2012) with a request to be part of the research at hand. This request for participation was sent as a general announcement to the complete MobiMOOC participant group. All of the participants in this research study voluntarily signed the informed consent form.

As such the study made use of a convenience sample as well as a purposeful sample, but both representing only a portion of the total population. In the first (quantitative) phase of the study a convenience sample was used (volunteers taking the online survey), for the second phase of the research a purposeful selection of the population was chosen which resulted in a set of strategies and possible consequences coming from the analysis of the learner interactions as proposed at the end of this study.

The purposeful sample was selected as follows: for the second phase the researcher identified 14 participants who had volunteered to take part in the one-on-one interviews (14 participants equally balanced over both target groups) to achieve detail in the resulting strategies. These participants were selected from all of the volunteers based on their answer to one of the online survey questions, asking for their (self-indicated) participation in MobiMOOC, namely ‘intermediately active’. By selecting this group, the researcher hoped to have a comparable sample group for both the mobile and non-mobile users. Moving towards a set of strategies that will increase impact on learner interactions in a MOOC demanded several iterations and verifications built upon the results from the first interviews. As such a second round of with the research participants of

phase 2 was planned in order to be able to verify the first outcomes of the interviews regarding possibly strategies that can be written down, as put forward by the selected sample group.

Research Methods

This sequential, explanatory mixed methods approach consisted of 2 phases: one quantitative and one qualitative phase to come to a coherent set of strategies that derive from the analysis of the impact of mobile accessibility on learner interaction in a MOOC and lead up to consequences of implementing such strategies. This mixed methods study was proceeded by a pilot study to validate some of the research instruments and add to the validity of the research.

Pilot Study

A pilot study was undertaken prior to the above mentioned research to look for evidence for research interest and to develop and validate the survey instrument that was used in the qualitative part of the study.

Looking for mLearning facts in an open, online course.

In running up to this thesis study, the researcher and author of this thesis has rolled out a pilot study during MobiMOOC2011, which was a free, open, online course focusing on mLearning that lasted 6 weeks and focused on a diversity of mLearning topics. During the MobiMOOC2011 a first survey was sent to all the participants as a means to see whether participants did access the learning materials and/or course locations with their mobile devices. These are the relevant data related to the research study that is described in this thesis.

Figure 1 use of mobile device to access MobiMOOC course materials (n=44)

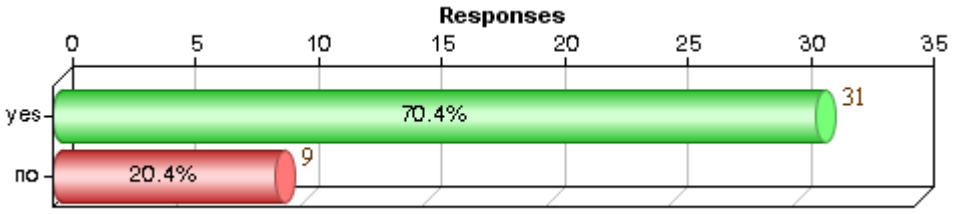


Figure 2 what was the reason to access the material with a mobile device? (n=44)

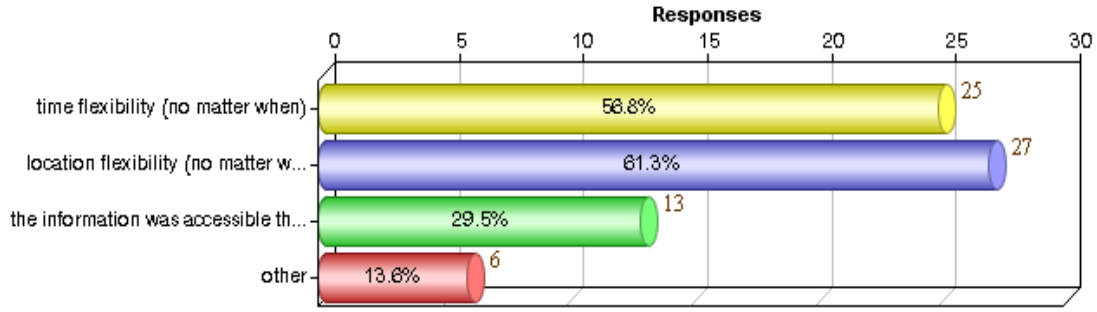


Figure 3 which MobiMOOC resources did you access via mobile? (n=44)

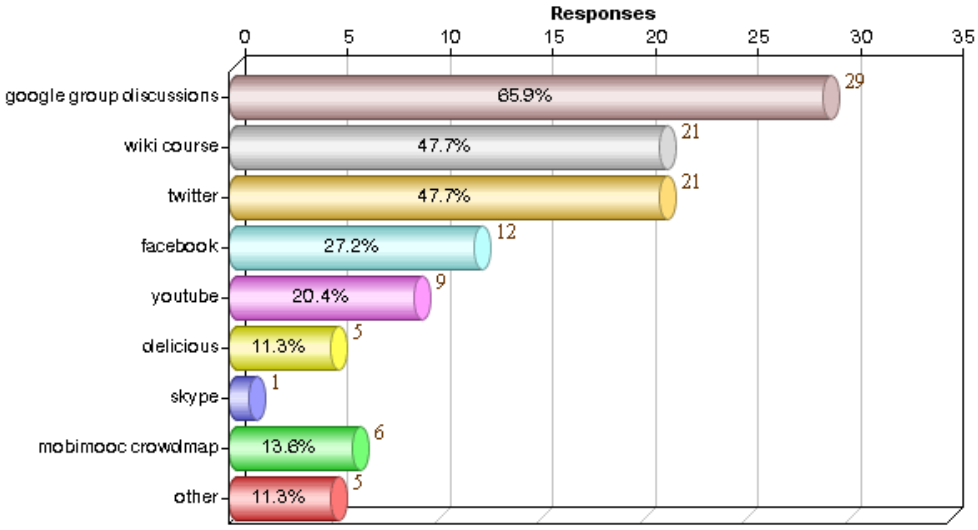


Figure 4 when you are given a choice of using a computer or a mobile device, how often do you choose the mobile device? (n=41)

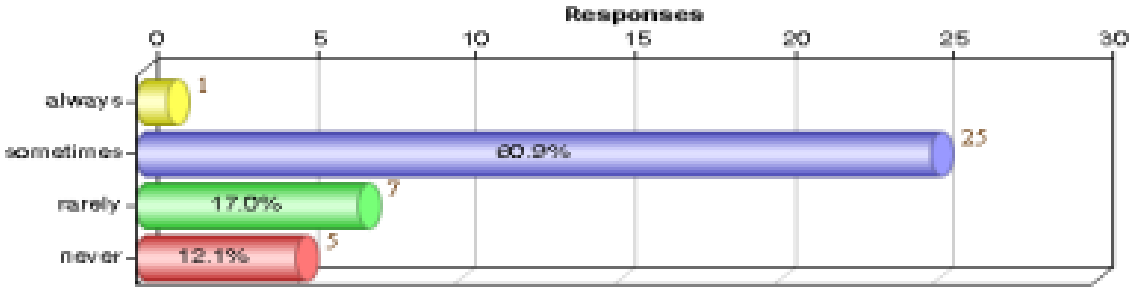
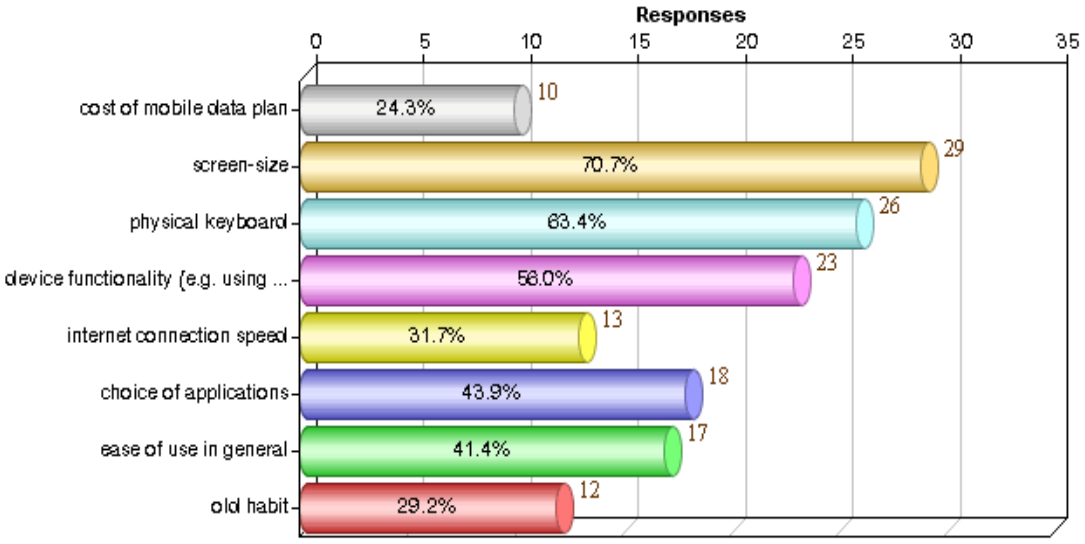


Figure 5 what factors influence the choice between a computer and a mobile device (n = 41)



Conclusions from the pilot study looking at mLearning interest.

Based on the results that came from the pilot study and that were shared in the figures 1 – 5, it was clear that participants engaged in the MobiMOOC course were indeed accessing the material through their mobile devices (70 % of the survey respondents indicated that they accessed the course with a mobile device at least once). The MobiMOOC2011 participants also indicated that they did access

different course locations, including those that were specifically aimed at interactions between learners (Google discussion group and course wiki). In addition to this the participants from the pilot study did indicate they had specific barriers or choices pushing them towards mobile or non-mobile use. This indication that learners did engage in learner interactions using their mobile devices resulted in the research question pertaining to this research study, namely: how does mobile accessibility impact the learner interactions of adult learners in an informal, open, online course?

The results coming out of the online survey linked to the pilot study also gave rise to a publication entitled "Merging MOOC and mLearning for Increased Learner Interactions" (de Waard, Koutropoulos, Hogue, Abajian, Keskin, Rodriguez and Gallagher, 2012) an upcoming publication in IJMBL expected in December 2012 for which the researcher of this research study took the lead in writing the paper and she opened up the paper to any MobiMOOC participant willing to co-author the paper. This publication can be seen as a forerunner of this thesis study, as it looks for parallel characteristics between mLearning and MOOCs as providers or stimulants for learner interactions.

Optimizing the online survey questionnaire.

Based on the survey written up during MobiMOOC2011, an adapted survey was written for the actual thesis study that had MobiMOOC2012 as its research environment. The adapted survey was sent to volunteering participants that had been involved in MobiMOOC2011 and that were willing to screen the survey for its mobile learning relevance and consistency during August 2012 (the survey validity test group). By delivering the adapted survey to some of the previous participants, it was possible to measure the utility and validity of the survey

instrument in view of its research perspective. Some anomalies requiring adjustment were provided as feedback, mainly pointing towards questions that could be optimized, adjusted or revise.

This is the list of questions that were adjusted based on the feedback from the survey validity test group.

- Have you followed an online course before? (Y/N)
- Where you able to self-regulated / organize your learning amidst the content and discussions that were/are shared in MobiMOOC? (MC) yes, not at first, but as I got into it yes, no)
- Which type of learner do you consider yourself to be? (MC: a lurking participant (passive but following), a moderately active participant, an active participant)
- Suggestions added to the mobile related questions.
- Adapting a mobile question to reflect the options of a previous question related to non-mobile interactions enabling comparison.
- Which type of learner interactions did you engage in during the course up to this point?
    - posting questions
    - answering questions,
    - writing blogposts
    - using twitter
    - sending emails to other participants
    - writing an mLearning project
    - informal chatting/writing
    - chat during WizIQ webinars

    - other (OA)

- For which type of learner interaction did you use a mobile device to engage in the interaction while adding content? (MA)
    - posting questions
    - answering questions,
    - writing blogposts
    - commenting on threads/posts/tweets
    - using twitter: tweeting to other participants
    - sending e-mail messages to other participants
    - collaborating on an mLearning project
    - informal chatting
    - chat during WizIQ webinars
    - other.

One addition to the online survey was only taken up partially in the final results of the survey. The following question: “Please arrange the social media that are used during MobiMOOC according to the frequency you accessed them with your mobile device(s), if you have not used some of these tools it will show up in the cross-reference with a question that came before:” was first added to the online survey. But once the MobiMOOC2012 participants started answering this question, it turned out that this question was not fully useful, as it did not offer a ‘I did not use this social media’ option. This change could not be made to the actual online survey, as by the time this remark surfaced, many participants had already answered that particular question. As such from this question only the most used tool was taken into account during the analysis of the survey.

Unexpected change to the online survey questions related to course design adaptation.

During MobiMOOC there was an unexpected factor that lead to rewriting some of the questions in the online survey. At the beginning of MobiMOOC2012 a discussion forum was build using a MyBB forum (www.mybb.com) . This type of software needs to be installed on a server, using php and MySQL software. This discussion forum was going to be used to centralize all the discussions in MobiMOOC2012 from week 2. Unfortunately the MyBB forum was spammed even before it was in full use. Actions were taken to reduce the spam affecting the forum, but to no avail. These anti-spam actions resulted in email accounts of the participants being marked as spam. As a result the MyBB discussion forum was taken down, and replaced as the course went on by different Google groups, each related to a specific mLearning topic. This shift of discussion forum to different discussion groups affected all the online survey questions that looked into learner interactions using the discussion forum. All the online survey questions were adapted, so the questions would ask for information on the Google discussion groups and not the discussion forum.

Following the above design alterations, tempted the author of this research to add a question to understand the possible effect of these mid-course design changes. The following question was added to the online survey: “What is your opinion on the fact that the design of MobiMOOC was adapted as the course went on? (OQ)”.

The optimized online survey questionnaire was used and rolled out to all participants in MobiMOOC2012 willing to engage in the online survey (survey questions, see appendix B).

Visual Model

Before sharing the quantitative and qualitative phases of the research, the visual model is shared in table 1 below, to give a better overview of all the steps undertaken by the researcher to investigate the impact of mobile access on learner interactions in a MOOC via a mixed methods approach.

Table 1 visual model of sequential explanatory mixed methods approach

Phase	Procedure	Products
Quantitative Data Collection	Cross-sectional web-based survey (n= 34) Distributed via www.formsite.com	Numeric data
Quantitative Data Analysis	Data screening of three different data collections: CoI, web statistics and online survey Frequencies SPSS quantitative software	Descriptive statistics Cross tabulation Web statistics CoI frequency
Case selection for Phase 2 (qualitative phase)	Purposefully selecting the participants for the qualitative phase	Qualitative sample group (n = 14)
Qualitative Data Collection	Individual in-depth online semi-structured interviews with 14 participants	Text data (interview transcripts) Multimedia data (recorded Skype video)
Qualitative Data Analysis	Coding and thematic analysis Listing a set of strategies and consequences based on qualitative data	Codes, themes, coding paradigm

	analysis consisting of three phases of coding: open, axial, and selective.	
Qualitative iteration	Putting forward the strategies that would impact learner interactions in a mobile accessible MOOC in phase 2 (member checking) via a second set of interviews.	Transcripts of interviews. Audio/video recordings. Feedback for adapting the strategies.
Interpretation of entire analysis	Explanation of the meaning of research results Writing up all the strategies	Strategies and consequences of embedding them Discussion Recommendations for future studies

Phase 1: Quantitative Phase

The goal of the quantitative phase was to identify learner interaction variables and mobile related statistics, and to allow for purposefully selecting voluntary respondents for the second phase. This phase consisted of collecting and analyzing data coming from three sources:

1. screening the learner analytics taking place in the central course discussion group by the Community of Inquiry framework to get an idea of the frequency of the social presence (personal interactions between

course participants) and cognitive presence (cognitive, academic or intellectual interactions between participants),

2. looking at web statistics from online course locations (specifically the course wiki and the course YouTube channel), and
3. getting an idea of potential differences in mobile and non-mobile learner interactions via an online survey.

Each data source will be described in function of the data collection and analysis, and at the end of each of the data processes, a sectional conclusion is given. At the end of phase 1 an overall conclusion for phase 1 is provided, which will be taken into the results part of this research study.

Community of Inquiry.

Arbaugh, Cleveland-Innes, Diaz, Garrison, Ice, Richardson and Swan (2008) encouraged "works that use the CoI as a dependent measure in comparing courses and the implementation of emerging technologies within courses" (p. 136) as such the CoI model was incorporated in this study.

Inquiry-based learning. The foundation of a CoI can be found in inquiry based learning. This particular type of learning is ideal for connectivist MOOCs. At present date there is a debate going on about MOOCs, and two different types are put forward: connectivist MOOCs and xMOOCs. the difference between these two being that the design and dynamics of an xMOOC (put forward by Udacity, Coursera, amongst others dated 2012) is (currently) more behaviorist in approach, more formal and more oriented towards formal knowledge gains. Whereas connectivist MOOCs or cMOOCs have a more informal dynamic based on enabling the course participants to connect with each other, enter into dialogue in search of their own knowledge needs. Inquiry-based learning is based on the idea

that learning should be authentic to science practice, an idea advocated by Dewey (1964). This makes cMOOCs more fitting for inquiry-based learning, as authentic learning is part of cMOOC because the participants start from their own contexts and work towards resolving personal knowledge needs as will be shown during this study.

CoI adaptation. The Community of Inquiry (CoI) framework is used in the following section in an adapted from. The CoI model is based upon three different types of presences: social, cognitive and teaching presence. In this research study the CoI model will only be used to screen the learner interactions for two presences: social and cognitive. This is because the open, online course format that was used for this study was based on the connectivist Massive Open Online Course (cMOOC) model as proposed by Siemens (2005) and Downes (2007), and which – as mentioned above - focuses on learner-to-learner interaction, and in which the teacher to learner interactions are less present. As such the teaching presence which is linked to the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes (Anderson, Rourke, Garrison, & Archer, 2001) is not taken up.

The definitions used for making a distinction between different learner interactions are derived from the Community of Inquiry model:

Social presence is “the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities.” (Garrison, 2009)

Cognitive Presence is the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison, Anderson, & Archer, 2001).

Inquiry based learning and MOOCs

Data collection using the CoI. The learner interaction data used for screening against the CoI model, comes from the central discussion location of MobiMOOC2012 (MobiMOOC Google group: https://groups.google.com/forum/?fromgroups=#!forum/mobimooc2012). In an attempt to link the perceived division between social versus cognitive learner interactions to the actual social⇔ cognitive learner interactions, the researcher of this study has gathered only those interactions of participants who described themselves as being 'moderately active participants' (n=14) in the online survey.

The totality of interactions was divided into two groups: the mobile and the non-mobile users. After this the interactions were divided into social/personal interactions versus academic/professional interactions. In total there were 18 participants in the moderately active group, and from those 9 were mobile users and 9 were non-mobile users. However, the interactions gathered here are from 14 moderately active participants (7 mobile and 7 non-mobile), as there were 3 people answering anonymously to the online survey, making it impossible to deduce which learner interactions they engaged in at the central discussion group and 1 of the mobile users was a facilitator, which could affect the data gathered, so he was taken out as well.

Data analysis of the CoI. The analysis of the CoI was carefully following research suggestions to allow optimal data processing to occur. "Transcript analysis provides a window on actual student behavior in online environments" (Garrison,

Cleveland-Innes, Koole and Kappelman, 2006, p. 7), as such this analysis fitted the learning environment of a MOOC. And as Garrison et al. (2006) pointed out that cases of rich, sophisticated concepts are likely to require negotiation, a shared identification of meaning (Garrison, Cleveland-Innes, Koole and Kappelman, 2006). In case of this study the analysis not only consisted of multiple iterations rereading the interactions and fitting them to either social or cognitive presence, but the conclusions were also shared with other researchers for their feedback to double check identification of meaning. Those outside researchers (academics involved in educational research) were asked to double check the coding process and see whether the three coding stages seemed logical, as well as meaningful or whether discrepancies could be identified that needed to be double checked. The feedback given by these researchers was then integrated in the thesis study in order to improve its research quality. By incorporating different iterations, as well as having other experts screen the data process, the principal researcher of this study wanted to strengthen the validation process of this study.

Decisions taken during the CoI coding phase. Based on the explanatory nature of this research, the primary researcher decided that the student's posted message (word, sentence, paragraph, or sequence of paragraphs) should become the unit of analysis. This fits with what Garrison, Cleveland-Innes, Koole and Kappelman (2006) wrote, adding that "coding at the message level alleviated the need for the coders to identify units in more subjective ways" (p. 5), as such the researcher of this study took into account the full message as an indicator of either social or cognitive presence. Although the unit of analysis was now limited to the message, the researcher was confronted with the fact that one message could be seen as being part of both the social as well as the cognitive presence. This needed

to be resolved and an answer was found in the Garrison et al. because in their 2006 study, they were confronted with the same problem. In response to this difficulty Garrison et al. researchers requested that "the coders choose only the most salient category for each presence and that they not attempt to code at the indicator level" (Garrison, Cleveland-Innes, Koole and Kappelman, 2006, p. 5).

So for the data put forward in table 2 below, the analysis was based on messages, that were then divided into the most salient category. Table 2 gives an overview of the quantitative results of analyzing the learner interactions that were taking place in the central course discussion forum by the self-disclaimed 'moderately active participant'-group, for the mobile and non-mobile users, using the Community of Inquiry framework.

Table 2 cognitive and social presence for mobile and non-mobile users

	Mobile device users			**Non-mobile device users**		
	Interaction	Follow-up interactions	Total per type	Interaction	Follow-up interactions	Total per type
Cognitive presence						
Triggering event	6	1	7	3	0	3
Exploration	18	11	29	18	6	24
Integration	14	22	36	3	4	7
Resolution	4	3	7	2	0	2
Subtotals for cognitive presence	**42**	**37**	**79**	**26**	**10**	**36**
Social presence						
Affective	24	7	31	7	2	9
Open communication	7	6	13	4	0	4
Group cohesion	15	7	22	13	3	16
Subtotals for social presence	**46**	**20**	**66**	**24**	**5**	**29**
Total amount of interactions	**88**	**57**	**145**	**50**	**15**	**65**

Sectional conclusions CoI. Looking at the interactions taking place in a ubiquitous, online discussion group there are significantly more learner interactions for the mobile group in comparison to the non-mobile group. Focusing on the cognitive ⇔ social ratio of the messages in both the mobile and non-mobile group, there seems to be balanced presence for both the cognitive and social interactions. However, when looking at the follow-up messages, it is clear that the cognitive

presence has much more follow-up messages. An additional distinction can be seen in the reactions in follow-up interactions in the same discussion threads, where mobile users will interact more than the non-mobile participants. As such one can conclude from looking at the CoI analysis that mobile users engage more frequently in learner interactions than the non-mobile users. A significant difference however can be seen in a cognitive presence sub-categories. Mobile users seem to come to a 'resolution' much more frequently than there non-mobile counterparts.

But what if we look at course tools that did not offer interactions, but were purely offering content material that could be accessed via mobile devices? In the following section this study will analyze the web-based statistics for mobile and non-mobile access and use, in order to filter out possible factors that might be of interest to the second qualitative part of the study.

Web-based statistics on mobile and non-mobile access of course resources.

In the following section the web statistics of the course wiki and the course YouTube channel are analyzed. The course wiki was one of the core spaces of the course, where the YouTube channel was the content location where the webinar recordings were centralized after they were recorded. The purpose for looking at these statistics and screening them for mobile versus non-mobile access, was based on the research sub-question whether learners actually do access resources with mobile devices if they are made available. In addition to this the researcher searched for factors that could be taken into the second part of the study. Both the course wiki and the course YouTube channel were used primarily (almost solely) for content access purposes.

Before looking into the data collection and analysis of the web-based statistics, the challenges are shared in order to increase research transparency and add to the overall validity of the research.

Challenges that arose related to web analytics. In an attempt to provide a transparent research study, and in relation to validation and credibility strategies as listed by Creswell (2009) which focus on the importance of adding transparent data clarifications, the researcher feels that adding this paragraph on the challenges of using web statistics will help future research that is planning to use of online tool statistics.

The course discussion group was one of the course core elements and it was the primary dialogue content area of the course. The discussion group was set up via a Google group called MobiMOOC2012 which can still be found at the following location: https://groups.google.com/group/mobimooc2012/. Unfortunately Google analytics did not support Google groups, which meant that there was no transparent way to analyze with which type of device the participants of MobiMOOC2012 accessed the discussion groups. Fortunately, the Community of Inquiry data collection and analysis provided insight into possible difference in learner interactions between the mobile and the non-mobile group.

One of the reasons behind the difficulty of analyzing a Google group discussion forum was (and is) the fact that messages are sent out to email locations. This means it is near to impossible (at the moment) to see with which type of device (mobile or non-mobile) those emails are read. This made it difficult to quantify mobile access and use for the central Google group discussion group.

Embedded content poses a challenge for analyzing mobile access. Another challenge in learner analytics when looking at access via mobile and non-mobile

devices lies in the fact that when a specific medium or course content is embedded in another course location, this poses a problem for clear mobile ⇔ non-mobile analysis. The problem is based on the fact that you can no longer know with which type of device a specific medium is accessed, for it is not the medium access that is screened for mobile or non-mobile, but the location access. So if a YouTube movie is embedded in a course wiki, than you can only view whether or not the wiki is accessed via a mobile device or a desktop computer, but not whether that device was used to access the actual movie. This poses a problem for full learner data statistics for this and similar research studies. Another challenge of the learner statistics provided by the web-based tools investigated here, was related to the average view time. Although the statistics did indicate the average viewing time, this was not broken into more meaningful pieces, such as detailed viewing time. Would such a division be possible, a researcher can look deeper into the time of visit in comparison to the total duration of every resource, but per learner. This will give a clearer indication of those people actually having a more extensive look, or those simply having a very short look either to come back later, or to decide they are not interested.

But having said that, the web-based statistics provided by many online tools add to any research that has an interest in online statistics, even though the reporting parts of these analytic tools can be improved. In the next section an overview of the data collection and analysis of the available web-based statistics is given.

Data collection of web-based statistics.

Most of the course locations provided access to statistical data. The statistical data for each of the course locations was collected with the data tools

provided by the software behind the course location. As all of the web-based statistics offered the means to look at data from a specific starting time, to a specific end time, the course duration was picked for the time period of all the web-based statistics, i.e. 7 – 30 September 2012. Although the course only started on 8 September, due to the time difference for the participants located in the Oceania and far East Asia region 7 September was included in the statistics.

It was important to limit the web-based data statistics to the actual duration of the course as this insured that the data were closely linked to the actual hits and actions during the course. Because of the nature of the course, those same locations were and are accessed now that the course has finished. This additional traffic is due to the fact that some of the resources build during the course resulted in Open Educational Resources (OER) which can be accessed at any moment in time once they are created.

The data collected from some of the course locations were chosen on the basis of mobile browsers, or overall mobile versus non-mobile interest. The data collection was done by using Google analytics for the browser access identification for the course wiki (http://mobimooc.wikispaces.com) and by YouTube statistics for the MobiMOOC YouTube channel which featured recorded webinars related to the subject of mobile learning (http://www.youtube.com/mobimooc).

Data analysis of web-based statistics.

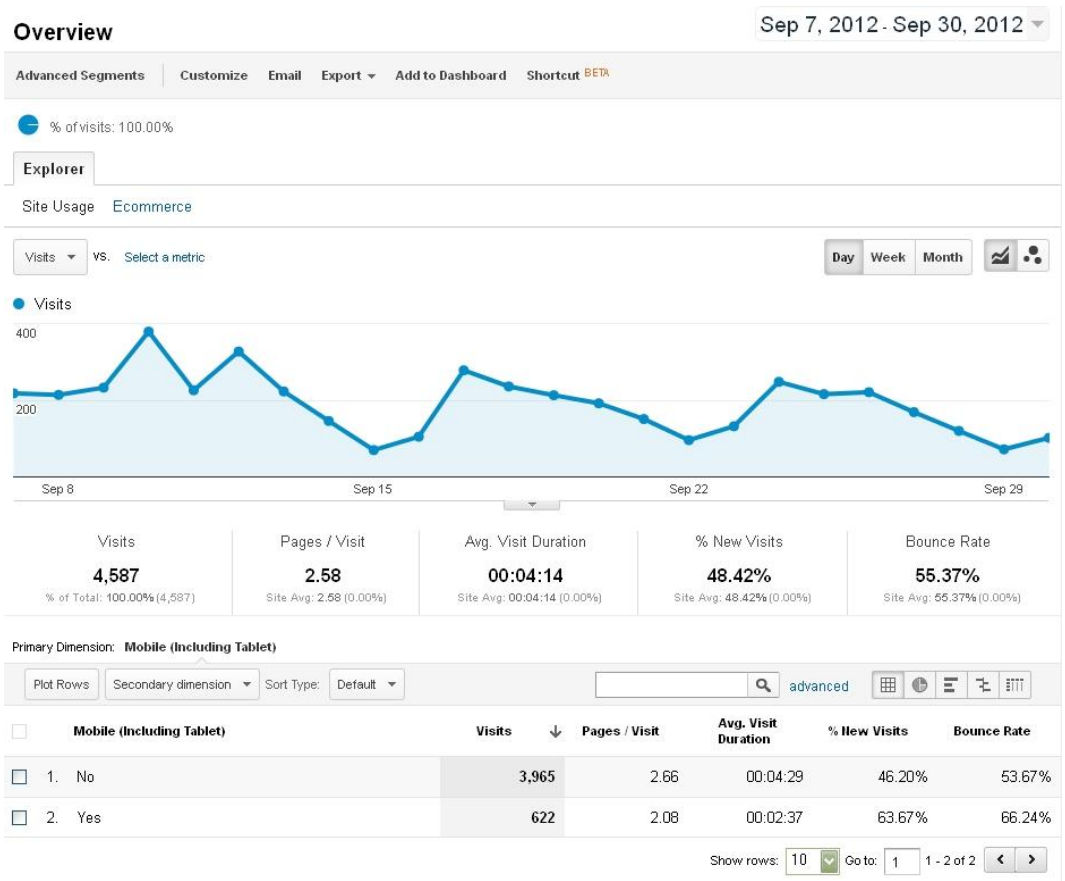
An analysis was made based on web-statistics concerning browser access, because this can be sub-divided in non-mobile and mobile browser statistics.

Analytics of the course wiki. The course wiki is of interest for looking at mobile access, as the course wiki was mainly aimed at content consumption, or reading access. The course wiki was the central course anchor, meaning that

content displayed on this course location was more of a starting and orientation point than a discussion or interaction point. This makes it of interest for mobile access, because analytics on this course location might indicate preferences according to screen size for readability or other device functionalities.

The course wiki was monitored by statistics coming from a Google analytic key that was added to the wiki by the principal researcher. The statistics resulted in percentages on mobile and non-mobile access. The following numbers and percentages describe the access during the actual duration of the course:

Figure 6: wiki views during the course divided into mobile and non-mobile devices



Data analysis from figure 6. Looking at the total of 4587 course wiki visits, 622 (14%) were performed with a mobile device (including tablets , but excluding laptops and netbooks as they use a traditional browser and as such cannot be traced as a mobile device).

An interesting observation to take along to the second part of the research is the fact that much more new visits were performed with a mobile device in comparison with the new visits coming from non-mobile devices. Especially when you add the difference in average visit duration between mobile devices and non-mobile devices to that factor of the new visits. Combining both, might point to an indication that learners choose to revisit the course wiki using a non-mobile device based on specific user affordances linked to specific devices and the type of content or time available, because this might explain why there is this difference in average view and new visits per device.

An interesting finding is also that for both mobile and non-mobile access the activity increased on Mondays. This coincides with the moment on which new topics were launched in the course, and as such with a new focus on specific content displayed or listed on the course wiki.

Figure 7: looking at mobile browser use in the course wiki.

	Operating System	Visits	% Visits
1.	iOS	498	80.06%
2.	Android	113	18.17%
3.	BlackBerry	6	0.96%
4.	Windows Phone	3	0.48%
5.	SymbianOS	2	0.32%

Data analysis from figure 7 on mobile browser use in the wiki. Taking into account the first and second remark on figure 6 looking at mobile access for the course wiki, tempted the researcher to look into the types of mobile browsers used to access the course wiki (see figure 7). As more than 80% of the visits were made with a iOS operating system, it was of interest to do a bivariate analysis of the different mobile operating systems on the duration of the visit and the screen

size (see table 3 below). Table 3 is of interest as it shows that there is a relationship between the screen resolution and the duration of the visit by the learner.

Table 3 bivariate analysis of the screen resolution versus the mobile operating system

	Screen Resolution	Operating System	Visits ↓	Pages / Visit	Avg. Visit Duration	% New Visits
1.	768x1024	iOS	359	2.11	00:03:02	61.28%
2.	320x480	iOS	134	1.94	00:01:29	70.15%
3.	1280x800	Android	25	2.60	00:02:59	40.00%
4.	320x473	Android	10	1.00	00:00:00	10.00%
5.	320x341	Android	7	1.71	00:02:24	14.29%
6.	1280x752	Android	5	7.60	00:03:56	80.00%
7.	320x455	Android	5	2.40	00:04:23	60.00%
8.	480x800	Android	5	1.60	00:03:55	100.00%
9.	0x0	iOS	4	1.50	00:00:01	75.00%
10.	320x401	Android	3	4.33	00:06:19	33.33%

Results derived from table 3. Looking at the bivariate analysis of screen resolution and operating systems of mobile devices that accessed the course wiki, the following was derived: the wiki content was viewed much more by tablet sized mobile devices (768 X 1024 and more), than smartphone sized mobile devices (size from 320 X 480 and less), which is true for both operating systems: Android and the iOS, or Apple-based operating system.

Analytics of the MobiMOOC YouTube channel.

The MobiMOOC YouTube channel was monitored, using the YouTube statistics provided by the tool itself. The following statistics describe the access during the actual duration of the course. Figure 8 shows the average duration participants actually spend to watching the provided course movies (i.e. the total amount of minutes watched) in relation to the amount of views coming from mobile and non-mobile devices. An important factor here is that the embedded

player option does not provide the opportunity to know whether the devices accessing the embedded player were mobile or not. Additionally the average duration watched does not have an option to see how many people actually watched the movie in full, and who only clicked for a moment, as mentioned in the web-based statistics challenges paragraph.

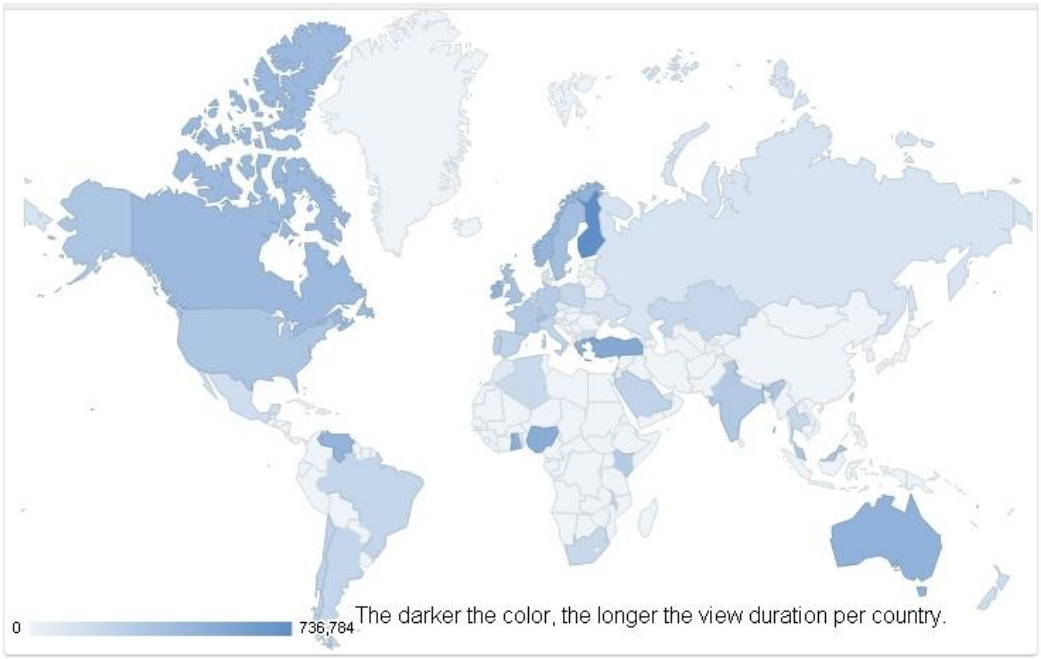
Figure 8 YouTube statistics of YouTube page, embedded player and mobile playback

Playback location	Views	Estimated minutes watched
YouTube watch-page	670 (55.7%)	3,326 (53.6%)
Embedded player on other websites	410 (34.1%)	2,065 (33.3%)
Mobile devices	122 (10.1%)	1,103 (17.8%)

An analysis that is available is a view of the average view duration per course movie. This sheds light on the differences dedicated view time. Unfortunately this option does not allow a breakdown into mobile and non-mobile viewers.

An additional point of interest while looking at figure 9 below, is the geographical dispersion of the people watching the course movies either through their mobile or non-mobile devices. This gives a rough indication of the universal access to online resources across the globe. This is relevant for this study, as ubiquitous access and the MOOC are placed in the global shift where learners from around the globe can engage in courses. This diversity of learners also reflected in the learners participating in both phases of this study. Due to ethical reasons the location specific information per learner is not disclosed.

Figure 9: mapping average view duration linked to country access.



Video | Geography | Date

	Video		Estimated minutes watched ↓	Average view duration	Average percentage viewed
1.	mobimooc launch video		1,603	3:47	49.4%
2.	mobimooc2012 mlearning intro presentation		1,131	6:39	15.3%
3.	MobiMOOC 2012 .	presentation	996	7:00	11.1%
4.	MobiMOOC 2012	global impact mobile d...	835	10:51	18.2%
5.	MobiMOOC mLearning planning full		558	4:36	22.9%

Results derived from the YouTube channel analysis. Although the movies were made available for cross-platform (mobile and non-mobile devices), figure 8 indicated that the course participants accessed this location more frequently with their non-mobile device, than with their mobile device. Looking at the access and average percentage viewed of the course webinars and videos showed that the movies are accessed from various locations across the world, not necessarily in regions where English (the course language) is spoken natively. This is important for this study, because some of the videos provide food for thought that result in learner interactions in the discussion forum. The fact that content was

viewed by an international audience, indicated that learner interactions could come from international audiences. This fact will be taken into account during the interviews, as a possible cultural or linguistic feature impacting learner interactions in this MOOC.

Sectional conclusions web analytics.

Bringing together the sub-conclusions of the wiki and the YouTube analysis, it becomes clear that there are factors influencing the access of content materials on the web (device affordance, readability, time…?), and especially returning to or consuming content via mobile devices, which might have an effect on learner discussions that refer or are related to the course materials provided. This ascertainment will be taken to phase 2 for further investigation.

Online survey.

Data collection of the online survey. An additional part of the quantitative data phase comprised an online survey. A cross-sectional survey design was used, which implied that the data was collected at one point in time (McMillan, 2000). The primary technique for collecting the quantitative data was a self-developed questionnaire, containing items of different formats: multiple choice questions, Yes/No questions, multiple answer questions, appreciation and evaluation questions (using a 7-point Likert scale) and open-ended questions.

An online survey (see appendix B) built with the html-based software Formsite (http://www.formsite.com/) was sent to all those who volunteered to participate in the study. The formsite software was chosen, for it allowed easy and cross-platform mobile accessibility, which was in line with the mobile access that was researched by this study. A pre-survey evaluation was performed by four participants with a research background that had taken part in MobiMOOC2011,

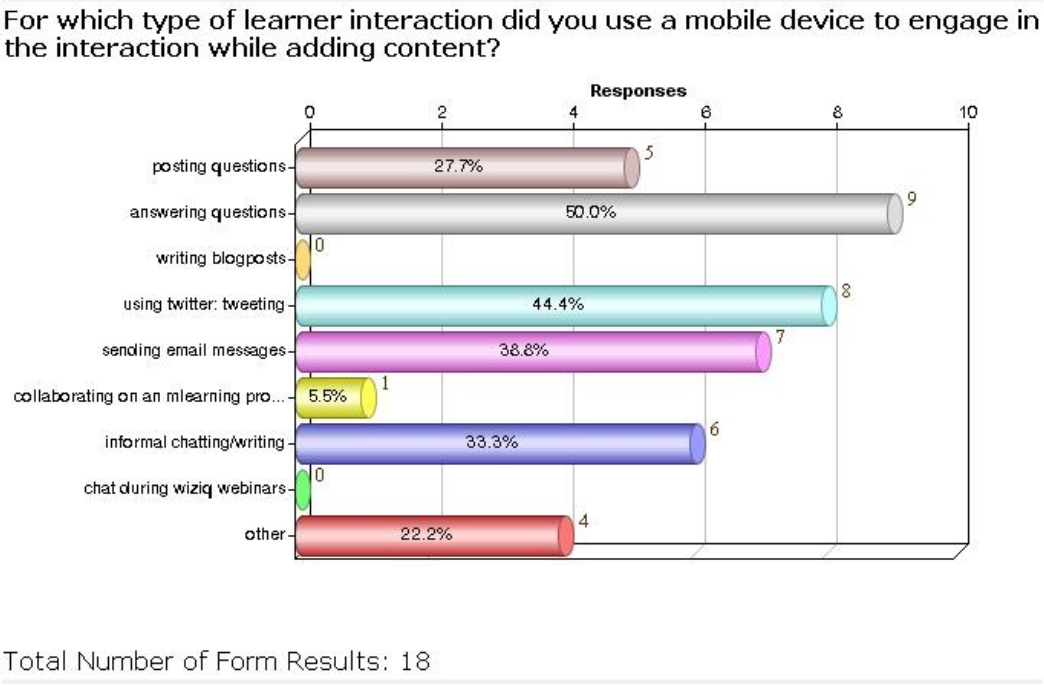
which was the pilot study to start off this MobiMOOC2012 research study. The survey evaluators screened the online survey for its purpose and validity and they added suggestions and feedback to improve the validity of the online survey. This resulted in an optimized online survey that was used as a basis for the first, quantitative part of this research. A description of the feedback given by the people that screened the survey questions, as well as the findings of the pilot study can be found in pilot section of this research study.

The survey was sent to all MobiMOOC participants by the end of week 2 (i.e. 21 September 2012). This enabled all the participants to engage in a multitude of learner interactions before the actual survey, which allowed a more valid representation in the survey answers. There were 34 respondents (n=34), of which 18 made use of a mobile device to access the course and 16 accessed the course with a desk computer.

Data analysis of the online survey. The answers to the online survey screened the participating learners for their learner interactions. By going through the obtained data, meaningful relation could be pinpointed. These meaningful relations are shared below.

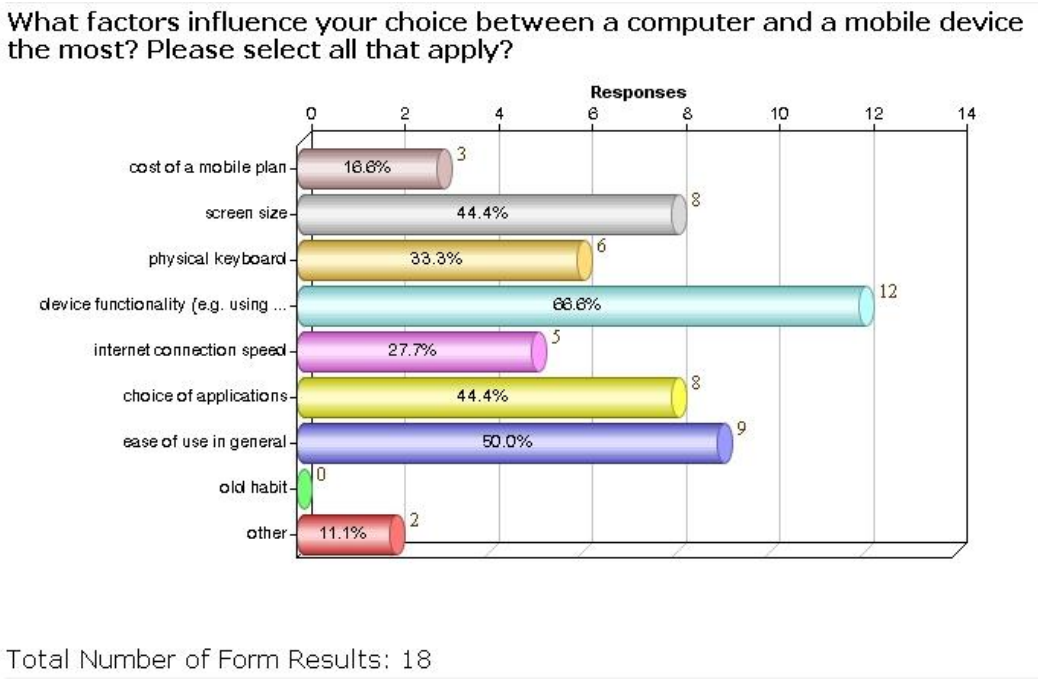
Online survey results pertaining only to the mobile user group. The following figures give information linked to the mobile user group only. Figure 10 shows the type of learner interactions the mobile respondents to the survey engaged in during the course.

Figure 10 type of learner interactions during the course



The factors influencing the respondents choice for either using mobile or non-mobile devices when engaging in learner interactions during MobiMOOC is shown in figure 11 below.

Figure 11 deciding factors for using a mobile device.



Analyzing figure 11 above, it becomes clear that device affordances such as screen size, a physical keyboard, are decisive factors in choosing which device will be chosen. This is supported with the data visualized in figure 5, which clearly shows that their mobile devices were not used for writing blogposts, which can be understood to be long posts.

Figure 12 below shows the reasons why respondents accessed material with their mobile device. Looking at the data it becomes clear that location and time independence were pivotal factors to use a mobile device or not.

Figure 12 reasons for accessing material with a mobile device.

For what reason did you access the material with a mobile device ?

Result	Responses	Percentage	Graph
flexibility to access no matter what time	11	57.8%	
flexibility to access no matter where I was	14	73.6%	
the material was easily accessible throug a mobile device	6	31.5%	
it was useful for my context at the time	7	36.8%	
i love to use mobile devices	7	36.8%	
other	2	10.5%	

Total number of Form Results: 18

In addition to this, all of the mobile respondents indicated that the MobiMOOC Google discussion group was the course location they accessed the most with their mobile device(s).

General information from the online survey pertaining to both groups. Analyzing the data of the online survey, there were non-distinct differences that I would like to mention here: gender was equally balanced over the mobile and non-mobile user group, there was no significant difference between those learners that labeled themselves as lurking, moderately active or very active participants to the course when looking at the mobile and non-mobile users, and there was an equal spread to experience in social media when looking at both research groups. In

relation to online learning, there both groups had similar experiences with online learning and whether they did or did not access a MOOC before.

Cross tabulation of the mobile and non-mobile learner groups. However, cross tabulation of the results of the online survey did result in some significant differences, which I like to add here. These are data derived from the online survey, each time comparing results from the mobile and non-mobile user group. All of the observations resulting from this cross tabulation were taken into consideration when looking at the following data analysis of section one as well, and rounded up in the conclusion at the end of part one.

Table 4 how important is it for you to engage in learner interactions ?

How important is it for your personal learning to engage in learner interaction?	Mobile users	Non-mobile users
Not at all important	0	2
Low importance	0	1
Slightly important	2	1
Neutral	2	0
Moderately important	2	4
Very important	9	6
Extremely important	3	2

The data from table 4 above showed that the mobile users found the ability to engage in learner interactions of more importance than the non-mobile users.

Table 5 were you able to self-regulate/organize your learning ?

Were you able to self-regulate/organize your learning during MobiMOOC?	Mobile users	Non-mobile users
Yes	11	6
Not at first, but as I got into it yes	5	9
No	2	1

Table 5 showed that the mobile users indicated that they were significantly more able to self-regulated their learning during the course.

Table 6 which type of learner interactions did you engage in during the course?

Which type of learner interactions did you engage in?	Mobile users	Non-mobile users
Posting questions	10	10
Answering questions	13	5
Writing blogposts	4	4
Commenting on blogposts	8	5
Using twitter	9	7
Sending emails to other participants	5	3
Writing an mLearning project	4	2
Informal chatting and writing	2	7
Chatting during WizIQ webinars	5	8
Other	3	3

Looking at the type of interactions each group of learners engaged in, a few indications could be seen pointing towards a difference in learner interactions for the mobile user group. Table 6 shows that the mobile users engaged more frequently in answering questions and commenting on blogposts, whereas the non-mobile user group engaged more in informal chatting and writing (webinars). Table 7 did you share what you have learned in the MobiMOOC with people outside of MobiMOOC?

Did you share what you learned during MobiMOOC with others?	Mobile users	Non-mobile users
Face-to-face colleagues	11	7
Online colleagues	10	5
Your online network	5	6
Face-to-face friends	7	3
Online friends	9	3
Family	4	3
Classmates from other courses	3	2
Other	0	0

The data depicted in table 7 shows that overall the mobile users shared much more information with people outside of MobiMOOC in comparison to the non-mobile group. Interesting enough this sharing of information was mentioned for both the face-to-face colleagues, as well as online colleagues and friends.

Table 8 if you shared information learned in this MOOC with others, how did you share it?

If you shared information with others, how did you share it?	Mobile users	Non-mobile users
Talked to them in person	12	9
Called them	3	1
Emailed them	9	4
Tweeted information	8	6
Posted it on Facebook	4	5
Put it on a blogpost	5	8
Printed it in a newsletter	1	0
Other	1	0

When looking at how information was shared in table 8, the mobile group showed a mix of face-to-face as well as online sharing (phone calls, e-mails and tweets), while the non-mobile group indicated to share more information via blog posts.

Sectional conclusions deriving from the online survey. There is a distinct difference in the perception of and engaging in learner interactions when screening the mobile versus the non-mobile group. Bringing all the observations together of this section analyzing the online survey, a couple of conclusions can be put forward. There are two interesting categories: one pertaining to the learner interactions, and one related to the device affordances and overall user mobility.

Mobile users and learner interactions. Mobile users:

- found the ability to engage in learner interactions of more importance than the non-mobile users.

- perceived themselves as better at self-regulating their learning during the course
- engaged more frequently in answering questions and commenting on blogposts, whereas the non-mobile user group engaged more in informal chatting (webinars).
- shared more information with people outside of MobiMOOC in comparison to the non-mobile group. Interesting enough this sharing of information was mentioned for both the face-to-face colleagues, as well as online colleagues and friends. Looking at how information was shared, the mobile group showed a mix of face-to-face as well as online sharing (phone calls, e-mails and tweets), while the non-mobile group indicated to share more information via blogposts.
- Mentioned that time and location were deciding factors to use their mobile device.

This list of mobile user indications flows into mobile device affordances that also seem to affect learner interactions. Device affordances such as screen size, a physical keyboard, are decisive factors in choosing which device will be chosen. One course tool that stands out in mobile access and use, is the Google discussion group. All of the mobile respondents indicated that Google discussion forum was their first or second most important course location that they engaged in with their mobile device. Which is of interest to this study, because the Google discussion forum is not only ubiquitously accessible, but it was also the core learner interaction space.

Conclusions Phase 1

Combining the sectional conclusions of phase 1 of this research study, provided the following data relevant to both learner interactions and mobile device access, which was built upon in phase 2.

Looking at the CoI analysis of the Google discussion group that was seen by mobile users as the most important tool used, it showed that mobile users engage more frequently in learner interactions than the non-mobile users, especially when engaging in follow-up messages.

When screening other course tools based on their web statistics, it showed that although mobile devices were used to access these more passive, content consuming tools, the duration and frequency with which these resources were accessed seemed to indicate a more frequent non-mobile use.

From the online survey additional points of interest were noted, both on the learner interaction and the mobile side. Mobile users engaged more in learner interaction, which they also found of more importance. The mobile users also felt more comfortable with organizing the course information and they shared the course information with online and offline people outside of the course. A possible reason to investigate this self-regulated learning is the fact that mobile users were less dependent on time and location to access the course.

Linking the web statistics with the mobile device affordances mentioned during the online survey there seemed to be decisive factors in choosing a device for interacting based on the device affordance, the user mobility and the content accessed.

Now the central question of this study becomes more urgent: what is the impact of mobile accessibility on learner interaction in a MOOC? This question

will be answered in the second phase of this study, while building upon the themes raised in the first phase of this study and letting additional themes emerge from the interviews.

Phase 2: Qualitative Phase

Data collection of phase 2.

The second, qualitative phase in this study focused on interpreting the results of the statistical tests, obtained in the first, quantitative phase and using these results as a basis for in-depth semi-structured interviews with a purposely chosen sample of the MobiMOOC participants covering both groups (mobile and non-mobile users). The sample group for phase 2 consisted of 14 MobiMOOC participants, divided up into the two research relevant groups. The interviews were conducted online, using Skype software, in combination with Messenger Plus which enabled the researcher of this study to record the interviews. Before the interviews were recorded, the researcher always double checked if the interviewee agreed with the fact that the interview would be recorded. As such permissions were acquired to record the interviews on two occasions: the informed consent form and the verbal affirmation right before the actual interview. The interviews were than transcribed for later data analysis.

Two rounds of interviews were planned: the first round gathered qualitative data regarding the research question at hand, the second round of interviews included member checking, where the researcher solicits participants' views of the credibility of the findings and interpretation. Putting forward the draft version of qualitative research results (draft strategies) to the members who participated in the research is part of the validation process (see validation section in this proposal).

The interviews were between 20 – 45 minutes in length and were one-on-one interviews with all the participants that volunteered to participate in the second part of this study. On request of some of the participants, a set of questions was sent to them in advance to the actual interviews. The request to send the questions came from participants that used English as a non-native language. One interviewee requested to be interviewed via chat, as this allowed her to have a more comfortable feeling as she would not need to speak out loud. That request was taken up and that particular interview was done via Google chat. The synchronous chatting did allow questions to be tailored to the responses given by the interviewee, much like the actual tailoring of additional questions during the verbal interviews that took place, as such both types of interviews had similar dynamics as the interviews were taken.

Data analysis of phase 2.

The results of the quantitative phase were used as a basis to select the participants for phase 2 and to develop the initial interview questions based on the outcomes of the survey.

The data analysis procedure to result in a set of strategies that will be put forward in the next section of this thesis research is based upon the three phases of coding – open, axial, and selective – as advanced by Strauss and Corbin (1990) as mentioned by Creswell (2007). To analyze the recorded audio/video interviews Nvivo version 10 was used. From this data analysis a set of usable strategies were written combining the themes that emerged from the data and that might optimize the learner interactions in a mobile accessible MOOC. These preliminary findings were put to the interviewees of this second phase of the study, to allow them to give feedback and give their views on the research findings. The data collected

from this second round of interviews was used to fine-tune the strategies, as well as the coding process in order to add to the transparency and validity of this research.

Before starting the one-on-one interviews, some questions were sent to the interviewees in order to enable them to prepare for the interview. These are the questions that were sent via e-mail:

- Within online learning, how much of your time do you think you spend on social or personal communication with your fellow learners? And how much time do you spend on academic or professional communication (in estimated percentages)?
- Why do you think you engage in social personal communications?
- Do you have the feeling your personal or social communication adds to the learning process(trust, feeling more or less comfortable, relating to similar authentic learning situations…)?
- Is there a certain threshold or barrier you need to surpass before entering into a personal or social interaction with fellow learners?
- Is there a certain threshold or barrier you need to surpass before entering into an academic or professional interaction?
- What is the most decisive factor for entering into a social/personal interaction with fellow learners and why?
- What is the most decisive factor for entering into an academic/professional interaction with fellow learners and why?
- If you decide not to react immediately to something you want to react to, which are or is the reason for taking more time before reacting? In that case do you make a distinction between personal or professional?

Additional questions asked to the mobile user group:

- How do your mobile interactions differ from your non-mobile interactions?
- Does the fact that you communicate through your mobile device affect the speed with which you react to posts or other communications?
- If you decide not to react immediately to something you want to react to, which are or is the reason for taking more time before reacting? In that case do you make a distinction between personal or professional?
- What is your biggest differential in deciding to enter into an interaction with or without your mobile device(s)?
- Does it make a difference whether you use a smartphone or a tablet? If so how?

Coding phases.

Open coding. As Creswell (2007) suggested the researcher examines the text for salient categories of information supported by the text. These categories are then saturated until the new information obtained does not further provide insight into the category.

In table 9 below a summary of the codes is given per category. In order to ensure transparent qualitative data analysis, all the codes were given references that were taken up in the axial coding paradigm later on. The use of the code references was introduced to allow the reader of this study to trace the codes as they move from inception to the list of strategies.

Table 9 summary of the results of the open coding based on the interviews that came out after a series of coding and reading iterations.

Categories	Category frequency	Codes	Code frequency
Time management	37	Self-regulated learning (*TM01*)	5
		Immediate action possible (*TM02*)	10
		Time management (*TM03*)	12
		Information overload (*TM04*)	3
		Reflection time (*TM05*)	4
		Clear course timeline(*TM06*)	3
Safe learning environment	40	Surroundings (*SLE01*)	5
		Tolerance (*SLE02*)	11
		Feeling safe and comfortable (*SLE03*)	12
		Trust (*SLE04*)	7
		Language (*SLE05*)	5
Community	32	Learner centered (*C01*)	2
		Group size (*C02*)	2
		Community feeling (*C03*)	9
		Course design (*C04*)	6
		Finding mutual ground (*C05*)	7
		Group diversity (*C06*)	3
		Network (*C07*)	4
Ubiquity	73	Digital literacy (*U01*)	6
		Ubiquitous access (*U02*)	9
		User mobility (*U03*)	10
		Content demands (*U04*)	4
		Device affordances (*U05*)	24
		Mobile social media (*U06*)	3
		Formal ⇔ informal (*U07*)	5
		Ownership (*U08*)	2

		User-friendliness (*U09*)	5
		Infrastructure (*U10*)	5
Interaction drivers	110	Room for emergence (*IA01*)	5
		Deepening knowledge (*IA02*)	11
		Knowledge diversity (*IA03*)	2
		Icebreaker (*IA04*)	6
		Reflection time (*IA05*)	8
		Knowledge needs (*IA06*)	14
		Mutual course activity (*IA07*)	6
		Sharing expertise (*IA08*)	7
		Knowledge niche (*IA09*)	7
		Formal ⇔informal *(IA10*)	6
		Opinion respected (*IA11*)	2
		Facts straight (*IA12*)	6
		Common professional interest (*IA13*)	12
		Personal character (*IA14*)	10
		Non-verbal communication (*IA15*)	5
		Language (*IA16*)	3

Locating the central phenomenon of interest. While screening the different categories (time management, safe learning environment, community, ubiquity and interaction drivers), overlapping concepts could be located. The most central phenomenon was the category ‘interaction drivers’, for this category seemed to bring indirect and directly related codes together and work as a connector for all the other categories. The category of time management is linked to the interaction drivers, because being able to organize time and self-regulate learning is necessary to be able to acquire or deepen knowledge. Similarly creating a safe learning environment is necessary to address the personal characteristics and

specifically to move the learners onto interaction. Looking at the codes of interaction drivers, there is also an indirect link connecting it to community. For sharing expertise or having a common professional interest, as well as respect is part of the feeling of being in a community. And last but not least there is the category of ubiquity. Ubiquity is also a condition in order for the interaction drivers to start having an effect, because in the background of interactions a ubiquitous environment must exist in order for all the interactions to be taken place. As such the category of interaction drivers is put forward as the central phenomenon of interest for this research study. This enabled the study to move into the axial coding phase.

Axial coding. As described by Creswell (2007), the next phase of coding was to take another look at the data to provide insight into specific coding categories that relate or explain the central phenomenon, in this case: interaction drivers.

Insight into the axial codes. After looking through all the categories, the researcher of this study found that the codes per category might have meaning to the researcher herself, but that it would benefit the transparency (and possibly the discussion) of the research undertaken, by clarifying the codes at this stage. In addition to this clarification, some examples coming from the interviews are added for each category. This clarification with transcript examples is also an attempt to take the reader or/and colleague researcher along on the thought journey that led to the selective coding part which follows this axial coding phase.

Time management. This category consists of six codes. The self-regulated learning code comprises all the remarks shared by the interviewees with regard to their ability or inability to structure their learning. The immediate action possible

code, related to the fact that the interviewees pointed out the time won, and as such managed, by having immediate access to share their interactions. Time management took in all the thoughts related to balancing learning within the interviewees life: family, work, hobbies, access… The information overload organized all remarks on the abundance of material and interactions that led to the amount of information that course participants needed to manage. Reflection time also had an immediate, and sometimes unexpected effect on managing time dedicated to the course, as at times it took the course participants more time to either understand, or reply to previous interactions. The time spend on reflecting decreased the time they could spend on other parts of the course. Clear course timeline gathered all the ideas that pointed towards the effects that the common timeline provided well in advance of the course had on the course participants ability to manage her/his time spend on the course.

Table 10 summarizes some of the comments related to time management

Comments related to the time management category
"Mobile learning snacks that is what I do, only 5 - 10 minutes time to consume content." (*101MS05*)
"While commuting I am checking mails, tweeting on my mobile devices … it is part of everyday life." (*101MS07*)
"The same can be said for twitter, you have immediate access to content, you do not have to close something, or have additional clicks… it is efficient" (*101NMS10*)
"Time is the biggest factor with all of the interactions: you need to see what you can really do in that time that I have." (*101MS05*)
"So each morning I would look at the notice board to fit in the Google groups with

my work schedule. So I self-regulated the learning and interactions." (*101MS03*)
"The other stuff [social interaction]... I guess I just do not have time for that." (*101NMS11*)

Safe learning environment. The safe learning environment category comprised five codes. Feeling safe and comfortable was mentioned in relation to the learning environment and was always mentioned with clear emphasis. This code was mentioned by almost all of the participants (12 of 14) as a key factor for learner interactions to take place. In surroundings the interviews mentioned how for some type of interactions they waited before posting, as they did not like the fact that people within the same location could view their content. The tolerance code captured all the remarks pointing towards being able to say what one thinks in an environment that ensured freedom of expression, without being judged or frowned upon. Trust was raised in relation to the fact that information could be shared, but would not be taken advantage off. Language was added as a code to a safe learning environment by participants that did not have English as a native language, for during the course nobody fell over spelling faults or misuse of grammar by any of the participants.

Table 11 summarizes some of the comments that refer to a safe learning environment

Comments related to the safe learning environment category
"The ice was broken through the interactions, which made the chats a safe place to comment and to interact". (*101MS03*)
"I fell myself more comfortable in online courses than face to face courses" (*101MS14*)

"One of the things I noticed from the beginning, I noticed that you made a point in emphasizing that interactions needed to be kind, nice, be careful with how things are said and shared. … Because it showed from early on the course, it made me feel safe." (*101NMS11*)
"Trust and intuition … it is the all-round feeling of the person that makes it more attractive to get into a conversation with them." (*101NMS06*)
"These possibilities … we did not have before. We need to take advantage of that, the networked community… sharing ideas with people with the same interest." (*101NMS12*)
"My biggest fear to enter a mooc, was the anxiety of having to look stupid by giving a comment that would be not appreciated by the 'professors'." (*101MS03*)

Community. The category of community had seven relevant codes emerging from the data. The group size was mentioned as being important, in comparison to other MOOCs that also harbor many participants. The group size was seen by these interviewees as a factor for engaging in interaction, which in their view resulted in a sense of community between all the course participants. The fact that the course was learner centered was mentioned by some of the interviewees as an essential part of creating a community as there was no perceived hierarchy. The community feeling code gathered a lot of ideas, all pointing towards beneficial factors that added to a feeling of being part of a community: familiarity due to frequent interactions, willingness to share, feeling part of an intellectual group, mutual professional interests. The course design code gathered all the comments focusing on factors that the interviewees found beneficial for community building: e.g. the personal mails send to them, the mutual course activity on building a mobile

learning project and sharing it. Finding mutual ground was a factor combining breaking down (social/professional) barriers to become a community, as well as connecting to other participants through language or interests. Group diversity was mentioned as a way to become more involved due to a diversity of opinions and disciplines. The network code gathered reactions that transgressed the course community and pointed towards more durable connections even after the course, as well as the importance for continuous learning.

Table 12 comprises some of the remarks referring to community

Comments related to the community category
"Forming some sort of alliance, or community or group with mutual interest" (*101NMS04*)
"I do not think it is important to me to know these people socially. I am not interested in their situation. I will read the introductions, but I do not become connected." *(101MS13*)
"There are people more active, and you grasp the personality… I saw that people started to make funny comments for each other … I think this is related to the size of the group." (*101NMS02*)
"Finding a common language for communicating … no matter if it is on a formal or informal dialogue." (*101MS08*)
"you can self-select your 10 -20 peers and you can select them from week to week… these connections became part of my PLN" (*101MS01*)
"But of course you know … for me sitting here.. you easily feel isolated. Talking to others on both levels helps me feel part of a group, not to stand outside a group... You have to jump in to be part of the group." (*101NMS12*)

Ubiquity. The category of ubiquity was a key category as it pertained many links to mobile devices for learning, as well as accessibility in all circumstances. In total it contained ten codes. The code of ubiquitous access comprised of all the remarks on the fact that the core discussion was ubiquitously accessible, as well as the use by the interviewees of multiple devices to access the course, including references to Bring Your Own Device (BYOD). Digital literacy was a code covering the skills needed to use different devices and different learning tools. User mobility incorporated both the location and time independence remarks. The code content demands related to all issues where the type of content being shared asked for different devices to be used (accessing websites, links). Whereas the device affordances code collected the list of device characteristics that made the interviewees decide to use one or another device (e.g. screen size, keyboard, headset). The technology of mobile social media was used on several occasions for their cross-device potential. When relating to mobile social media, the remarks were always made in relation to the type of device used, as such making it a code of interest for this category. Another interesting code to emerge was one related to formal versus informal. This code gathered all the actions listed by interviewees that did point towards ubiquitous options, but in which they decided to shift devices due to the formal or informal demands of the actions. Ownership was a code comprising those interview parts that mentioned the importance of having ownership over the devices used. This also comprised remarks that referred to a ubiquitous mobile design built upon BYOD. The user-friendliness code referred to the ease of use of the devices to access course material with. Infrastructure was a code used to combine all the remarks linked to the hardware that needed to be in place for ubiquity to be enabled.

Table 13 shares comments on ubiquity

Comments related to the ubiquity category
"on the train I will write a shorter blogpost with mobile device" (*101MS01*)
"I did learn to use a variety of tools, but I needed to learn that new technology in order for me to use it." (*101MS05*)
"If the communication would be formal, than I might also use a mobile device, but only if it is for short messages. Otherwise, if it takes more information, or broader topic, I would change towards my laptop." (*101MS08*)
"Yeah, Mobile applications make it easier [to interact]" (*101MS14*)
"Mobile devices.... with the webinars I used a laptop, but during my commute I used my iPad, on which I did a lot of interaction on forums and chats, keeping up with twitter and Facebook. And that felt beneficial. There is no way I could have done it behind a computer due to lack of time." (*101MS03*)

Interaction drivers. The category of interaction drivers contains 16 codes. The code of room for emergence arose out of the remarks from interviewees that clearly stated that the fact that they felt free to add or start a topic that was connected to the subject, but not immediately linked to the material provided by the course, could be added. The deepening knowledge code gathered all ideas mentioning the importance of interactions to deepen knowledge (driving the interactions to a specific subject matter, engaging in the learner process, communication as a need to increase understanding). The code called knowledge diversity pointed towards the beneficial factor of reading or hearing different points of view to get a deeper understanding of one's own knowledge. Icebreaker emerged as a code resulting from remarks on lowering interactions thresholds.

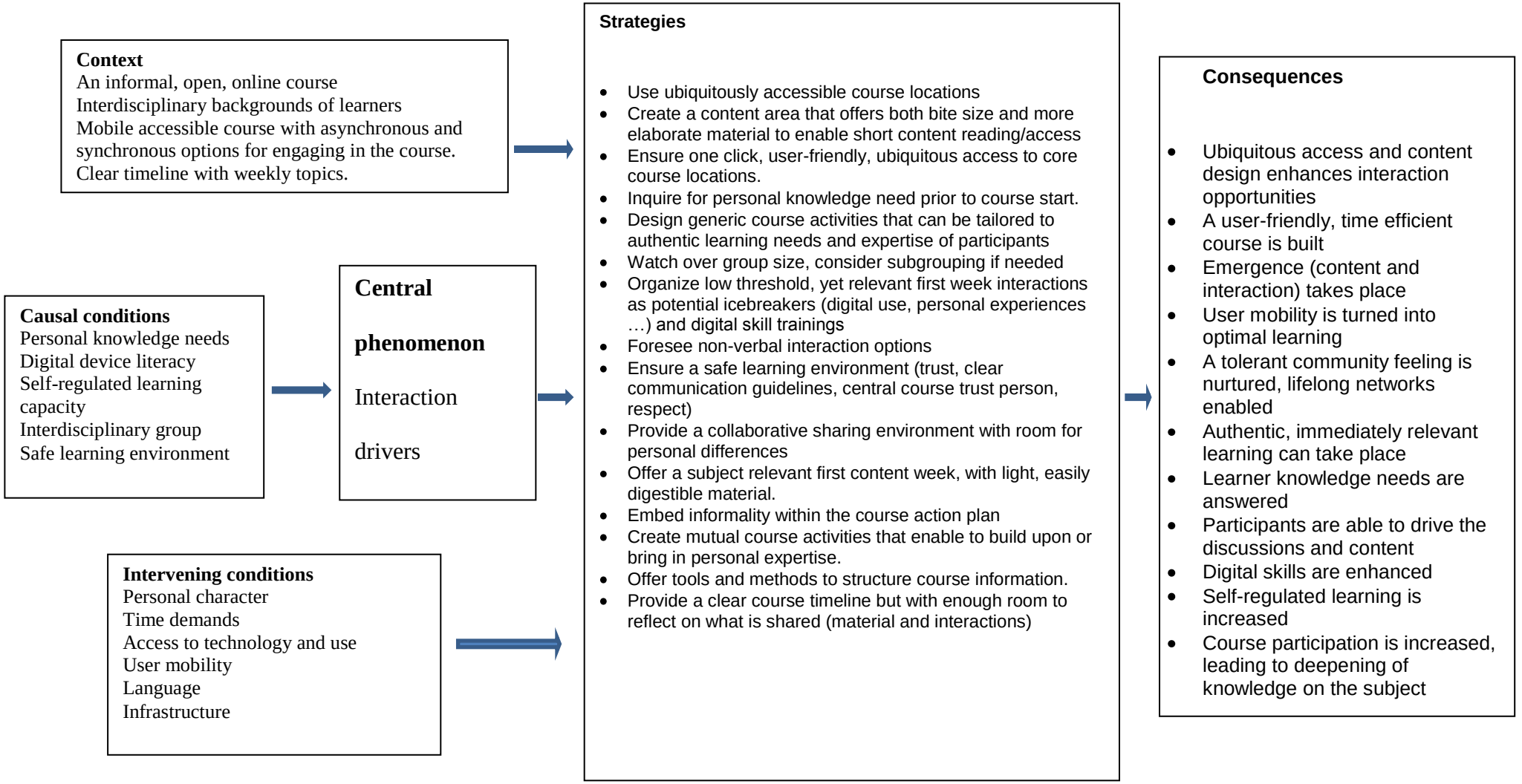
Reflection time was a code gathering remarks from interviewees on the effect lengthy or short reflection time can have on actual interactions, as well as on the quality of the shared interaction. Knowledge needs comprised of all the remarks on their own quest to satisfy personal learning needs and challenges they faced. Mutual course activity was a code coming from remarks focusing on the collaborative course actions that gave a clear push for increased interaction. Sharing expertise was also a clear code leading towards increased interaction due to the beneficial feeling of being able to add something to the conversation based on known experiences or expertise. Knowledge niche also came out as a clear code, referring to the fact that certain interviewees only added something if they felt the subject was relevant and not yet added. The formal ⇔ informal code emerged here describing the impact of an informal course on the willingness and dare to react and interact. The code on opinion respected harbored clear indicators pointing towards others and their action towards interactions that were shared. In the code 'facts straight', all remarks mentioning the importance of using strong data to support any opinion or interaction, were brought together. Common professional interest was mentioned linking it to professional, academic and intellectual factors. Personal character harbors ideas linked to the personalities of the interviewees that pushed them to interact: helping out others, not being spontaneous (reflecting first), having to know a person. A code for non-verbal communication was added after hearing interviewees mentioning their preference for non-verbal communication to get a clear understanding of the other they are interacting with. Language was also a clear code, coming from remarks on the need to get a common language going, but also referring to crossing the barrier and daring to write in a non-native language.

Table 14 provides some of the answers related to interaction drivers

Comments related to the interaction drivers category
"Increase learning outcomes for me, is by increasing personal involvement, ownership." (*101MS03*)
"I am not very spontaneous, I like to think about my answer before sending it. So it sometimes takes me a few hours before responding." (*101MS09*)
"A lot of stuff I like to get via email, both on mobile, desktop...Often that will trigger me to either respond, or post to somebody's blog, Google group..." (*101MS13*)
"I take a big pride in using correct numbers... So I need to be very sure about the numbers I use." (*101NMS10*)
"maybe there is a small academic instance that I feel is of interest and where I want to contribute too." (*101MS13*)
"how to communicate with other peoples and know English intermediate level at least" (*101MS14*)
"One of the major factors was the motivational email that was sent. That gave the feeling of valuing the opinion, so this made me feel that others would also value my opinion." (*101NMS02*)
"Informal education enables me to establish my own personal path for learning … and I can use the tools I want." (*101MS07*)
"Usually, if I do start a conversation, it is because I have a need that I could not solve for myself… I really really have to need it, otherwise I won't do it." (*101NMS11*)

Carefully interweaving the above categories and codes with one another, gave rise to the following coding paradigm represented in table 10, that presents a theoretical model of the process under study.

Table 15: Axial coding paradigm: theoretical model for learner participation in a mobile accessible open online course



Selective coding - theory and hypothesis derived from the axial coding paradigm. The strategies and consequences resulting from this study were the result of conditional and contextual factors. As one can see in the insight into the codes section, there are overlapping codes that have mutual bearings to multiple categories. This interrelated weave between all the categories put forward the central phenomenon: interaction drivers.

In this part of the axial coding paradigm, the code references are linked to the different parts mentioned in the axial coding paradigm to allow the reader to find the connection between the codes of the categories deriving from the open coding and the actual parts of the coding paradigm.

The central phenomenon, 'interaction drivers', was a core category labeled as such because it derived from and linked to the categories developed during the open-coding process. Interaction drivers refer to a combination of factors that pushed towards, or deterred from engaging in learner interactions by the course participant in this ubiquitous course.

Conclusions Phase 2

Context. The whole of the study was situated in the context of a mobile accessible, informal, open online course focusing on the subject of mobile learning. The course was populated by adult learners that came from a diversity of disciplines and backgrounds and had a course timeline based on weekly topics.

Causal conditions. A set of causal conditions could be found that influenced the central phenomenon of interaction drivers. The personal knowledge needs of the course participants lead them to look for ways to deepen or strengthen their knowledge on the subject (*IA06*). The group

diversity or interdisciplinary backgrounds of the group enable topic relevant and rich interactions (*C06, IA03*). A safe learning environment was pivotal for learner interactions (*SLE03*). The digital device literacy (*U01*) gave course participants an advantage for staying on top of the information flow (*TM04*). At the same time this device literacy was also the starting point for exploring different affordances, or devices with which the course could be followed and interaction upon. As the course was informal, a lot of responsibility was put on the learner's personal capacity to regulate their own learning (*TM01*).

Intervening conditions. In addition to context and the central phenomena itself, there were also intervening conditions, which were broad, general conditions that influenced participants choices for engaging in learner interactions. Personal character was a condition that influenced learner interactions (*IA14, IA12*). Balancing learning life with family and professional life has an effect on course interactions, due to time demands (*TM03*). The user mobility intervenes with their ability to engage with the course. Access to technology, or more generally supporting infrastructure (*U10*), as well as being able to use it affected the way the user entered into learner interactions. And last but not least, language had an effect on the willingness and the ability to communicate (*IA16*).

Strategies. Taking all the influencing factors into account, it was possible to define strategies that impacted learner participation in a MOOC.

A ubiquitously accessible course with one click access and overall user-friendliness greatly affects learner interactions (*U02, U09, TM03, TM02, SLE01, U06, U08*). In order to achieve this the content area's must offer a

variety of content bites, ranging from small size content snacks to large, comprehensive content material (*U03, U04, IA05, UA05*).

Personal knowledge needs are essential for participation (*IA02, IA06, IA10*). Understanding potential knowledge challenges prior to the course gives an extra angle to design course actions (*IA07, C04, TM01, U04*). Due to the open, online course format a diversity of interested people will join the course. By providing generic course activities that tailor to the authentic learning experiences or demands from the participants, an increased interest is assured (*C01, C06, IA13, IA07, IA03*). The group size has an effect on creating a community feeling. As such it might be of interest for the course organizer(s) to consider subgrouping once the course cohort gets too big (*C02, C03, C05, SLE04, SLE02*). Getting a community feeling going can be realized by embedding purposeful course actions: organizing low threshold interactions during the first week of the course as potential icebreakers but always keeping in mind the professional relevance of these suggested course actions (*IA04, IA08, IA06*). Allowing users to enhance their digital skills is crucial in MOOCs (*U01*). By providing a safe learning environment (*SLE03, IA11*) that builds on trust (SLE04), creates a collaborative space for sharing ideas (*IA08*), provides clear guidelines for communication (*SLE05, IA16, IA15*) and which puts forward a central course person that instills trust (cfr mother or father hen), also provides a push for additional learner interactions to take place. Ensuring that the course is at least in part informal (which still means connected to the professionalism and on the subject discussions), also adds to the conversation (*IA10, U07*). Mutual course activities that allow course participants to embed their own expertise, react at their own point of comfort

and cater to their needs offer strong interaction drivers (*IA14, IA12, IA01, IA07, IA04*). But with an increase in learner interactions, tools and methods must be shared to structure course information (*TM04, TM01*). This management of the overall course dynamics can also be improved by a clear course timeline that leaves time for reflection and a timely opportunity to engage in or add to discussions. (*TM05, TM06, IA05, IA12, IA14, C05, SLE04, SLE03*).

Consequences. If the above mentioned strategies are followed, they result in an increased learner participation in a ubiquitous, informal, open online course or MOOC.

Following the strategies mentioned above the course becomes fully ubiquitous in access, with relevant content design that enhances interactions. A user-friendly – and as such time efficient course would be built, with room for emergence in both the content as well as the discussion areas. That way the user mobility is turned into optimal learning opportunities that are authentic and immediately relevant to the diversity of course participants. That way a tolerant course community is created based on meaningful, professionally related interactions which enables lifelong networks (*C07*). By providing ubiquitous access in both the infrastructure and content, the digital skills as well as the self-regulated learner skills will be improved. The combination of all these elements will lead to increased course participation resulting in an increased chance for developing more in-depth knowledge (*IA02*) on the subject.

Validation and Evaluation

Validation and credibility of the research. This research employed six strategies for validating the findings of qualitative research, as outlined by Creswell (2009):

1. Prolonged engagement for comprehending the ideas emerging from the participants (survey to set-up phase 2 consisted of two sets of interviews, one for interviews, the second one to cross check draft research findings with the interviewees)
2. Peer review or debriefing to ensure the study resonates with people outside of the research group and the researcher (the findings were read and commented on by mLearning as well as MOOC researchers).
3. Clarifying the researcher's bias for future readers was done by clearly pointing out the role of the researcher within the MobiMOOC course.
4. Member checking: the researcher has solicited participants' views of the credibility of the findings and interpretation.
5. Rich, thick descriptions are used to enable readers to make decisions regarding transferability: a particular effort was made to clarify the codes, as well as add references to all the codes that could be cross-referenced throughout the three phases of coding, as the researcher felt this would enhance overall research transparency of thoughts.
6. Throughout the process of writing this research negative or discrepant information that falls outside of the themes was mentioned to offer full insight into the research progress.

Evaluation Criteria

Strauss and Corbin (1990) advance seven criteria (as cited by Creswell, p. 216) to evaluate the quality of qualitative research of this kind, and in this section each of the criteria is linked to sections within the thesis that have a direct link to the evaluation criteria mentioned by Strauss and Corbin. This is done to ensure a more transparent research study:

- Criterion 1: How was the original sample selected? What grounds?
- The selection process of each of the samples was described in the study.
- Criterion 2: What major categories emerged? The categories that emerged from the codes were listed, and also described to enhance research transparency.
- Criterion 3: What were some of the events, incidents, actions, and so on that pointed to some of these major categories? In order to give the reader of this research a closer feel with the actual interviews and the codes derived from them, examples of the interviews were given to support the categories.
- Criterion 4: On the basis of what categories did theoretical sampling proceed? In order to make the process of moving from the categories to the theoretical sampling more transparent, additional descriptions were provided that allow the reader to follow the thought process behind selecting codes and categories.
- Criterion 5: What were some of the hypotheses pertaining to conceptual relations, and on what grounds were they formulated and tested? The distillation of the conceptual relations was described in the

study. One of the hypothesis was that learner interactions increase when a MOOC is made mobile accessible. This hypothesis was tested by looking at the actual learner interactions of mobile and non-mobile course participants. In addition to this the resulting set of strategies were put forward to those course participants that agreed to be part of the one-on-one interviews. They provided feedback on the actual coding process or/and the conclusions drawn from the interviews.

- Criterion 6: Were there instances when hypotheses did not hold up against what was actually seen? How did they affect the hypothesis? The hypothesis derived from the strategies did hold up, but there were instances that could potentially be disruptive to the theories formulated in this research, these instances were mentioned in the discussion section. The challenges encountered during this research were also documented throughout the thesis in the relevant sections. One of the difficulties encountered during the research was the fact that there was no option to track the mobile versus non-mobile access via statistics provided by the web-based tools for the discussion group of the course. This prevented the principal researcher from comparing the mobile activities performed for content access to the mobile activities performed for learner interactions, and consequently pinning down whether the possibility of being able to enter into dialogue with peers had an extra effect on using a mobile device. This was a pity, as the interviews did point towards the fact that dialogue and interaction were pushing participants to use their mobile device, whereas accessing

course content was not seen as pressing for it could be done at any point during or even after the course.

- Criterion 7: How and why was the core category selected? On what grounds? The relation of the categories in relation to the core category was described in full by indicating the relationship between the interaction drivers and the other categories. The categories of ubiquity, safe learning environment, community and time management all had overlapping comments with the core category – interaction drivers. The relationships between all categories came out after several iterations undertaken by the researcher to understand the underlying connections between the codes leading up to the categories.

Ethical Considerations

Conform the academic research guidelines and in relation to the privacy laws, ethical considerations needed to be taken into account for this research study. This research has gotten the full approval of the ethics review board of Athabasca University. As such this research study and the related, drawn-up consent forms as well as methodologies, data storage and analysis have been submitted and screened for scrutiny by the Athabasca University's Ethical Review committee (see appendix A).

Role of the Researcher

As mentioned in the delimitations, the researcher was part of the learning and research environment, as she was the coordinator of MobiMOOC2012.

Creswell (2007) stated that “it is important that the researcher describes their own experience with the phenomenon under study in an attempt to set

aside the researcher's personal experiences so that the focus can be directed to the participants in the study" (p. 159). This is the case for this study, as the principal investigator was the organizer, one of the facilitators and the overall coordinator of MobiMOOC 2012. As such she was directly concerned with the engagement and participation of the (future) adult learners that attended the course. This role could have resulted in bias towards the interpretation of the data, or could have influenced the data provided by the course participants. Nevertheless, the researcher of this study took every measure to decrease – ideally delete – bias from the analysis and conclusions by involving other researchers to have a look at the data, by keeping an open dialogue between her, the research and the course participants, and by questioning her own analysis while keeping in mind her role throughout the process.

In order to provide full transparency of the role of the researcher, it might be important to know that one of the ideas leading up to this study came from the researcher her own professional experiences. The accessibility of course material through mobile devices was of great concern to the researcher as an adult learner, as she was and is both mobile through the demands of her work, and uses mobile devices as one of the major instruments to develop online courses in support of health care workers in low resource settings. Based on her own experience with MOOCs she wondered if it would not be much easier to stay on top of the discussions that were happening in a course if these discussions were also mobile accessible, because this would enable her to keep up with the discussions on a variety of moments and locations. As such this research, as well as the findings are closely knit to the learning and researching questions of the researcher herself. Because of this close

relationship between the research interest and the personal experiences, outside researchers were asked to screen the research and specifically look for parts of the research that needed clarification, or that did not seem to be directly related to the interviews that provided the basis for the resulting strategies.

Chapter IV: Results

Results from Phase 1: CoI, Online Survey and Web-based Data

Looking at the CoI analysis of the Google discussion group that was seen by mobile users as the most important tool used in the course, it showed that mobile users engage more frequently in learner interactions than the non-mobile users. Additionally mobile users engage more in follow-up messages.

When screening other course tools based on their web statistics, it showed that although mobile devices were used to access these more passive, content consuming tools, the duration and frequency with which these resources were accessed seemed to indicate a more frequent non-mobile use.

From the online survey additional points of interest were noted, both on the learner interaction and the mobile side. Mobile users engaged more in learner interaction, which they also found of more importance. The mobile users also felt more comfortable with organizing the course information and they shared the course information with online and offline people outside of the course. A possible reason to investigate this self-regulated learning is the fact that mobile users were less dependent on time and location to access the course.

Linking the web statistics with the mobile device affordances mentioned during the online survey there seemed to be decisive factors in

choosing which device will be chosen on the basis of device affordance, the user mobility and the content accessed.

Results from Phase 2: one-on-one Interviews

Providing mobile access to a MOOC has an impact on the learner interactions happening in that course. Based on the analysis of the one-on-one interviews a series of strategies and consequences could be identified that would improve the impact of mobile access on learner interactions in a MOOC. This is the list of 20 strategies grouped per subject, deriving from the research and which lead to more learner interactions when implemented in a MOOC or open, online course:

Design

1. Offer a ubiquitous learning environment based on BYOD design and content, making use of existing ubiquitous tools (social media, e-mail…) so people can switch between devices at their own preference.
2. Create a user-friendly, one button centralized access learning environment. This easy access must be linked to a clear course overview to increase transparency, user-friendliness and provide the learner with a structure that s/he can organize for self-regulating learning purposes.

Self-regulated learning

3. Provide self-regulated learning strategies to the learners.
4. Enabling immediate access to content material as well as discussion areas adds to time management options and it enables self-regulated learning.

5. Offer synchronous and asynchronous learner activities within a clearly timed course. This provides the necessary freedom for the learner to access, reflect and possibly react on the subject touched at specific moments during the course.
6. Provide a clear timetable of the course, while embedding time for reflection into the course timeline. This suggested flexible, yet cohort move through the course provides an opportunity to nurture reflection time, which is in direct relation to learner interactions.
7. Embed informality in the course to allow increased, autonomous learner interactions to emerge. This room for emergence is induced by the course being both formal and informal, or informal overall and being mobile. The informal character of a course results in participants feeling more at ease with sharing and producing content and engaging in interactions across all their devices.

Digital skills

8. Increase the necessary digital skills of the learner, providing basic training before the course starts via meaningful content-related actions. If a course is accessible for a multitude of devices, it affects (the need for) digital skills, because multiple devices have multiple characteristics and affordances.

Content

9. Offer an array of course materials, varying from bite size snacks to big, time consuming content. The mobility of the user results in the ability to access materials in a variety of locations and times. As such a wide array of course materials is needed to cater to the time

availability of the learner. Offering the learner a choice to tailor the content to their current possibilities.

10. Provide a sense of ownership about the content and the learning: BYOD, contextualized options, this adds to the overall learner motivation.

Human learning environment

11. Ensure a safe learning environment. This essential to increase learner interactions in general. Tolerance, trust, daring to write in a non-native language and knowing that one can pose every content related question and not being judged for either its simplicity or format must be set early in the course.
12. Provide interaction/communication guidelines stipulating balanced communication allowing a safe discussion area to be ensured. By creating a safe learning environment, a broader perspective of personalities are tempted to engage and interact in the course.
13. Profile a central course person(s) (e.g. central coordinator, course support person) who watches over the interactions and links to each participant personally, ensuring a trusting learning environment with room for cultural and language diversity.
14. Watch over the group-size. Community feeling is increased by an intermediate group-size and learner-centered activities, which in turn affects learner interactions.
15. Allow networks to emerge. A community feeling based upon easy (mobile) access increases the formation of a more durable

professional network for those connecting to each other in a way that surpasses the course duration.

Course activities

16. Embed icebreaker activities and/or discussions at the beginning of the course to allow learner interactions to take off. These activities should also be linked to intellectual topics.
17. Ensure discussions or conversation starters. The act of conversation and exchanging ideas leads to more interactions as participants become more familiar with each other on professional grounds.
18. Create meaningful, contextualized, generic, topic related interactions, as they are pivotal to create a course community spirit, because the exchange of professional interests adds to the knowledge need of the learners.
19. Add activities involving non-verbal communication to offer additional understanding, which increases the community feeling, for it might offer an additional insight into dialogue and discussion.
20. Ensure topic relevant learner diversity in examples or actions. Learners can more easily join in those conversations where they detect knowledge niches to which they can provide an answer, strengthening each other.

This list of strategies were derived from the mixed methods analysis of this research, however they need to be put to the test in future research to validate them in reproducible research.

Chapter V: Discussion

This part of the study, takes another look at the research sub-questions mentioned at the beginning of the study and debates them based on the results and experiences coming from this research.

Discussing the Research Sub-Questions

Do course participants access MOOC course locations with their mobile devices if it is made mobile accessible?

This study looked at web-based statistics to see whether MOOC learners do access course locations with their mobile devices. Enabling mobile access in a MOOC does indeed result in learners using their mobile devices to access course locations, as could be seen in the web-based analytics from the MobiMOOC course wiki and YouTube channel. But when looking at the returning visitors and their devices, the statistics seem to indicate there is room for improvement to increase the total user experience while providing mobile access, especially when increased interaction and knowledge deepening is targeted. This fits with what Hassenzahl and Tractinsky (2006) wrote when indicating that "future HCI [Human Computer Interface] must be concerned about the pragmatic aspects of interactive products (i.e. its fit to behavioral goals) as well as about hedonic aspect, such as stimulation (i.e. personal growth, an increase of knowledge and skills), identification (i.e. self-expression, interaction with relevant others) and evocation (i.e. self-maintenance, memories)" (p. 92). This emphasis on the total user experience might then translate to an optimized overall mobile user experience, as the user experience in the sense of a positive Human Computer Interface would,

thus, focus on how to create outstanding quality experiences rather than merely preventing usability problems (Hassenzahl & Tractinsky, 2006, p. 95).

Digging deeper into the available web-based statistics versus the learner analytics some additional points of interest must be shared. The web-based statistics used during this study gave rise to some contemporary educational research challenges.

Due to the fact that MobiMOOC is an open, online course, its content is inevitably in the realm of the Open Educational Resources (OER), this means that people from all around the web can access any content that is shared during MobiMOOC. As such it is difficult to fine-tune the statistics to only represent statistics from actual MobiMOOC participants. If a closed learner statistics analysis needs to be done, this can – as far as the researcher knows – only be done in a closed learning environment (at this point in time). And a closed learning environment is immediately in sharp contrast with learning analytics of an open, online course. Overall it would be of educational and technological research interest to be able to trace learners in their full learning interactions (technology used, time spend in learning locations, content creation and production ….) for it is the researchers opinion that only by enabling detailed mapping of all the educational actions taking place in a learning environment, an optimized learning environment can be reached.

Is there a difference in learner interactions between mobile and non-mobile users in an open, online course / MOOC?

A long road of analysis and reiterations has been travelled since the beginning of this research, which led to new questions and possible answers emerging from all the investigations.

Looking at the data, it is clear that there is a difference in learner interactions between mobile and non-mobile users in an open, online course or MOOC. But it must be said that this is true for truly mobile enabled parts of the course design which lead to more tailored learner interactions based upon the learner needs. This coincides with what Batchelor and Botha (2009) shared: “in the design of learning events, it is always imperative to place the needs of the students [or learners] first” (p. 8) with which they referred specifically to mobile course design. By allowing learners to take initiatives on sharing content and ideas, the discussions resulting from that will be tailored to their needs.

The users with mobile devices tend to engage more in learner interactions when looking at the CoI analysis. But this might be linked to a number of reasons and not be linked to the mere fact that they use mobile devices. Maybe using a mobile device is linked to a certain technology driven, or innovative learner profile? Although when looking at the cross-tabulation looking at mobile/non-mobile users and their social media use, the data from MobiMOOC’s online survey indicate that there is no distinct difference in social media use when looking at the amount of years engaging with social media (see table 16).

Table 16 how many years have you been using social media?

How many years have you been using social media?	Mobile users	Non-mobile users
None	0	0
1 year or less	1	1
3 years or less	5	5
5 years or less	5	5
More than 5 years	7	5

But, when looking at the social media tools used during MobiMOOC, there a difference can be seen between the mobile and non-mobile users, pointing towards a more experienced use of MobiMOOC's social media tools by the mobile users (see table 17).

Table 17 which type of social media tools do you have experience with?

Which type of social media tools used during MobiMOOC do you have experience with?	Mobile users	Non-mobile users
Wiki	17	10
Twitter	16	13
Facebook	14	12
Google groups	15	11
Delicious bookmarks	8	5
YouTube	16	11
Other	2	2

This could indicate that prior experience(s) with specific social media tools might have an effect on the actual interaction frequency as well. Especially when taking into account that digital skills are a factor that influences learner interactions. It is a fact however that digital skills improve the learner's willingness to enter interaction, and this fits with what Arrigo, Kukulska-Hulme, Arnedillo-Sanchez and Kismihok (2012) mentioned: "increasing everyday use of mobile technologies will create its own momentum that will assist informal lifelong learning" (p. 21) which relates nicely to mobile accessible MOOCs.

How do the social versus cognitive academic interactions compare to each sample group (mobile and non-mobile users)?

The CoI framework is a workable instrument to screen learner interactions based on their content and type of interaction. The results of the CoI analysis showed that mobile learners engage more in both the social, as well as the cognitive learner interactions. An interesting finding was that mobile users also had more interactions leading towards the resolution of a specific learner problem. However, during this research a semantic problem arose. When questioning the participants during the one-on-one interviews, most of them pointed out the ambivalence they felt when thinking about how much of their interactions were either social or cognitive oriented. Even though the definitions for social/cognitive interactions provided by the CoI were given, that was not specific enough to allow the interviewees to give a clear indication of which type of interactions they felt they were engaged in. Additionally, it must be said that all of the participants expressed the necessity of topic relevance in order to stay interested in the conversation. This

emphasis on cognitive presence is of interest and relates to CoI theory. Swan, Shea, Richardson, Ice, Garrison, Cleveland-Innes and Arbaugh (2008) already indicated that "social presence acts as an intervening variable, a necessary but not sufficient condition of a satisfying and effective online experience" (p. 8).

What factors influence adult learners to engage in learner interactions in a MOOC?

Taking a look at the findings of this study, one can gather the factors influencing adult learners to engage in MOOC interactions. Some factors are related to infrastructure, of having mobile devices or connectivity at once disposal, other factors are related to personal characteristics of the learner (self-confidence, reflection time). This fits adult learner research, as Lieb (1991) mentioned, it is crucial that adults should be treated as equals in experience and knowledge and allowed to voice their opinions freely in order for them to be willing participators in a learning setting.

An interesting fact coming from the interviews is the combination of a safe learning environment in combination with an open, online course or MOOC. For when hearing popular discourse, open, online spaces are often perceived as unsafe. This creation of a safe, yet open, learning environment is related to a sense of being part of a tolerant community, as well as the feeling that one's opinion is respected. This coincides with what Jonassen (1994) mentioned when indicating that creating a social negotiation environment can foster reflective response and support collaborative construction. Another decisive factor that draws adult learners into learner interactions is their own knowledge need, the fact that they are looking for answers that can help their own knowledge quest. This relates to the overall principles of adult learning as

proposed by Lieb (1991) who noted that learning has to be applicable to their [adult learners] work or other responsibilities to be of value to them. This notion is seconded by Huang (2002) who wrote that "adults become ready to learn when their life situations create a need to learn" (p. 29).

Which factors influence mobile accessibility according to learners?

With regard to the question on what effect mobile accessibility has on learner interactions, a couple of facts could be derived from this research. This increase is in part related to an improved time management, that can be achieved by time and location independence. Mobile access also implies that people use mobile devices to actually access content or interactions. From the interviews that led to the set of strategies, it was made clear that having mobile accessibility allowed people to access content not only at their own availability, but also linking that access to their preferred mobile needs derived from their preferred mobile device. This connects to what Taylor, Sharples, O'Malley, Vavoula and Waycott (2005) mentioned in that "people may or may not carry mobile devices with them – any device represents an embodiment of some of the functionalities a person needs" (p. 151). Having the necessary devices is not enough, it also means the content of the material must be adapted. The fact that participants referred to bite-size content snacks coincides with research undertaken by Bruck, Motiwalla and Foerster (2012) which noted that micro-content delivery enabled users to learn without information overload. Bruck, Motiwalla and Foerster included the importance of investigating whether content delivered is more useful when personalized, collaborative and part of a conversation. Stead (2012) also pointed this out, indicating that it is becoming increasingly important to ensure that good

quality mlearning content can work on many devices, across many networks, and in multiple languages. This embedding of mobile micro content inside of a personalized, collaborative learning environment fits a MOOC.

As time goes by there is also an increasing grey area when looking at mobile devices. At the start of mobile learning, the focus on mobile devices was on cell-phones, PDA's and/or smartphones. But with the onset of tablets and the increased 3G/4G access of netbooks and small laptops, it becomes much more difficult to make a distinction between what consists of a mobile device and how learners use their wide arrange of mobile devices for learning. The analytics are also not always able to trace whether or not a learner is accessing course material or course locations with a mobile device, as it becomes more and more difficult to make a distinction based on operating system and/or browsers used to access material with mobile/non-mobile devices.

Chapter VI: Conclusion

Using the Lessons Learned in Practical Settings

With the increasing interest in MOOCs grabbing the attention of the educational world, research into all the aspects of MOOCs is of timely interest to enable optimal MOOC roll-out. When looking at the vast amount of MOOCs offered by corporate and non-profit entities (e.g. Udacity, Canvas.net, Coursera, EdX – the so called X-MOOC) in addition to the more philosophical strand that gave rise to MOOCs (the so called connectivist MOOCs, or C-MOOC, with George Siemens and Stephen Downes as its main drivers), it cannot be denied that there is a big interest in designing a MOOC that will have a lasting impact on its participants.

In order to provide an optimal learner experience in any MOOC, it is pivotal that the course design, as well as the overall learner experience is addressed and researched so that future MOOCs will ensure knowledge creation and a maximal return for the learners wanting to participate in them. MOOCs are not only of interest to the universities who are now at the foreground of exploring the options of MOOCs, but they also have the potential of addressing professional development in all fields.

The researcher hopes that this research will tempt knowledge managers, instructional designers, trainers, as well as individuals with an interest in online learning environments to embed some of the findings in their future courses and trainings. Opening up an online course environment to better suit the learner and her or his mobile learning options, will no doubt result in an improved learning experience. Enhancing learner interactions will lead to a more profound understanding of any subject matter delivered through the means of a MOOC.

Future Research

Researching an open, online learning environment, such as a MOOC, brings along a lot of challenges. Nevertheless these challenges are so entangled in contemporary learning (formal and informal, temporary and lifelong…) that we must proceed in researching these types of learning environments and combining different research disciplines to come to a deeper understanding of these types of learning environments in relation to the emerging new, educational technologies. Some of the strategies listed in the result section of this thesis have links to proven best practices of Distance

Education, it will be off interest to zoom into mobile MOOC specific learner interaction optimization.

Looking at the findings of this research study, an additional couple of areas for future research can be pointed out to move towards an improved learner environment for open, online courses.

Follow up research needs to be planned to cross-check the strategies and consequences put forward in this thesis, and see whether the implementation of the guidelines put forward here, can actually result in improved learner interactions and whether this increase of interactions have an effect on learning outcomes. If so, in follow up research a grounded theory can be produced related to the effect of mobile accessibility on learner interactions in a MOOC.

In relation to CoI research and the knowledge deepening that was mentioned during phase 2, an relevant link can be made between the two. Swan et al. (2008) remarked that "developing ways to move students toward higher levels of cognitive processing are a latent but central objective in many higher education courses" (Swan, Shea, Richardson, Ice, Garrison, Cleveland-Innes, Arbaugh, p. 8) and they added that the fact that "cognitive presence is composed of elements across the spectrum of inquiry: triggering events, exploration, integration and resolution" (Swan, Shea, Richardson, Ice, Garrison, Cleveland-Innes, Arbaugh, p8). As deepening knowledge was indeed emerging as a factor from learner interactions, one can link this to the CoI data analysis section, as the mobile group displayed more follow-up messages than the non-mobile group. This opens up an interesting strand of future research.

MobiMOOC by its content and format attracted specific participants already having several digital skills. This means that any findings derived from this research might be linked to those types of participant profiles. In an attempt to come towards an all participant embracing research, research has to be done on the impact of ubiquitous access for courses that are populated by a variety of learners.

This research only looked at a small group of course participants. It would be of interest to plan similar research for bigger open, online courses to see whether the results from this research can be reproduced and supported under those conditions.

More holistic learner analytics need to be in place to grasp the total learning path of participants in an open, online course. As the participants not only read content in a variety of online spaces, but they also add content all over the web. This results in a challenging, educational research environment.

As time goes by one can imagine that within the next few years there will be no more talk on mobile devices, or the distinction between online or offline (read face-to-face) learning, as contemporary learning becomes much more ubiquitous in this newly developing Knowledge era. However this brings along the importance of researching learning as a whole: bringing together researchers from various educationally related disciplines to move towards a more comprehensive understanding of learning in this new era. For it is not only the learner that is becoming much more global, but the researcher as well, which inevitably has an effect on the need to redefine the open versus closed science dichotomy. It is the principal researcher's opinion that if we – as researchers - want to create ground breaking research, we will have to dive

into open (educational) research, and gather multiple research institutes to come to global research efforts that are able to come up with the wo/manpower, technology and knowledge to reach the next level of expertise and research excellence.

The group size was mentioned by interviewees as a defining factor for creating a community feeling. They reported that other open, online courses they were involved in had group sizes that were too large to get a community feeling going. The cut off for optimized community feeling with regard to learner interactions in an open, online course is an interesting subject for future research.

Conclusion

This thesis study used a sequential explanatory mixed methods approach to investigate the impact of mobile access on learner interaction in a MOOC. The study showed that opening up a MOOC for mobile access has immediate impact on learner interactions, as participants with mobile devices tend to interact more with their fellow learners then their non-mobile colleagues. This was deduced from the mixed methods approach looking at web-based statistics, an online survey, an analysis using the Community of Inquiry framework and one-on-one interviews with volunteers.

The study gave rise to a set of 20 strategies that can optimize the impact of mobile access on learner interactions in a MOOC. However, future research needs to support the findings that came out of this study, embracing a larger learner population from a more varied background. Overall, this research hopes to add to the body of knowledge strengthening the field of distance education.

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Appendix A - Ethics Approval

MEMORANDUM

Athabasca University
Canada's Open University

DATE: July 6, 2012

TO: Inge de Waard

COPY: Dr. Mohamed Ally (Research Supervisor)
Janice Green, Secretary, Athabasca University Research Ethics Board
Dr. Simon Nuttgens, Chair, Athabasca University Research Ethics Board

FROM: Dr. Rick Kenny, Chair, CDE Research Ethics Review Committee

SUBJECT: **Ethics Proposal #CDE-12-06:** ***"Impact of mobile accessibility on learner interaction in an informal, open, online course"***

Thank you for providing a revised application on July 2 which incorporated the remarks conveyed by the Centre for Distance Education (CDE) Research Ethics Review Committee via informal e-mail from the committee chair June 25, 2012.

On behalf of the CDE Research Ethics Review Committee, I am pleased to confirm that this project has been granted ***FULL APPROVAL*** *on ethical grounds.*

You may proceed with the research once the minor changes listed below have been documented *in a final revised version of the application submitted* ***for file purposes only*** *(no further review required). Please highlight the changes in yellow before saving and submitting.*

1. ***Appendix 3: Online Survey Questions***
   - *General section, Q #5: Typically, you would ask for this information in the information letter or consent form. That is, ask them to indicate on the consent form (or email back to you) that they only wish to participate in the survey part of the research, or if they would also be willing to participate in a survey (if selected). If you keep this statement here in the survey, then clarify that this is to ask if they would be willing to participate in the interviews since they are obviously doing the survey part here.*

2. ***Appendix 4: Informed Consent Form for Online Survey***
   - *Purpose of the Study section, first sentence: (MDDE) should be corrected to read (M.Ed. in D.E.)*

- *Confidentiality section, fourth sentence:* "Choosing NOT to include an email address will automatically indicate that you do NOT wish to be contacted further" – *see comments re: Appendix 3 in #1, above.*

  Rather than asking for an additional consent for the interview in the survey, provide a second, direct statement in the consent form whereby the participants state whether they would also be willing to participate in the interview. It is recommended that you provide two choices at the bottom of the consent form and ask about interviews right away, rather than to have it in the survey itself.

  This would also save you having to provide the second Informed Consent Form for Interviews (Appendix 5) and having to send it out.

- *Dissemination of the research section: Add current required standard language for student research:*

  "The existence of the research will be listed in an abstract posted online at the Athabasca University Library's Digital Thesis and Project Room; and the final research paper will be publicly available."

- *AU REB standard language statement is to be placed below the researcher and supervisor contacts paragraph in its own paragraph, worded EXACTLY as follows:*

  "This study has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this study, please contact the Office of Research Ethics at 1-780-675-6718 or by e-mail to rebsec@athabascau.ca "

  (NOTE: Language and REB contact information is incorrect in Appendix 5. This was from an older version which is no longer used, and does not conform to the application Guidelines.)

The approval for the study is ***valid for a period of one year from the date of this memo.*** *If required, an extension must be sought in writing prior to the expiry of the existing approval.* ***A Final Report is to be submitted when the research project is completed.*** *The reporting form can be found online at http://www.athabascau.ca/research/ethics/ .*

This approval of your application will be reported to the Athabasca University Research Ethics Board (REB) at their next monthly meeting. The REB retains the right to request further information, or to revoke approval at any time.

As implementation of the proposal progresses, if you need to make any significant changes or modifications, please forward this information immediately to the CDE Research Ethics Review Committee via rebsec@athabascau.ca , for further review.

If you have any questions, please do not hesitate to contact Janice Green at

janiceg@athabascau.ca or rebsec@athabascau.ca .

Appendix B - Online Survey Questions

This is the list of survey questions that was sent to the MobiMOOC participants by the end of week 2 of the course (i.e. 21 September 2012). The software used to distribute the survey was Formsite (www.formsite.com).

The survey was adaptable to the answers given, meaning that those question groups that are not relevant to one of the target groups will be automatically skipped by the survey software.

The following definition of learner interaction was provided in the introduction section of the survey:

The term ‘learner interaction’ refers to all interactions that are undertaken by (adult) learners. These interactions can cover any content (social and/or intellectual/academic) and are reflected in written dialogues and or discussions, connecting to other participants via social media commenting, engaging in informal information exchange, or simply communicating.

The survey questions mentioned here are categorized as followed:

- MC = multiple choice
- MA = multiple answers
- Y/N = yes or no answer
- LS7 = 7-point Likert scale
- OQ = open question
- OA = open answer (used for ‘other’ option)

General section

1. What is your name (OQ)

2. What is your surname (OQ)

3. What is your gender? (MC)

- Female
- Male
- Other

MOOC context

4. Is this the first time you are engaged in a MOOC? (Y/N)

5. Have you followed an online course before?

6. How would you describe your learning experience in a MOOC (for instance: chaotic, innovative, inspiring, overload…). (OQ)

7. Where you able to self-regulated / organize your learning amidst the content and discussions that were/are shared in MobiMOOC? (MC)

- yes
- not at first, but as I got into it yes
- no

8. What is your opinion on the fact that the design of MobiMOOC was adapted as the course went on? (OQ)

9. Which type of learner do you consider yourself to be? (MC)

- a lurking participant (passive but following)
- a moderately active participant
- an active participant)

10. Do you feel that you engage in more or less interactions with your fellow MOOC learners then in other online courses? (MC)

- I do not engage in interactions with fellow MOOC'rs

- I engage in substantially less interactions with MOOC'rs compared to learners other online courses
- I engage a little less in interactions with MOOC'rs compared to learners in other online courses
- I engage equally as much with MOOC'rs compared to learners in other online courses
- I engage a bit more in interactions with MOOC'rs compared to learners in other online courses
- I engage substantially more in interactions with MOOC'rs compared to other online courses
- I only engage in interactions in MOOCs, not in other online courses

Social learner interaction section

11. Which type of learner interactions did you engage in during the course up to this point? (MA)

- posting questions
- answering questions,
- writing blogposts
- using twitter
- sending emails to other participants
- writing an mLearning project
- collaborating on a project
- informal chatting/writing
- chat during WizIQ webinars
- other (OA)

12. How important is it for your personal learning to engage in learner interaction? (LS7)

- Not at all important
- Low importance
- Slightly important
- Neutral
- Moderately important
- Very important
- Extremely important

13. Have you connected to any other MobiMOOC participants in order to collaborate on projects after the MobiMOOC? (Y/N)

14. Did you share what you have learned in the MobiMOOC with people outside of MobiMOOC? (colleagues, friends, network)? (Y/N)

12.a If so who were they? (MA)

- face-to-face colleagues
- virtual colleagues
- face-to-face network
- your online network
- friends
- family
- classmates from other courses
- Other (OA)

12b. If you shared information learned in this MOOC with others, how did you share it? (MA)

- talked to them in person

- called them
- emailed them
- tweeted the information
- posted it on facebook
- put it on a blog post
- printed it in a newsletter
- other (OA)

15. What stimulates you to enter into social learner interactions? (OQ)
16. What stimulates you to enter into academic/intellectual learner interactions? (OQ)
17. What are your benefits for engaging in social, personal or informal learner interactions? (OQ)
18. What are your benefits for engaging in academic/intellectual learner interactions? (OQ)

Social media use and experience

Social media (or Web2.0) are any online tools that allow the creation and exchange of user-generated content (Kaplan and Haenlein, 2010).

19. How many years have you been using social media (blogs, twitter, facebook…)? (MC)

- none
- 1 year or less
- 3 years or less
- 5 years or less
- more than 5 years

20. Which type of social media tools used during MobiMOOC do you have experience with? (MA)

- wiki
- twitter
- facebook
- google groups
- delicious
- crowdmap
- netvibes
- youtube
- skype
- other (OA)

21. Have you been using a mobile device to access the MobiMOOC resources? (Y/N) (this question will skip the mobile section for those respondents answering No).

Mobile device use and experience section (to be skipped by those participants not using a mobile device to access MobiMOOC)

22. Which mobile devices do you have? (MA)

- mp3
- digital camera
- cell phone
- smartphone
- tablet pc
- Netbook

- eReader
- other (OA)

23. How many years have you been using mobile devices for learning? (MC)

- none
- 1 year or less
- 3 years or less
- 5 years or less
- 7 years or less
- more than 8 years

24. For what reason did you access the material with a mobile device (MA)

- flexibility to access no matter what time
- flexibility to access material no matter where I was
- the material was easily accessible through a mobile medium
- It was useful for my context at the time
- other(OA)

25. Which MobiMOOC resources did you access via mobile? (MA)

- google group
- course wiki
- facebook
- twitter
- youtube
- delicious
- skype
- synchronous sessions

- other (OA)

26. For which type of learner interaction did you use a mobile device to engage in the interaction while adding content? (MA)

- posting questions
- answering questions,
- commenting on threads/posts/tweets
- using twitter: tweeting to other participants
- sending e-mail messages to other participants
- collaborating on a project
- informal chatting
- other.

27. What factors influence your choice between a computer and a mobile device the most? Please select all that apply? (MA)

- cost of mobile data plan
- screen-size
- physical keyboard
- device functionality (e.g. using multiple applications at the same time, typing vs making a phone call...)
- internet connection speed
- choice of applications
- ease of use in general
- old habit
- other (OA)

Other section

28. Is there anything else you would like to share? (OQ)

29. Are you willing to participate in a 45 minute one-on-one interview as a follow-up research? (MC: yes, no – but do send me the final report, no)
30. If you choose Yes, or you are interested in the research report, please fill in the email where I will be able to reach you for the follow up research. Thanks in advance!

Appendix C – Information and Consent Form

Informed Consent Form for an Online Survey and/or Interview participation

Impact of mobile accessibility on learner interaction in an informal, open, online course

This letter is to invite you to participate in an innovative study of the impact of mobile accessibility on learner interaction in an informal, open, online course. My name is Inge de Waard and I am a graduate student currently in my thesis stage at Athabasca University (AU). Other members of the team conducting this research include Dr. Mohamed Ally, Chair and Professor Centre for Distance Education at Athabasca University, and Dr. Marti Cleveland-Innes, Professor, with the Centre for Distance Education at AU.

Purpose of the Study:
This research will be part of a thesis work to acquire a Master Degree in Education in Distance Education (M.Ed. in D.E.) at the Athabasca University. The study will be conducted by Inge de Waard, graduate student at Athabasca University. The purpose of this study is to come to a theory on how mobile device access does or does not increase learning interactions (social as well as academic/intellectual) in an open, online course environment that is social media rich, in this case MobiMOOC. MobiMOOC is an open, online course on the subject of mobile learning (mLearning).

What will be done:
This research consists of two parts. You can choose freely whether to take part ONLY in the first part of the study (the survey) OR to participate in both research parts (survey and interview). You can indicate your choice of participation at the end of this consent form.

Part 1: Research survey
The survey will be sent by the end of week 2 of the MobiMOOC course (i.e. 21 September 2012). You will complete a survey, which will take 20-30 minutes to complete. The survey includes questions about your course interactions, social media use and mobile use and experience.
After you complete the questionnaire, I will examine some of the collaborative learner interactions based upon anonymous and overall browser entries to get an idea of the mobile device browser frequencies that are used during MobiMOOC.

Part 2: Research interview
The interview for which you are being asked to participate in, is a part of the research study. The interviews will be one-on-one using Skype or another online conferencing tool. The researcher is specifically interested in the factors that engage learners to create or engage in learner interactions.

Your participation in the second part of this study will consist of an interview lasting approximately 45 minutes. You will be asked a series of questions

about your learner interactions during MobiMOOC (comments in social media spaces, topic discussions you have started or engaged in, personal chats with MobiMOOC peers…). You are not required to answer the questions. You may pass on any question that makes you feel uncomfortable. At any time you may notify the researcher that you would like to stop the interview and your participation in the study. There is no penalty for discontinuing participation. The interviews will be recorded to help me (Inge de Waard, researcher) accurately capture your insights in your own words. The recordings will only be heard by me for the purpose of this study. If you feel uncomfortable with the recording, you may ask that it be turned off at any time. You also have the right to withdraw from the study at any time. In the event you choose to withdraw from the study all information you provide (including recordings, secondary data, any data related to your person) will be omitted from the final thesis and be destroyed.

Benefits of this Study:
You will be contributing to knowledge about learner interactions for course participants engaged in an open, online course. This specific research will take a closer look at the impact mobile devices might have on the learner interactions in an open online course, in this case MobiMOOC.
As a **bonus, you will receive the final report with more detailed information about the research findings once the research is finished.**

Risks or discomforts:
No risks or discomforts are anticipated from taking part in this study. If you feel uncomfortable with a question in the survey or during the interview, you can skip that question or withdraw from the study altogether. If you decide to quit at any time before you have finished the questionnaire, your answers will NOT be recorded. Data can be removed on your request up to the point that the analysis begins.

Confidentiality:
Your responses will be kept completely confidential. I will NOT know your IP address when you respond to the Internet survey. With regard to your name and e-mail address, those will not be archived for later retrieval. Each of the participants will be assigned a participant number, and only the participant number will appear with the survey responses. Only the principal researcher will see your individual survey responses and the results of the analysis. The list of e-mail and weblog addresses of our participants will be stored electronically in a password protected folder; a hard copy will be stored on a non-connected, stand-alone hard disk that is kept in a locked closet in a secured office. The data will be stored for five years after which it will be expunged

Dissemination of the research: Insights gathered by you and other participants will be used in writing a qualitative research report, which will be read by my professor and presented as a thesis for the Master in Distance Education at Athabasca University (MEd. In D.E.). Though direct quotes from you may be used in the paper, your name and other identifying information will be kept anonymous. The existence of the research will be listed in an

abstract posted online at the Athabasca University Library's Digital Thesis and Project Room; and the final research paper will be publicly available.

If you have any questions about this study or would like additional information to assist you in reaching a decision about participation, please feel free to contact Inge de Waard via Skype: Ignatia_dW or at +32 479 789 837 or ingedewaard@gmail.com or Dr. Ally at **1-800-788-9041 ext 6406** *or mohameda@athabascau.ca.*
This study has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this study, please contact the Office of Research Ethics at 1-780-675-6718 or by e-mail to rebsec@athabascau.ca

Thank you in advance for your interest in this project. To participate in this research, please **fill in the three question survey by 5 September, 2012 or earlier: add your** email, along with **your name** which will be used to contact you during the study and select one of the following statements in the survey:

> "Yes, I accept to participate in the research study on the impact of mobile accessibility on learner interaction in an informal, open, online course to be conducted September – December 2012, at Athabasca University. I only want to participate in part 1 of the research: the online survey. "
>
> OR
>
> "Yes, I accept to participate in the research study on the impact of mobile accessibility on learner interaction in an informal, open, online course to be conducted September – December 2012, at Athabasca University. I want to participate in both parts of the research (online survey and interview). "

This statement will indicate your consent to participate in the study. Volunteers will be contacted by email at which time they will get more information on the research timeline and locations.

Yours sincerely,
Inge de Waard