Exploring Instructor Contributions to Discussions in Massive Open Online Courses (MOOCs)

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Submitted in accordance with the requirements for the degree of Doctor of Philosophy

The University of Leeds

School of Education

September 2019

i

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Academic publications arising from this thesis

1) Goshtasbpour, F., Swinnerton, B. and Morris, N. (2019). Look who's talking: Exploring instructors' contributions to Massive Open Online Courses. *British Journal of Educational Technology.* https://doi.org/10.1111/bjet.12787

The candidate was the lead author of this publication and was solely responsible for writing it. The role of the two co-authors was limited to help with the structuring and editing of the manuscript.

Aspects of the publication that are discussed and elaborated upon in this thesis include:

      Chapter 3: 3.2, 3.4.3, 3.4.4, 3.4.5, 3.4.7, 3.4.8 and 3.6
      Chapter 4: 4.2, 4.3 excluding 4.3.6 and 7
      Chapter 6: 6.6

2) Goshtasbpour, F. (2017) Educators' Participation in MOOCs: Barriers and Disablers. *Westminster Higher Education Forum briefing document* (Technology in Higher Education-Data analytics, the learning experience and next steps for MOOCs). http://www.westminsterforumprojects.co.uk/order/tech-in-HE-17.

No parts of this publication are used in the thesis.

Acknowledgments

This thesis represents the end of a long, difficult at times but extremely rewarding journey. There have been many individuals along this journey who have supported and encouraged me, and I am deeply grateful to them and would like to thank them for their guidance and support.

I would like to express my deepest appreciation for my supervisors Professor Neil Morris and Dr Bronwen Swinnerton for their patience, guidance, and support. I could not have asked for a more supportive and understanding supervisory team, who work exceptionally harmoniously together and have made my journey a smooth and pleasant one. Their thought-provoking discussions, detailed feedback and useful suggestions to enhance this study have been invaluable in reaching this point. I wholeheartedly thank them not only for their academic guidance and for showing me how systematic and rigorous research is done, but also for the many great opportunities they gave me, and which enabled me to grow academically.

Similar profound gratitude goes to Dr Paul Gray (Manchester Metropolitan University), who has been my best (critical) friend and unofficial supervisor from the beginning of this PhD. Thank you for your generous support, vital help at different stages, constructive feedback, critical guidance and great Friday PhD catchups. I could not have made it to the finish line without you. You are what any PhD student would wish for.

I am also grateful to the MOOC instructors in this study for sharing their experiences and insights so willingly and generously. The most enjoyable part of this journey has been interviewing them and learning about their approaches and practices. I hope this thesis accurately reflects their input.

I would also like to offer special thanks to my dear friends who started their doctoral journey with me: Dr Lucy Taylor and Dr Tina Papathoma. Talking to them and bouncing ideas off them has been very helpful.

A special thanks goes to my family for their love and support during the last three years. Thank you for being with me on this long journey and comforting me at difficult times.

Finally, I thank anyone who helped in any way, shape or form: friends and colleagues at Manchester Metropolitan University, the Open University, FutureLearn Academic Network (FLAN) and the University of Leeds - too numerous to name individually, Thank you!

Abstract

MOOCs as a new form of online education have attracted the attention of researchers; however, little research has examined MOOC instructors' practices particularly in delivering the courses. Therefore, this study set out to explore what instructors do in MOOC discussion areas and how learners react to them.

Drawing on an extended mixed design, this research investigated the level (frequency) and type of instructors' contributions to discussion areas, and the ways and extent to which learners engage with them. First, the content of 818 learner-instructor conversations of three FutureLearn MOOCs were analysed based on the Community of Inquiry (CoI) framework. Instructors' contributions were then studied for learners' explicit (responding) and implicit (liking) engagement. In addition, the changes to instructors' contributions and learners' engagement over the duration of courses were examined to explore the impact of time on instructors' and learners' discussion activities. Finally, in-depth qualitative interviews were conducted with instructors to understand the role of their contributions in learning.

The findings revealed that social postings are the clear majority of instructor contributions, whilst postings related to teaching and cognitive presences constitute a smaller proportion. This indicates that instructors do not focus on all contribution types equally and that there is an imbalance between the social and content-related support that learners receive. More specifically, the results showed that instructors' teaching contributions focus on facilitating the learning discourse and less on providing direct instruction. This suggests that instructors take a facilitative rather than a directive or leading role in FutureLearn MOOCs. The predominance of instructors' social contributions, on the other hand, signifies the social emphasis of instructors' discussion activities. Furthermore, the analysis showed that learners engaged with 42% of instructors' contributions by responding to or liking them or a combination of both. Most learner engagement was evident when instructors' contributions were focused on teaching presence. The most engaging combination appeared to be a high level of direct instruction and facilitating discourse in a contribution and the lowest level of affective responses.

Considering the level of instructors' contributions, more than half of contributions occurred at the beginning of MOOCs, and this proportion had more than halved by the middle and reached its lowest level at the end of MOOCs. Despite the decrease in all contribution types over time, the relative importance of each type changed.

This study also showed that although the Community of Inquiry framework required re-operationalisation and re-conceptualisation of some indicators and the introduction of three new ones to describe the dynamics of learner-instructor interactions in MOOCs, it provided a powerful lens to explore MOOC instructor discussion activities.

While this study has resulted in an enhanced understanding of instructors' contributions to the MOOC discussions, and offered new insights into learners' engagement with instructors, it revisited the CoI framework in a MOOC context. Thus, the significance of this study also lies in proposing a revised model that can inform future research into learning and teaching in MOOCs or other open, scaled and informal educational contexts.

Table of contents

List of figures

List of tables

Definitions of key terms

While a variety of definitions have been suggested for the following terms, this thesis uses the following definitions for the purpose of clarity.

Contribution: This term refers to a comment made by an instructor (or a learner) within the discussion areas of a MOOC. It is what an instructor or a learner types and then shares with others by pressing "post" on the platform. *"Contribution", "comment", "post" and "posting"* are used interchangeably in this study.

> **Type of Contribution:** Refers to the content and quality of a contribution based on the three presences of the Community of Inquiry framework, i.e. social, teaching, and cognitive presences. A contribution can include a combination of two or more presences.

> **Level (frequency) of Contribution:** Refers to the number of contributions made by instructors over the duration of a MOOC.

Discussion: The word discussion refers to the discussion areas within a FutureLearn MOOC. There are two types of discussions devised by the FutureLearn platform to facilitate conversations among learners and between learners and instructors:

1- "Discussion areas", which are designed alongside each content step or teaching element to enable learners to have topic-related conversations.

2- "Discussion steps", which are connected to a discussion task to allow learners to engage in more reflective conversations and synthesise their knowledge on a topic.

In this study, instructor contributions to both discussion types are examined.

Instructor: It is an umbrella term for the three teaching roles of *lead educator*, *educator* and *mentor* specified by the FutureLearn platform. Since the study examines the findings across these teaching roles, the term instructor helps differentiate when the three roles are used collectively versus individually.

> **Lead Educator**: is an academic with specialist knowledge of the course subject who also leads the design, creation and delivery of the course in terms of subject-specific knowledge. There is no limit to the number of instructors who may be assigned this role within a course; however, MOOCs in this study have only one lead educator.

> **Educator**: is an academic with specialist knowledge of the course subject. Educators are engaged with design, production and delivery of a MOOC as a part of the teaching team.

Mentor: is an academic with a good understanding of the course subject, who can help guide discussions. Mentors can have varying levels of responsibility depending on the structure of the teaching team. Some are heavily involved with teaching and course creation, even appearing in videos or writing weekly emails. Others have only a support role and respond to comments or escalate them to the lead educator and educators.

Teaching team: consists of a combination of lead educators, educators and mentors and sometimes a guest educator. A teaching team in this study does not include *hosts* or any other assigned roles within the course.

Chapter 1 **INTRODUCTION**

1.1 Introduction

This doctoral study focuses on Massive Open Online Courses (MOOCs) as a new form of online education and investigates instructors' contributions to them. It explores the ways and the extent to which instructors contribute to learning in MOOCs and the way these contributions are received by learners. It draws on the conversations between instructors and learners in discussion areas, as well as the experiences of a group of instructors, to understand the role of instructors' contributions in learning in open and scaled online settings.

This chapter provides the background and rationale for this study, introduces its research aims and outlines the thesis structure.

1.2 Background and context

To address issues of education access and affordability, open initiatives in higher education have been shaped around the creation and development of open course content, open source software, and licensing tools, whose output is labelled as Open Educational Resources (OERs) (Albright, 2005; Tait, 2018). The movement associated with OERs is an attempt towards sharing educational resources and practices by eliminating social, economic and cultural constraints that limit access to education (Zheng *et al.*, 2016; Garrison, 2017). MOOCs, as one of the most recent developments of the OER movement (Petkovska, Delipetrev, and Zdravev, 2014; Schultz, 2014) have the potential to serve previously unattended populations of learners (e.g. refugees or underprivileged learners in developing countries) and meet the needs of a changing learner population, i.e. non-traditional part-time students (Siemens, 2015). These courses, by definition, aim to provide online learning that is both open and massive (Ferguson and Sharples, 2014).

Although it is difficult to provide a precise definition of MOOCs due to the use of the term by different initiatives and approaches (Knox, 2015), the definition provided by Jansen and Schuwer (2015:4) serves the purpose in this study:

> *Online courses designed for large numbers of participants that can be accessed by anyone anywhere as long as they have an internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for free.*

Massiveness in these courses refers to their scalability and capacity to serve large numbers of learners (Knox, 2015), while their openness, depending on the type of MOOC, is interpreted as *open access* (being open to all and for free), *open education*, (no physical or temporal barriers to participation), and *open scheduling* of the course (learning at any time and with any pace) (Kolbas, Mackintosh, and Murphy, 2015). Another interpretation of open is the openness of learning objectives (personalised learning goals), subject choice and the form of participation (full or selective participation, lurking or active participation) (Schultz, 2014). These courses are offered entirely *online* via the internet, and the term *course* refers to the course-like structure of MOOCs in terms of having a defined length (Phan, 2018), and the need for course designers to decide about the course goals, content, level and pacing (from entirely self-paced to set weekly activities with fixed deadlines) (Kolbas, Mackintosh, and Murphy, 2015).

Research into MOOC learners shows a diverse and heterogeneous learner population in these courses in terms of demographics and location (DeBoer *et al.*, 2013; Macleod *et al.*, 2015; Li, 2019). For example, DeBoer *et al.* (2013) found that learners participated in their MOOCs from nearly every country in the world although learners' level of participation from each country was varied. In terms of education and profession, most MOOC learners are educated to degree level and higher (Ding *et al.*, 2014; Liyanagunawardena, Lundqvist, and Williams, 2015; Macleod *et al.*, 2015), and are employed (Christensen *et al.*, 2013; Morris, 2014). However, there is less agreement with regards to learner gender especially considering the MOOC platform. Some studies such as Liyanagunawardena, Lundqvist, and Williams (2015) or Ho *et al.* (2014) have shown that most MOOC learners are male, whereas other research has identified female participants as predominant (Morris, Swinnerton, and Hotchkiss, 2015). Learners' motivations for enrolling in MOOCs are also diverse, and range from curiosity, refreshing a skill, and learning about a new topic, to advancing a current job (Christensen *et al.*, 2013; Hew and Cheung, 2014). As a result, learners' patterns of participation during a course vary and they can be recognised as *lurkers or observers* (Hill, 2013; Milligan, Littlejohn, and Margaryan, 2013), *auditors* (Kizilcec, Piech, and Schneider, 2013), *selective users* (Lust, Elen, and Clarebout, 2013), *keen completers* (Ferguson and Clow, 2015), *drop-ins* (Hill, 2013) and *disengaged* learners (Rodrigues *et al.*, 2016).

MOOCs have also had some benefits for instructors by allowing them to experience teaching to the described large and demographically diverse learner population. These courses have provided instructors with a richer understanding of online teaching at scale (Hew and Cheung, 2014; Hew, 2018), and an opportunity to experiment with new approaches to teaching and learning with technology (Lane, Caird, and Weller, 2014; Blackmon, 2018). In addition, feedback from forums, and the availability of learning

analytics provide instructors with feedback about their teaching (Loeckx, 2016), which has sometimes led to changes in their online and face-to-face practices (Sheard *et al.*, 2014; Najafi *et al.*, 2015). Furthermore, MOOCs have helped professional growth and increased the visibility and reputation of many instructors within their discipline (Dolan, 2014; Blackmon, 2018) whilst providing them with new research opportunities (Zheng *et al.*, 2016).

Nevertheless, despite the enriching experience MOOCs can provide, teaching on them is challenging (Bali, 2014; Castrillo de Larretta-Azelain, 2014; Blackmon, 2018). Teaching, engaging learners and creating adaptive learning paths for large numbers of learners who vary in age, experience, language, motivation and educational background is not easy (Hew, 2014; Hew and Cheung, 2014; O'Donnell *et al.*, 2015), and requires instructors to rethink the content and teaching strategies they use (Castrillo de Larretta-Azelain, 2014). In addition, instructors often cannot participate as actively in the learning process as they were able to in closed online courses (Toven-Lindsey, Rhoads, and Lozano, 2015), since they cannot provide personalised support to individual learners. Another major challenge for MOOC instructors is managing and facilitating interactions (learner-learner and learner-educator interactions), which are central to MOOC pedagogies (Fournier, Kop, and Durand, 2014; Khalil and Ebner, 2015). The scale and openness of these courses have affected the interactions between learners and instructors, as "learners outnumber educators by 1,000 to one or even more" (Ferguson and Sharples, 2014:103). As a result, these interactions are relatively low (Miyazoe and Anderson, 2013), and this can in turn lead to increased psychological and communication space between the learners and instructors (transactional distance), and decreased learner performance and satisfaction (Moore, 2013). Thus, it is particularly important to explore the ways instructors support learning through their interactions with learners in this open and scaled context.

1.3 The research rationale

Despite the growing number of MOOC offerings, the research in some areas of these courses has fallen behind (Siemens, Gašević, and Dawson, 2015). Between 2014 and 2016, several studies and systematic reviews highlighted the absence of focus on instructors in research into MOOCs (Castrillo de Larretta-Azelain, 2014; Ross *et al.*, 2014; Stephens-Martinez, Hearst, and Fox, 2014; Hockly, 2015; Bayne, 2016) despite the key role instructors play in learning (Kozan, 2016; Cohen and Holstein, 2018; Hew, 2018). The Raffaghelli, Cucchiara, and Persico (2015) systematic review of 60 articles on MOOCs published between 2008 and 2014, revealed that only four studies

documented the instructors' practices and teaching processes. Three years later, systematic reviews still show little research into MOOC instructors. Zhu, Sari, and Bonk (2018) examined 197 empirical studies published between 2014 and 2017, and only five of these (2.5%) focused on instructors. Blackmon (2018) also justifies the need for her phenomenography of MOOC instructors by identifying instructors as a missing component of MOOC literature and research. In her earlier study in 2016, she emphasises that for a better understanding of MOOCs, researching learner perspectives and performance is important; however, understanding the instructors' perspectives and practices is essential too. Lowenthal, Snelson, and Perkins (2018) echo the same concern. Moreover, Bayne and Ross (2014:68) criticise the research community's neglect of human-teacher presence in MOOC studies. Although Knox (2013) attributes this neglect to the tendency towards designing these courses around reliable resources where the role of teaching seems to be frequently ignored, Bayne (2016) states that regardless of disaggregated and re-adjusted instructor functions in MOOCs, "the need to value the notion of the teacher within the MOOC remains". Therefore, as Evans and Myrick (2015) suggest, the research lens should be turned to instructors in order to obtain a more comprehensive picture of learning in MOOCs. Hence, it is timely to focus on instructors' practices and explore how they contribute to learning in MOOCs, particularly in discussion areas where they interact with learners.

1.4 The research importance

As Sinclair *et al.* (2014:57) state, attending to the complexity of the MOOC instructor's practices ultimately supports the dialogue about learning – "dialogue that, at present, typically focuses on the student or the technology, but is silent on the matter of the teacher". In addition, such studies can provide a next step for research examining the impact of instructor contributions on learning while helping current MOOC instructors become more effective in what they offer. It also helps address two priority areas identified by Ferguson *et al.* (2018:206) for MOOC development, i.e. "supporting discussions more effectively" and "developing educator teams". As Ross *et al.* (2014:63) suggest, focusing on instructors "is an area that would richly reward the attention of researchers" and could contribute to the enhancement of this new form of education as well as any other type of teaching at large scale (Kop, Fournier, and Sui Fai Mak, 2011; Richardson *et al.*, 2015). Finally, as Siemens, Gašević, and Dawson (2015) maintain, even if the conversations around MOOCs decline, the outcomes of MOOC studies can be applied to other massive or informal educational settings.

1.5 The research aims

This study aims to address the gap in MOOC literature related to instructors' practices. According to Clarke and Bartholomew (2014), previous studies examined MOOC instructor contributions to discussion areas at a surface level and mainly by considering the frequency of instructor participation. They suggested that studies should "look deeper into what an instructor says in asynchronous discussions" (p:2). Therefore, this study investigates the quality (type) and quantity (level) of instructors' contributions to MOOC discussions over the duration of courses. This understanding is supplemented by researching the roles of instructors' contributions in learning and learners' engagement with them.

In order to achieve the above aims, two datasets and two approaches are brought together; first the content of learner-instructor interactions in discussion areas is analysed (transcript analysis), and then instructors are interviewed to understand the role of their contributions in learning, and to gain additional insight into their contributions (qualitative interviews). This unique combination of transcript analysis and qualitative interviews in a MOOC context provides a rich dataset to portray MOOC instructor discussion activities.

In addition, the Community of Inquiry (CoI) framework that describes learning and teaching through three interdependent constructs of teaching, social and cognitive presences is adopted as the conceptual framework to direct the research design and procedure. This provides the opportunity to apply the framework as a whole to the massive and open educational context and to examine how successfully this established framework can explain the dynamics of learner-instructor interactions in MOOCs (Nylén et al., 2015). This is a response to Joksimović et al.'s (2015) call for assessing the applicability of CoI for researching learning and teaching in large-scale contexts, such as MOOCs. Therefore, a secondary purpose of the study is to evaluate the suitability of CoI for analysing interactions in MOOCs, and to examine whether adjustments are required to enhance the scope of this framework. Overall, this study is an attempt to explore the overarching question: *What do instructors do in MOOC discussion areas and how do learners react to them?*

1.6 The thesis structure

The overall structure of the thesis takes the form of seven chapters. The organisation of the remaining chapters is as follows:

Chapter Two: Literature review

This chapter reviews the existing MOOC literature and key themes within it related to MOOC instructors. The aspects of literature that scaffold the study are: MOOC research and gaps, MOOC instructors and their roles in learning, and different forms of interactions that instructors are involved in. The chapter also presents the conceptual framework for this study (CoI), while describing its roles at different stages of research. The chapter ends by introducing the research questions.

Chapter Three: Research design and methods

This chapter deals with the study research design and details the methodological choices and decisions made to achieve the study aims. In addition to providing the rationale for the research design and approach, it provides a procedural description of how data are collected, analysed and interpreted. Moreover, it outlines how the CoI framework is modified to fit the MOOC context. The chapter ends by addressing the reliability of the research methods and covers ethical considerations.

Chapter Four (Results 1): What instructors do and say in discussions

Chapter four presents the findings of the first phase of the study and is divided into four sections to address the first and third research questions. It first provides a holistic view of learner-instructor interactions and then reports on how much and what type of participation instructors had in discussions and if this changed over the duration of a MOOC. Additionally, it presents the new indicators of the CoI framework. The final section of this chapter describes the learners' engagement with the instructors' contributions and the changes to them over time.

Chapter Five (Results 2): The roles of MOOC instructors' contributions in learning

The key findings of the second phase of the study concerning the roles of instructors' contributions in learning are presented in Chapter Five. This chapter principally addresses the second research question.

Chapter Six: Analysis and discussion

This chapter synthesises and discusses the findings of the study in light of the existing literature and draws out the main conceptual and theoretical contributions of the study. It also discusses the implications of findings for practice, study limitations, and directions for future research.

Chapter Seven concludes the thesis by summarising it.

Chapter 2 **LITERATURE REVIEW**

2.1 Introduction

This chapter reviews the published literature on instructor activities to facilitate learning in MOOCs. It begins by providing an overview of MOOCs and MOOC research with a focus on MOOC instructors and then outlines the conceptual underpinnings of the study. Since the chosen conceptual framework (CoI) grounds learning in interactions among the elements of learning, i.e. learner, instructor, and content, the third part of the chapter focuses on interactions in online education and discusses the value of these interactions in MOOCs. It also highlights the challenges that MOOC scale and openness have created for facilitating different interaction types.

Section four examines literature on discussion areas (forums) where the interactions between learners and instructors occur. It specifically discusses the functions of discussion areas and different aspects of learner and instructor participation in them. The last section summarises the reviewed literature and introduces the study's research questions. These four sections together offer the depth and breadth of the previous research with which the current study engages, and to which it aims to contribute.

2.2 MOOCs, MOOC research and gaps

2.2.1 MOOCs

MOOCs are often characterised as cMOOCs or xMOOCs depending on their pedagogical underpinnings (Rodriguez, 2013; Cui and Wise, 2015). Although this dichotomy is criticised as being oversimplified and showing insufficiencies in describing the diversity of MOOC design and pedagogy (Bayne and Ross, 2014), it "has gained considerable authority and reveals some of the key ideas that shaped the design, development, and promotion of the MOOC" (Knox, 2015:2). Early MOOCs, known as cMOOCs, are based on connectivist pedagogy that recognises learning as a distributed process where learners build and maintain connections to knowledge resources and peers in a network (Siemens, 2005). In this learning through participation philosophy, the aim of education is facilitating self-directed exploration of concepts, or autonomous learning through collaboration (Ross *et al.*, 2014). In cMOOCs, the concept of a course is modified from a structured course with teacher dominance, to non-linear, decentralised and self-directed learning (Rodriguez, 2013; Margaryan, Bianco, and Littlejohn, 2015) where the instructor role more resembles that of a discussion moderator, who coordinates and summarises the content (Rodriguez, 2012; Schultz, 2014). These courses also do not include any formal assessment or accreditation (Knox, 2016a).

In cMOOCs, the content is not prepared before the course; is stored in different places, and learners create it collaboratively by sharing their perspectives (e.g. through a blog post) and resources (e.g. links to videos or articles) using their own environments. The course moderator(s) then aggregates this information in the form of the course newsletter or home page and delivers it to learners via email. In addition, learners can have discussions (e.g. through Google Group forums, social media, or Moodle discussion forums). Therefore, understanding the content does not include learning or remembering set learning materials, but rather engaging with the process of creating and sharing information. This allows learners to make connections not only between ideas and people, but also between different systems and places (Downes, 2012).

xMOOCs in contrast, follow a cognitivist-behaviourist pedagogy with some constructivist activities (Rodriguez, 2013; Hew, 2014). In these structured and curriculum driven MOOCs (Margaryan, Bianco, and Littlejohn, 2015), learners go through a systematic journey of studying the course content. A large part of the content is pre-prepared (e.g. video lectures) and comprises the static teaching elements of the course. The other course elements are discussion areas, which enable the social and informational needs of learners to be met (Wise and Cui, 2018). xMOOCs are delivered through a learning platform such as edx, Coursera, Udacity or FutureLearn. These platforms provide instructors with tools and resources to create, support, deliver and manage a learning journey. In the next section, FutureLearn as a MOOC platform and courses offered by it are discussed.

Instructors in xMOOCs are knowledgeable experts who are mainly available to learners through recordings of their lectures and narratives, and not in a very dialogic way (Ross *et al.*, 2014). They take varying roles ranging from the course designer, educator and host to a learning fellow and sociocultural friend (Ferguson and Whitelock, 2014; Nacu *et al.*, 2014). However, Bayne and Ross (2014) point out that learning platforms are influential in defining these roles. They state that each platform has a specific understanding of them, and instructors in FutureLearn might be understood differently from instructors in Coursera.

FutureLearn MOOCs

FutureLearn MOOCs, which are examined in this study, differ from both c- and xMOOCs by their underpinning social-constructivist pedagogy (Ferguson and Sharples, 2014) and focus on social learning (Ferguson and Clow, 2015). In social-constructivism, learning is a sense-making process through interactions with self, others and the environment rather than a knowledge acquisition activity and requires an environment where active learning

and collaboration are enabled through interactions (Rovai, 2004). While being underpinned by social-constructivism, FutureLearn MOOCs follow an xMOOC design by providing pre-prepared materials available for registered learners on a static platform, yet they incorporate some elements of cMOOCs by encouraging learners to interact and engage in discussions to collaboratively construct knowledge (Kerr *et al.*, 2015).

More specifically, the FutureLearn platform is designed based on Laurillard's Conversational Framework (Ferguson and Sharples, 2014). According to this framework (Figure 1), learning with the aim of constructing new knowledge, is considered a self-regulating process where learners share and negotiate differences in their understanding and reach agreement through conversations. In this process, learners converse with self and other learners recursively at different levels of abstraction, i.e. actions and descriptions. When they try to understand a topic or solve a problem, they are active, and they are acting with a medium such as a text or a video. While they are acting, they are also reflecting on their actions and have internal conversations about what they are trying to understand and the way it relates to their previous knowledge. Throughout this process, learners also have opportunities to converse with other learners. These conversations can occur at actions or descriptions level. At *actions level*, learners discuss an activity through addressing "how" questions, sharing experiences and interpretations. For these conversations, learners need a shared language that can sufficiently express their understanding and actions, or learning may not occur. At *descriptions level*, which includes higher level conversations to reflect on actions, learners address "why" questions (i.e. why things happened). They try to reach agreement about their reflective understandings through sharing conceptions of their learning and questioning the understanding of others. Although this process is exploratory and to a great degree self-regulatory, instructors play an important role at different stages of conversations by creating appropriate activities and facilitating exploration, discussion and reflection (Sharples and Ferguson, 2019).

LEVEL OF DESCRIPTIONS

Shared medium
Enables learners and partners represent arguments and reach agreement

"Why" Q&As
Offering understanding & explanations

Learner
▪ Shows understanding
▪ Proposes solutions

Partner
▪ Shows understanding
▪ Elaborates solutions to problems

Reflect   Adapt   Reflect   Adapt

Learner
▪ Shows understanding
▪ Proposes solutions

"What & How" Q&As
Proposing goals & modifying actions

Partner
▪ Shows understanding
▪ Elaborates solutions to problems

Shared medium
Enables learners and partners represent arguments and reach agreement

LEVEL OF ACTIONS

Figure 1: Conversational Framework
(adapted from Sharples and Ferguson, 2019:4)

FutureLearn MOOCs provide several opportunities to enable the conversations at actions and description levels (Table 1). The first is *"Discussion areas"*, which are designed alongside each content step[1] or teaching element to allow learners to have topic-related conversations (Ferguson and Clow, 2015). As a result, unlike discussion forums in other MOOC platforms such as EdX[2], FutureLearn discussions are in context and focused but not centralised (Swinnerton, Hotchkiss, and Morris, 2017) which helps learners find relevant conversations more easily (Chua *et al.*, 2017; Thair, 2018). The main function of these areas is to encourage water-cooler type conversations among learners and facilitate sharing of understanding of materials, experiences, reflection, and discussion of issues within a step. In terms of the conversational framework, these

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[1] FutureLearn MOOCs are structured based on weeks and each week includes several steps that allow flexibility in possible learning paths and study patterns.

[2] In EdX, each course has a discussion page where all discussions occur. Discussion threads within the discussion page are identifiable through their topic and type (question, statement) (EdX.org).

conversations are at the actions level, as the discussion is directed towards interpreting the content (Ferguson and Sharples, 2014).

"Discussion steps", which are connected to a discussion task, are another means of enabling the conversation flow. Conversations within the discussion steps occur at description level for learners, since they allow exploration, review and synthesis of different perspectives on topics that are more abstract (Ferguson and Sharples, 2014; Kirsop, 2016). *"Study groups"* are another method used to foster conversations among learners and complement content-focused discussions and discussion steps (Kirsop, 2016). They are local and private spaces that allow up to 80 learners to have a smaller and more focused discussion. These groups can encourage free interactions that are not restricted to a topic or an activity and allow learners to share their learning experiences with little or no instructor involvement. Alternatively, they can be instructor-led or project-based groups. Learners can exit the group at any point and re-join the next active study group (Manathunga, Hernàndez-Leo, and Sharples, 2017). Considering the number of learners involved in a study group and the possibility of creating stronger social connections, it is more likely that study groups allow most processes in the conversation cycle to occur; however, the way study groups are planned and the amount of time learners spend in them are important too.

The conversation cycle in some instances is taken outside the platform (e.g. Twitter and Twitter hashtags) (Kerr *et al.,* 2015). These opportunities together aim to give learners tools for interactions and reflections whilst aiding the formation of a shared understanding of the topic goal (Ferguson *et al.,* 2015).

It must be noted that unlike other MOOC platforms such as EdX, all the described discussion types in FutureLearn MOOCs are designed for social learning and are located alongside the teaching elements (not primarily as a tool for asking questions). That is, learners are not directed to a discussion page for the course (as in EdX MOOCs) where discussion threads within the page are organised based on the topic and type (Waller, Douglas, and Nanda, 2019). This in-context nature of discussions (Swinnerton, Hotchkiss, and Morris, 2017) together with their single hierarchical structure (Tubman, Benachour, and Oztok, 2018) are design characteristics to enable recursive conversations (internal or external) at different levels to occur.

Table 1: Some Discussion types in FutureLearn MOOCs

Discussion type	Discussion level (based on the Conversational Framework)
Discussion area a) Content-level b) Step-level (non-threaded discussions linked to content) c) Course-level (threaded forum)	Actions level
Discussion step	Descriptions level
Study groups	Actions or descriptions level depending on the purpose of the study group

Although Laurillard (1999; 2002) states that the conversational framework describes the core structure of an academic dialogue, which is not required to happen explicitly between learner and instructor, and can be an internal dialogue, MOOC settings may not create the conditions for the full cycle to occur. Chua *et al.*'s (2017) examination of conversations in FutureLearn MOOCs shows that only a small number of learners' (18%) and instructors' (6.3%) postings develop into a conversation. As a result, the explicit iterative and interactive process that Laurillard describes may not occur frequently in discussions (unless it occurs internally). In addition, the large number of comments and selective participation of learners can make the negotiation of the shared understanding of concepts very difficult. Thus, despite FutureLearn design being based on the conversational framework, MOOC settings and learners' characteristics (e.g. large numbers, relative participation, or varied language levels) can challenge the conversation cycle.

2.2.2 MOOC research and gaps

The systematic reviews of MOOC empirical research between 2008 and 2017 (Raffaghelli, Cucchiara, and Persico, 2015; Veletsianos and Shepherdson, 2016; Zhu, Sari, and Bonk, 2018) consistently show that learner-focused studies are the most common MOOC research strand, while MOOC literature is limited on instructors, particularly on their practices (Liyanagunawardena, Alexandar, and Williams, 2013). Zheng *et al.* (2016) note that in many studies, instructors have been a secondary consideration within the study research agenda. Among the few studies that primarily focus on MOOC instructors, the major interest has been instructors' motivation and experience, and not their practices (Stephens-Martinez, Hearst, and Fox, 2014; Gil-Jaurena and Domínguez, 2018; Lowenthal, Snelson, and Perkins, 2018). In summary, the existing literature is sparse when it comes to instructors' teaching and facilitation

strategies or the way they engage with learners, particularly in discussion areas (Watson *et al.*, 2017).

Before reviewing the existing research into MOOC instructors, instructor roles in learning and the impact of MOOC scale and open settings on these roles are covered.

2.2.2.1 MOOC instructors and their importance in learning

Although MOOCs aim to promote self-regulated, collaborative and peer learning (Zhang, Skryabin, and Song, 2016), instructors as one of the human actors of the learning process, play a crucial role in facilitating different aspects of learning in these courses (Evans and Myrick, 2015). Danish, Cayzer, and Madden (2017) emphasise the importance of an instructor's involvement in helping learners to make sense and be critical of the learning resources by validating their contributions or choices as the "trusted knowledgeable other" (Kop and Bouchard, 2011:67). Moreover, learners highlight feedback from an instructor as fundamental to their learning (Fournier, Kop, and Durand, 2014), since they find peer feedback superficial and inadequate in MOOCs (Hew, 2018). In addition, regardless of how self-regulated and autonomous learners are in understanding the course content, when application of knowledge is considered, learners require an instructor's feedback to confirm whether they are aware of areas of knowledge application, and if they can apply obtained knowledge correctly. It is this "reality testing" and feedback that makes interaction with instructors most valuable (Moore, 1989). Furthermore, during a MOOC learning journey, once the subject matter becomes difficult or unfamiliar, learners' participation and contributions decrease (Siemens, Gašević, and Dawson, 2015), and few learners feel confident assisting others (Onah, Sinclair, and Boyatt, 2014). This is when an instructor's involvement and scaffolding is key to maintaining learners' engagement and facilitating the learning process (Sharif and Magrill, 2015; Kozan, 2016). Similarly, a cohort of MOOC learners consists of both autonomous and less autonomous learners, and the latter group require more direction from an instructor (Kop and Bouchard, 2011). This highlights the need for both instructors' facilitation and direct instruction to meet the needs of different learner profiles. Rubio's (2015) study also shows that instructor presence is a strong predictor of learner success in MOOCs.

MOOC instructor presence has been shown to shape and affect learner engagement with the course too (McAuley *et al.*, 2010; Hew, 2014; Rubio, 2015; Hew, 2018). Hew (2014), in a study of highly rated MOOCs, observes that access to the instructor is one of the five most influential factors in increasing learners' engagement with the course. In a later study (Hew, 2018), he finds that the availability of instructors to answer learner

questions made learners feel more connected to the course. In addition, learners reported instructor attributes such as humour and enthusiasm to be some of the main factors that keep them engaged with the course. Likewise, Oakley, Poole, and Nestor's (2016) study shows that instructor quality (e.g. personality, warmth, passion, encouragement) is one of the three primary factors that creates motivational incentives for learners to continue the course.

Moreover, according to Helm (2013), if communications in an intercultural context (such as MOOCs) are not facilitated or challenged by instructors, learners tend to limit their conversations to safe topics and consequently they do not use the potential opportunities for deep and meaningful learning. Further, it is instructors' skilful facilitation strategies that prompt critical thinking, encourage learners to explain their positions, and elicit conflicting ideas (Chandrasekaran *et al.*, 2015a).

In summary, MOOC instructors play an important role in facilitating learning by validating learners' choices and providing feedback, as well as keeping learners connected to the course. It is the instructors' pedagogical choices and decisions that form learners' learning experience and to some extent affect their participation (Evans and Myrick, 2015). As current studies show, instructors are important for learning in MOOCs and it is expected that they will remain highly visible in these courses (Bayne and Ross, 2014).

The impact of MOOC scale and openness on instructor roles

The scale, openness, and underlying pedagogy of MOOCs have affected instructor roles in these courses significantly (Siemens, Gašević, and Dawson, 2015; Zheng *et al.*, 2016). The learner-instructor ratio (1,000 to 1) has made instructors a part of the crowd, relatively less noticeable, and most of the time absent (Garrison, 2016). In addition, automated marking, peer assessment and use of course assistants have minimised and to some extent automated instructor presence in these courses (Haavind and Sisteck-Chandler, 2015). Bayne and Ross (2014:68) argue that the instructor role has been entirely decentred, "disaggregated and re-described" in MOOCs despite teaching and facilitating learning being still highly dependent on instructors and their intellectual, pedagogical, emotional and time investments.

Research shows that MOOCs have required a less directive and a more supportive and guiding instructor part (Siemens, Gašević, and Dawson, 2015), which means instructors have to take a multidimensional role, from guiding and influencing learners to take part in discussions to being the knowledgeable expert. As Sharples (2015) states, instructors bring the educator's (authority) voice to the course, while at the same time, they facilitate learning by orchestrating the interactions, highlighting valuable learner contributions, and

challenging incorrect or incomplete ones. His expression "oil the wheels" suitably describes the instructor role in MOOCs.

In order to fulfil this multidimensional role, instructors have to share part or all of these roles with learners (Kop, Fournier, and Sui Fai Mak, 2011). Similarly, Siemens, Gašević, and Dawson (2015) emphasise that to maintain the sustainability of their roles, instructors need to redistribute their responsibilities among a team of instructors or allocate some of them to learners. To this end, often a team consisting of educators, teaching assistants, facilitators, content experts and instructional designers is involved in delivering and teaching in MOOCs (Loeckx, 2016). McAuley *et al.* (2010:52) use the term "partnership of facilitators" to describe this phenomenon, where each partner brings a particular expertise or skill to the teaching partnership and where some instructors are responsible for drawing the crowd and leading exploration, whilst others are in charge of scaffolding and engaging learners. However, Comer (2014) provides a different take on collaborative teaching in MOOCs and describes it as learners teaching each other. Nevertheless, this type of collaboration may not be reliable, as peer discussion and feedback may not be timely, and learners may not know the right answer (Alven *et al.*, 2015).

In summary, the prevailing view of instructor roles in MOOCs is that of a shared and distributed role where a team supports and delivers the course. However, the literature agrees less on the team members (i.e. learners vs other instructors) and the reliability and effectiveness of sharing responsibilities with learners. It seems that in comparison to closed online courses, instructor roles in MOOCs are more diversified, and in addition to a course's underlying pedagogy, the platform through which the course is delivered affects the instructor roles, as each learning platform has a specific understanding of the roles (Bayne and Ross, 2014). However, as Gil-Jaurena and Domínguez (2018) maintain, the diversity of approaches used in MOOCs, and the lack of a common core across underlying pedagogies make it difficult to characterise instructor roles as uniform.

2.2.2.2 Research into MOOC instructors

Studies investigating MOOC instructors and their activities can be classified into three groups: *Instructor motivations and experiences; Instructors' perspectives on process and challenges of offering MOOCs* and *Instructors activities in discussion forums.*

Research strand 1: Instructor motivations and experiences

Most studies of MOOC instructors focus on instructor motivations and experiences of designing or offering a MOOC. For example, Lin and Cantoni (2018) examined instructor

motivations for offering hospitality and tourism MOOCs. Their findings showed that senior management decisions, institutional interest, experimentation and risk-taking in a new teaching environment, and sharing knowledge were the main motivations for delivering a MOOC. Similarly, Lowenthal, Snelson, and Perkins (2018) found that most instructors delivered a MOOC because of personal interest and passion (interest in the format and open education, intellectual and professional dissemination of knowledge and research, personal challenge), benefits such as research opportunities or financial incentives, and publicity and marketing. Other studies that have investigated instructors' motivations with similar findings include Gil-Jaurena and Domínguez (2018), Blackmon (2018), Zheng *et al.* (2016), Najafi *et al.* (2015), Saltarelli and Collier (2015), Hew and Cheung (2014) and Kolowich (2013). What these studies have in common is their reliance on self-report methods and not moving beyond instructors' motivations and drives.

Research strand 2: Instructors' perspectives on processes and challenges of offering MOOCs

Another area of MOOC instructor research focuses on the processes and challenges of offering MOOCs. The outcomes of such studies have led to a number of process-based (instructor) engagement models. Lin and Cantoni (2018) for instance, explored the phases that instructors engage with to offer MOOCs, and introduced a six-step model of preparing, designing, developing, launching, delivering, and evaluating. Similarly, Stöhr *et al.* (2017) identified three developmental activities that instructors engage with: pedagogical design, production, and interaction with others. They also found that the instructor roles change from one activity to another (e.g. owner and designer in the pedagogical design, and learner and developer in production). Studies of this kind shed light on the processes that MOOC instructors undergo to deliver a course, however they do not reveal what instructors do to facilitate learning or to support learners. Zheng *et al.*'s (2016) research is another example that resulted in a three-stage teaching process: curriculum design, course implementation and feedback to learners. However, instructors in this study also reported key challenges associated with this process. They found managing collaborative activities, supporting learners, handling critical learners, finding time to teach the course, and maintaining realistic expectations particularly challenging. Likewise, Gil-Jaurena and Domínguez's (2018) survey showed that instructors recognised the need to receive more support for their teaching, since the diversity of learners required them to adapt the content and their teaching strategies.

Furthermore, the phenomenography of MOOC instructors by Blackmon (2018) revealed challenges such as high demands on instructors' time, effort and digital skills.

Interestingly, earlier research findings such as Hew and Cheung (2014) and Haavind and Sisteck-Chandler (2015) are consistent with these recent studies and highlight challenges from evaluating learners' work and lack of learner participation in discussion forums to the high time and energy demands of MOOC teaching. However, literature has been less proactive in addressing these challenges and only a few studies looked at the means to help MOOC instructors overcome some of these challenges. Almatrafi, Johri, and Rangwala (2018) for example, investigated the possibility of building a reliable model to help instructors locate learner contributions that require an urgent response. By using Linguistic Inquiry and Word Count to measure the social and psychological load of words (e.g. emotions) expressed in postings, they were able to provide a reliable classification that can recognise urgent posts regardless of the course discipline. Wong and Zhang (2018) also designed a visual analytics tool (MessageLens) to help MOOC instructors better understand the dynamics of discussions through providing them with information about the discussion topic, interaction among learners and learner attitudes.

Research strand 3: Instructors' activities in discussion forums

There is a relatively small body of research concerned with MOOC instructor activities in discussion areas and the way they engage with learners. Studies in this group have either investigated the impact of instructors on learner participation in forums or on the interactions and strength of connections through social network analysis. There are also a very small number of studies that have examined instructors' teaching activities in discussion areas. However, these studies are largely small-scale or case-studies with limited generalisability of findings (see **2.3.3**).

i)   The impact of instructor participation on learner performance and course participation

Research examining the impact of instructor participation on the level (frequency) and quality of learner participation in MOOC discussions or on course completion shows mixed findings. Onah, Sinclair, and Boyatt (2014) compared learner participation in two types of peer-supported and tutor monitored forums, and concluded that in the latter, where instructors provide frequent informed responses to learners, on-going discussions are less likely to be formed and an instructor's response in most cases closes the conversation. Since the peer-supported forums also failed to provide adequate support for learners, the authors suggest that future research investigate learners' support preferences. By contrast, Brinton *et al.*'s (2014) investigation indicates that active

participation of MOOC instructors in discussion forums increases discussion volume. When the effect of instructor contributions on completion rates is considered, studies still do not provide a consistent picture. Tomkin and Charlevoix (2014) report no statistically significant impact of instructor intervention on learners' completion rates, badge acquisition, participation, or satisfaction rates. Conversely, Gregori *et al.*'s (2018:153) examination of factors that play a key role in course completion reveals that the instructors' presence during a MOOC and their interactions with learners are "significant determinants of course completion". Additionally, they emphasise the importance of engaging with learners during the second quartile of a MOOC, as learner retention and success are related to maintaining learner engagement during this period. As these findings suggest, more evidence is needed to make a reliable conclusion about the effect of instructor participation and intervention on different aspects of learner activities in discussions.

ii)   **The impact of instructor participation on interactions and communication networks**

Danish, Cayzer, and Madden (2017) adopted social network analysis (SNA) to explore the instructor roles in mediating learner interactions in MOOCs. They found that instructors mainly take the role of educators and facilitators and in some cases, they have a central role in the network. However, there were also cases in which the instructor had very little effect on the network, i.e. when the instructor is removed from the network, several well-connected nodes were also eliminated, but the network was still well connected. This suggests that different modes of learning, with and without the presence of an instructor in MOOC discussions are possible. The authors explained that the removal of instructors from learner conversations has little impact on the number of nodes and the density of the networks, and the effect on links is more noticeable. However, due to the small sample size of this study and an uncontrolled research environment, the findings cannot be generalised to other MOOCs. In another SNA-based study, Wise and Cui (2018:283) report two important findings about the relationship between instructor and learner discussion participation. Their analysis shows that learner interactions were "overwhelmingly instructor-centric" in the way that the instructors' networks included 77% of total learners and 60% of the connections in the network. Moreover, they found that the instructor's approach to forum participation influences learner activities in discussion areas. That is, when an instructor rarely engages in social conversations and only gives straightforward responses, the network consists of fewer learner-learner connections. By contrast, when an instructor responds to all posts (social or content-related) and helps learners resolve problems, the community network has stronger ties. Therefore, they suggest instructors consider how much they engage with

learner discussions, as well as the ways in which they do so. Cleveland-Innes *et al.*'s (2016) study complements these findings by revealing that when instructors have a directive role, a group of star-shaped clusters are formed around them with fewer links between learners. However, when instructors are more supportive and take a facilitator role, tightly connected interaction patterns are shaped and distributed more equally between instructors and learners. These types of studies enhance the understanding of instructor presence and their impact on the dynamics of communications in discussions; however, they do not reveal what instructors do or say in discussions and how these foster learning.

2.2.2.3 Summary of MOOC instructor research

As indicated by several systematic reviews, MOOC research mainly focuses on learners and shows a noticeable gap related to MOOC instructors. The existing research into MOOC instructors has mostly investigated instructors' motivations, engagement models for their course design and delivery activities, and their challenges in offering MOOCs. More recently, studies have started focusing on examining instructors' activities and their effects on learner participation, completion rates and communication networks. Nevertheless, research (to the best of my knowledge) has not engaged deeply with instructors' contributions to discussion areas and the way learners engage with them. More specifically, little is known about what MOOC instructors do and say in discussions and how they facilitate learning in them. Therefore, the current study seeks to address this area. To this end, the study requires a framework or model to enable examining instructors' discussion activities and exploring the role of these activities in learning. Thus, the next section focuses on the study's conceptual framework (Community of Inquiry) and explains how it directed the design of this study.

2.3 The conceptual framework

2.3.1 The Community of Inquiry Framework

The CoI is a process-based learning model (see Figure 2) that is grounded in constructivist approaches to learning (Garrison, 2016). According to Garrison and Cleveland-Innes (2005), interaction as the core of constructivist approaches is a complex concept, which must be understood in a comprehensive way, and the CoI provides an exhaustive view of interactions in closed online or blended courses by capturing the complexities of online educational transactions through three interdependent components - cognitive, social and teaching presences (Garrison and Anderson, 2003). Cognitive presence focuses on the learning process and learners' development of higher-order and critical thinking. Social presence reflects the development of interpersonal and purposeful relationships within the learning community, and teaching presence focuses on the design (structure) of the educational experience before, and facilitation of learning during the course (Garrison, Anderson, and Archer, 2000). For an effective learning process and to achieve higher-order learning, the three presences need to be developed in a balanced way (Akyol and Garrison, 2008). Based on this framework, the purposeful collaboration among learners and instructors as participants of a learning community results in knowledge building, and a deep and meaningful educational experience occurs when learning communities actively seek personal meaning and mutual understanding (Garrison, 2016). This framework brings two important learning constructs together: *community,* which is concerned with social dynamics and collaboration for learning, and *inquiry,* which reflects the development of critical thinking to make new knowledge (Garrison and Vaughan, 2008). Thus, a community of inquiry refers to "a group of individuals who collaboratively engage in purposeful discourse and reflection to construct personal meaning and confirm mutual understanding" (Garrison, 2011:2). This allows a more contextualised view of online education where the instructor, learners and content are key elements forming an educational community (Morgan, 2011).
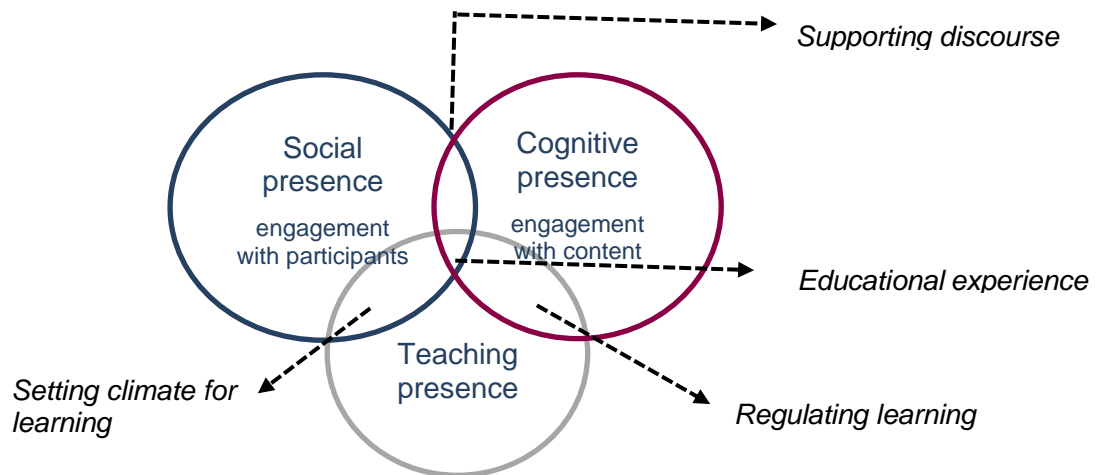
Figure 2: Community of Inquiry Framework (adopted from Garrison 2016:58)

CoI has been used by several empirical studies to investigate different aspects of online education, including *online communications and collaborative learning* (Jahng, Nielsen, and Chan, 2010; Jackson, Jackson, and Chambers, 2013; Zhao, Sullivan, and Mellenius, 2014), *course effectiveness* (Ladyshewsky, 2013; Arbaugh, 2014), *online teaching and instructor roles* (Gorsky and Blau, 2009; Borup, Graham, and Drysdale, 2014; Clarke and Bartholomew, 2014; Preisman, 2014; Richardson *et al.*, 2015; Evans, Ward, and Reeves, 2017; Turula, 2017), *informal and one-to-one learning* (Scott, Sorokti, and Merrell, 2016; Stenbom, Jansson, and Hulkko, 2016), *self-regulation* (Shea *et al.*, 2014; Volchok, 2017), *learner performance* (Joksimović *et al.*, 2015; Mills *et al.*, 2016) and *learners' engagement* (Joksimović *et al.*, 2014; Zhao and Sullivan, 2017). However, only a few studies have applied this framework to examine learning or teaching in MOOCs (Kop, Fournier, and Sui Fai Mak, 2011; Watson *et al.*, 2016; Watson *et al.*, 2017). These studies are mainly small-scale or case studies.

2.3.1.1 Cognitive presence[3]

The core of the CoI is cognitive presence, which is the extent to which learners are able to construct meaning through communication and collaboration. It is operationalised through four not necessarily linear phases of the Practical Inquiry: "Triggering event" initiates the inquiry process and involves the identification of a problem or problem conceptualisation. It is followed by "Exploration", where learners explore the problem by gathering and exchanging views and information about the topic. Next, they try to synthesise this information to find possible solutions. This "Integration" phase is followed

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[3] Please see Table 13 in **Chapter 3** for the breakdown of cognitive presence indicators and the definition of each.

by the final stage of "Resolution", where learners critically reflect on possible solutions and implement the best one through practical application (Garrison, 2009). Stein *et al.* (2007) emphasise the nonlinearity of these phases, since in many cases resolution is preceded by further exploration of the problem or social and teaching presences.

Garrison (2016) points out that moving learners through these phases - particularly integration and resolution - in a timely manner is challenging, since online discussions rarely provide sufficient time for the last two phases of cognitive development (Akyol, Garrison, and Ozden, 2009; Garrison and Akyol, 2013). In order to facilitate this progression, Garrison (2016) emphasises the importance of designing and facilitating the learning tasks, and studies such as Bai (2009) and Staley and Ice (2009) confirm that the design and nature of tasks plays a key role in reaching resolution. According to Garrison (2016), discussion activities should reflect the phases of practical inquiry with a clear outcome for resolution. Nevertheless, findings from Akyol, Vaughan, and Garrison (2011) reveal that most learners believe the resolution phase is achieved individually and through the homework and final projects, and not in the discussion forums. A further factor that Garrison (2016) considers as influential, is the facilitation of the inquiry process, which can occur at two levels of "Socratic questioning" where learners are asked to reflect on their ideas to move toward the learning outcome, and then at a deeper level where their ideas are challenged, and they must defend them. However, Clarke and Bartholomew (2014) found that instructors do not seem to be good at facilitating cognitive presence since they support learners but do not challenge their thinking. Garrison and Akyol (2013:113) attribute this to a lack of "metacognitive understanding of the inquiry process" and a lack of focused and continuous facilitation by instructors. Other influencing factors for moving learners through the phases of inquiry are group dynamics, learners' metacognitive awareness of cognitive presence phases, clear goals and enough time for learners to come together for collaboration, all of which require facilitation and direction from instructors (Garrison, 2007).

2.3.1.2 Social presence

Social presence plays a mediating role between cognitive and teaching presences and has a dynamic nature as it develops over the duration of a course (Garrison and Arbaugh, 2007; Garrison, 2016). It is most recently defined as "the ability of participants to identify with the group or course of study, communicate purposefully in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities" (Garrison, 2009:352), and serves three purposes; it shapes the identity of the learner community based on the inquiry outcome; it creates the conditions

for free and open communication, and finally, it allows personal relationships to be developed over time to improve group cohesion and open communication. However, as Garrison (2016) states, interpersonal relationships can limit open communication, and therefore the focus of social presence must be on group identity and cohesion, where learners can identify with the purpose of the community and feel their participation is valued. In other words, the goal is to develop both socio-emotional and interpersonal relationships but with an academic pursuit.

According to Kehrwald (2008), the development of social presence is a two-stage process: establishing social presence and then continuous demonstration of it. Learners and instructors first build their social presence by making themselves known to others (e.g. through personal introduction). They then maintain it through visible activities such as posting comments, which indicate both their attendance in discussions and their availability for communication and interpersonal relations. However, maintaining social presence is dependent on the strength and history of relationships between participants.

Social presence consists of three categories[4]: *affective (personal) communications,* which include expressions of feelings, emotions, beliefs and values; *cohesive communications,* which focus on creating and sustaining a sense of community and group commitment, and *open (interactive)* c*ommunications* reflecting behaviours and activities that others are attending, and supporting interactions among learners or between learners and instructors (Garrison, 2017; Swan and Richardson, 2017). These three categories change over the course of an online discussion. For example, Swan's (2003) study indicates a clear shift from cohesive responses to affective and interactive communications. She explains this in terms of less need for cohesion after community formation as well as the change in activity demands from exploratory to collaborative. In addition to time, *group size* can affect the level of this presence. According to Vickers and Shea (2017), a smaller group can lead to higher levels of social presence, as in such cohorts, learners know one another better and have more opportunities to interact consistently. By contrast, in large groups such as in MOOCs, the number of learners limits such opportunities and as a result the relationships between learners are more utilitarian (Siemens, Gašević, and Dawson, 2015). This is also confirmed by Kovanović *et al.*'s (2018) study, which shows that the large scale of MOOCs and their short duration create significant challenges for the development of social presence, as learners' perceived level of social presence was considerably lower than perceived levels of teaching and cognitive presences.

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[4] A full breakdown of social presence indicators and their definitions is provided in Table 11, **Chapter 3**.

In several publications, Garrison emphasises that the primary role of social presence is to support cognitive presence (Garrison, 2007; Akyol and Garrison, 2008; Garrison, 2011). However, Annand (2011), in a critical review of social presence studies, argues that the relevant research does not show any meaningful impact. He claims that the influence of collaborative and constructivist learning theories in the CoI is overstated. In his view, strategies for developing cognitive presence are not restricted to these theories and can be developed through objectivist-based theories too. He concludes that factors such as structured learning materials, timely and continuous instructor-learner communication, and direct instruction may result in more effective online learning than does creating social presence. Considering his claim and MOOCs as the context of this study, it seems a mixture of both constructivist and objectivist strategies are required to support cognitive presence. Large numbers of learners and the instructor-learner ratio in MOOCs require a stronger social presence, yet objectivist structuring of learning materials can be beneficial too.

2.3.1.3 Teaching presence[5]

Teaching presence is "the key to a successful and sustained community of inquiry" (Garrison, 2016:61). It represents the leadership dimension of the framework and is directly associated with learners' perceived learning and satisfaction (Turbill, 2002; Kop, Fournier, and Sui Fai Mak, 2011; Garrison and Akyol, 2013; Arbaugh, 2014). It consists of three progressive constructs: design, facilitation, and direction of social and cognitive presences. *Design* is the first step in creating teaching presence and is directed by macro decisions about the learning process. It is an ongoing process and requires adaptations based on learners' evolving needs (Garrison, 2009; 2016). *Facilitation* provides support and guidance for learning and is essential in establishing and maintaining social and cognitive presences. The level of facilitation is an important consideration, as too little or too much of it can impede learning. The third element of teaching presence is *direct instruction,* where more direct guidance is required to provide subject knowledge, diagnose misconceptions or summarise the discussion (Garrison, 2009; Jones, 2011). This construct requires an instructor's intellectual and pedagogical leadership, particularly as learners approach the resolution phase of an inquiry process (Garrison and Akyol, 2013). Facilitation and direction keep the learning discourse from premature convergence and inappropriate divergence (Garrison, 2016). Considering the last two

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[5] It must be noted that the concept of teachING and not teachER presence indicates the shared responsibility of academic leadership despite being mainly delivered by instructors. The categories and indicators of this presence are detailed in **Chapter 3** (Table 12).

teaching presence constructs, Zhao and Sullivan (2017) state that effective teaching presence requires both directive and facilitative activities on the instructor's behalf. Their study also reveals that the nature of teaching presence and the way through which it is enacted have more influence on learning than the level of teaching presence.

MOOCs can affect creation and maintenance of teaching presence. Kop, Fournier, and Sui Fai Mak (2011) state that facilitating teaching presence in MOOCs is not easy since the opportunities for learners to interact with instructors are restricted. Likewise, Koutropoulos and Zaharias (2015) report that the lack of traditional course structure and feedback mechanisms (such as grades and credits) in MOOCs necessitate reconsideration and adjustment of teaching presence and instructor roles. Nevertheless, Kovanović *et al.*'s (2018) CoI survey results confirm that MOOCs allow establishment of teaching presence from learners' perspectives.

2.3.1.4 Learner presence

Shea and Bidjerano (2010) and Shea *et al.* (2012) introduced a fourth construct of "learner presence" to the CoI to make this framework more comprehensive, since learner self and co-regulated activities are not considered by CoI's original presences. This presence represents "online self-regulation, self-efficacy and attendant effort" (Shea and Bidjerano, 2010:1722), and can be described as the extent to which learners in online learning environments are active metacognitively, motivationally and behaviourally (Shea *et al.*, 2012).

Learner presence includes three categories - *forethought, performance,* and *reflection*, which focus on the self-regulation of learning with an emphasis on the learning goals and outcomes. "The *forethought* phase includes planning, co-ordinating and delegating or assigning online tasks to self and others" (p:10). The *performance* phase consists of two elements: monitoring and strategy use. In monitoring, learners check their understanding of tasks and instructions with other learners, identify problems, monitor their own and other learners' task completion, evaluate the quality of what they have produced and take corrective actions if required. The strategy use component reflects learner activities where they seek or offer help or additional information to complete learning tasks, articulate gaps in their knowledge, and review expected outcomes and course expectations. The *reflection* phase focuses on learners' changes in thinking and the causal relationship between results and their individual or group performance in an activity (Shea *et al.*, 2014). The full breakdown of the learner presence categories and their indicators is provided in Appendix 2.

Learner presence has been used to examine learner self-regulation in blended learning contexts (Pool, Reitsma, and van den Berg, 2017), informal online learning spaces

(Scott, Sorokti, and Merrell, 2016), flipped classes (Kim *et al.*, 2014), and online K-12 education (Lock, Eaton, and Kessy, 2017).

2.3.1.5 Changes to CoI presences during a course

Research into the development of social, teaching, and cognitive presences over the duration of a course shows some interactions between the presences and categories within them. Akyol and Garrison (2008) and Akyol, Garrison, and Ozden (2009) report that the cohesive communications within social presence increase during a course. However, affective and personal communications consistent with Vaughan and Garrison's (2006) finding, decrease considerably from the beginning to the end of a course. This is in contrast with Swan's (2003) research, which revealed a significant decline in cohesive responses (except for greetings, salutations, and vocatives), particularly towards the end of a course. She explains this shift in terms of learners feeling less need to employ cohesive responses due to the organic cohesion among the group. She also states that the exploratory (rather than collaborative) nature of discussion tasks with a practical outcome might have reduced the focus on group cohesion. Moreover, she observes a consistent increase in interactive communications throughout the course and concludes that while cohesive communications become less important, interactive communications grow over time, most likely because learners notice their importance for linking the discussion into a coherent whole.

Considering teaching presence, Akyol and Garrison (2008) report that it has a shift from facilitation to direct instruction as the course progresses, since learners require more direct input as a result of moving to the higher levels of cognitive presence. However, they did not observe a statistically significant change for design and organisation, most likely because these activities occur before the course. Similarly, Vaughan and Garrison (2006) found that throughout a course, facilitating discourse decreases, while direct instruction increases considerably.

Furthermore, Akyol, Vaughan and Garrison (2011) investigated the development of three presences from another temporal aspect, i.e. course duration. Their analysis revealed that the number of postings reflecting direct instruction was higher in longer-term (13 weeks) courses compared to shorter ones (6 weeks), while postings facilitating the learning discourse were higher in shorter-term courses. However, there was only a statistically significant difference for the direct instruction category. Considering social presence, group cohesion was more evident in shorter-term courses while affective communications were more frequent in longer courses and the relevant quantitative analysis showed a significant statistical difference for both indicators. For cognitive

presence, instances of integration and resolution were more evident in longer courses whereas the number of contributions indicating exploration and integration were equal in shorter-term courses. As the authors suggest, this means that learners in shorter courses did not reach the highest level of cognitive presence.

Most studies that have investigated the development and dynamics of CoI presences during a course and examined the impact of course duration on them, consider the changes in learner and not instructors' presences, and some studies such as Akyol and Garrison (2008) explicitly state that instructors are removed from their dataset. More importantly, existing research has examined the impact of course duration on CoI presences in closed online or blended contexts and published literature has neglected MOOCs or other open and scaled or informal settings. This is important to note as MOOC scale and openness means that in addition to course duration, selective and relative participation of learners and instructors must be considered when investigating the development of presences. Therefore, examining the changes to social, teaching, and cognitive presences during a MOOC and within instructor activities will enhance the understanding and development of CoI presences.

2.3.2   The rationale for choosing CoI

In addition to the CoI framework, a number of online learning and teaching models for examining instructor activities and contributions to discussions were considered, including Henri's (1992), Gunawardena, Anderson, and Lowe (1997) Interaction Analysis Model, and general educational theories such as Activity Theory. However, none of these models proved satisfactory to address the research aims for the current study. For example, Henri's (1992) model, which is based on cognitive theories, focuses on three levels of analysis, and includes five dimensions - participative, social, interactive, cognitive, and metacognitive. However, as Howell-Richardson and Mellar (1996) state, the descriptions of social, cognitive and interactivity dimensions are based on a mixture of theories that are not mutually consistent and lack detailed criteria for systematic analysis. In addition, there are no clear criteria for unit of analysis. De Wever *et al.* (2006) also state that the model does not yield any information about the social co-construction of knowledge, and no information about the reliability of the instrument is provided, since it is not tested empirically. The Interaction Analysis Model also determines the amount of knowledge built within a discussion through five phases - sharing and comparing information, discovery of inconsistencies, negotiation of meaning, testing and modifying proposed hypothesis, and agreement and application of new knowledge, and four elements - types of cognitive activities, types of arguments built, resources used for

exploring and negotiating new meaning, and evidence of change in individual's knowledge. While this model outlines the full process of negotiation to knowledge construction, it does not shed light on instructor-specific activities to facilitate this process; therefore, it is not suitable for this research. Cultural Historical Activity Theory (Engestrom and Miettinen, 1999; Engestrom, 2001) was another option which could have provided a lens through which to look at the online teaching activities within MOOCs and identify the mediating components of the instructor contributions (subject, object, instrument, rules, community, divisions of labour) as an activity system. While it would have enabled understanding of instructor experiences and the historical and cultural nature of their practice, this theory would only help explain the process and experiences of instructors rather than illuminating their actual practice, which is the aim of this study.

Regarding the reasons for choosing the CoI, a major advantage of this framework is that it enables classifying and examining the type and level of instructor contributions to discussions and changes they undergo over the duration of a course. It also has a high adaptation rate and is known as the most widely employed explanatory educational framework for online education (Garrison and Akyol, 2013; Garrison, 2017; Wang *et al.*, 2017) due to its comprehensive view of educational transactions and its manageable application (Garrison *et al.*, 2006). In addition, its high validity and reliability for analysing interactions in discussion forums is confirmed by several studies (Rourke *et al.*, 2001; De Wever *et al.*, 2006; Swan and Ice, 2010; Jackson, Jackson, and Chambers, 2013; Stenbom, Jansson, and Hulkko, 2016). Furthermore, it is founded in collaborative learning theories, which helps to address the how and why of interactions between learners and instructors (Garrison, 2016). Kozan (2016) considers it a process-based framework that focuses on the learning and teaching processes rather than on the outcome, and in this study, it helps explore both the what and how of instructors' contributions to discussions. Additionally, the CoI framework is grounded in a constructivist view of teaching and learning (Garrison and Anderson, 2003), which is in line with the social constructivist pedagogy that underpins FutureLearn MOOC design (Ferguson and Sharples, 2014). Therefore, there is a match between the theoretical foundations of the framework and that of the MOOCs under investigation. This consistency is important as it ensures that instructors' activities within the learning environment are examined through the appropriate lens.

Another major reason for choosing the CoI is to evaluate its suitability for examining educational transactions in MOOCs. Nylén *et al.* (2015:137) emphasise the importance of applying established frameworks to MOOCs, i.e. an open and massive educational context, and examining the need for revising such frameworks. Likewise, Joksimović *et al.* (2015), and Amemado and Manca (2017) state that assessing the CoI for researching

learning and teaching in large-scale contexts such as MOOCs is needed, and Garrison (2017) stresses the need for continued refinement of the CoI as with any framework, to clarify and expand our understanding of online learning. Kovanović *et al.* (2018) have recently assessed the suitability of the *CoI survey instrument* within the context of MOOCs; however, this has not been done for the CoI framework. A small number of studies have used the CoI in MOOCs, but only partially (Rodriguez, 2014; Watson *et al.*, 2016; Watson *et al.*, 2017; Kaul, Aksela, and Wu, 2018). An example is Rodriguez (2014), who only used cognitive presence and highlighted this as a limitation of his study, encouraging future research to consider the entire framework. Moreover, some of the studies, such as Kaul, Aksela, and Wu's (2018) case-study are not good representations of MOOCs (the course had 149 participants, which is not representative of MOOC scale) or are small-scale investigations (e.g. Watson *et al.*, 2016 and 2017) and their findings cannot be generalised to other MOOCs. Hence, this study aims to apply the entire framework in MOOC settings and to examine its suitability for analysing interactions in MOOCs.

Nevertheless, there have been some criticisms of the CoI. Xin (2012) believes that this framework does not capture multiple functions of human communications. For example, it does not reveal whether a discussion posting that provides information is aimed at receiving recognition or provoking a reply. Thus, according to Xin (2012) although the framework enables analysis of discussion contributions, it does not reveal their communicative function(s), and this in turn leads to missing the discourse flow in analysis. While agreeing with Xin (2012), in the current study, the distinctions between such functions are not necessary, and if needed, they are elicited through interviews with instructors.

Moreover, Xin (2012) argues that the distinctions between the CoI presences are at an analytical level; i.e. they help understanding of the communication complexities; however, they do not always correspond to neat distinctions in reality. Morgan (2011) specifically criticises the limitation of teaching presence in identifying problems in online teaching since the framework does not enable exploration of the reasons for problems. Again, this limitation is overcome by bringing another methodology to the research design, i.e. interviewing instructors. Another shortcoming outlined by Morgan (2011) concerns the lack of attention to local and global contexts of learning that are important in terms of linguistic demands of teaching in such multicultural contexts and the way identity, agency and power of learners and instructors are negotiated. This limitation can also be addressed by bringing in another (linguistic) methodology such as corpus analysis, where such information can be tagged to data before the coding and analysis. However, these linguistic nuances are outside the scope of this study.

2.3.3   CoI and MOOC research

There are several studies that have examined different aspects of learning or teaching in MOOCs through the lens of the CoI. However, the majority of these studies rely on the **CoI survey instrument,** which reveals perceptions about social, teaching and cognitive presences. Poquet *et al.* (2018), for instance, examined learners' perceptions of social presence within three sub-populations - regular (n=27), occasional (n=37), and non-posters (n=347), and found that MOOC learners' perceptions of social presence were quite low, most likely because of the large number of non-posters who did not interact in discussion forums. In a similar study, Saadatmand *et al.* (2017) looked at learners' perceptions of the three presences in a professional development MOOC, and the CoI survey results showed a high perception of all presences, with social presence receiving the highest score. Most recently, Kovanović *et al.* (2019) employed the CoI survey as a part of research examining different learning strategies used by MOOC learners, and their relationship to the learning experience. They found that there are three groups in MOOCs: limited users, selective users and non-users, and that these three groups differ in their perceived cognitive presence. Before this study, the authors (Kovanović *et al.*, 2018) examined the reliability and validity of the CoI survey, and their findings confirmed that the instrument is both valid and reliable for measuring the three presences in MOOCs. However, their results suggest that three categories of course design (teaching presence), group affectivity (social presence) and resolution (cognitive presence) possess unique characteristics in MOOCs. Overall, these studies reveal MOOC learners' perceptions of CoI presences and show that their perceptions are highly dependent on the sub-population they belong to.

There are also a few studies that have employed the **CoI framework** and its coding scheme to understand learning and teaching in MOOCs. Kaul, Aksela, and Wu (2018) utilised the framework to investigate the educational experience of in-service teachers in a MOOC. The transcript analysis of discussion postings (n=78) revealed that most of the in-service teachers' contributions show instances of cognitive presence (71%), while cases of social and teaching presences (27% and 2% respectively) are noticeably fewer. However, the examined MOOC had only 149 learners, which is not representative of MOOC scale. In addition, the delivery of the course was not consistent with x or cMOOC delivery, as the learning materials were made available to learners progressively and upon the completion of relevant assignments. Moreover, the researchers removed some discussion forums from the analysis, a factor to which the authors attribute the low level of social presence.

Similarly, in a case study, Watson *et al.* (2016) examined how an instructor establishes social and teaching presences for attitudinal change in a MOOC. The analysis showed that most instructor contributions to discussions, announcements and blog posts were social (43%) followed by a lower proportion of contributions focusing on teaching presence (33%) and attitude dissonance codes (24%). The majority of the instructor's teaching postings focused on direct instruction and a much lower number of postings included facilitating discourse strategies, which showed a directive rather that facilitative teaching style in the examined MOOC. However, in a follow-up study (Watson *et al.*, 2017) where the researchers extend the scope of the study, the instructors' teaching presence had a very different composition, and facilitating discourse postings made a clear majority of instructors' contributions. By contrast, instructors' direct instruction was significantly lower than in the previous case study.

Interestingly, Cohen and Holstein (2018) applied the CoI to learners' reviews (n=3,460) of successful MOOCs and found that in these MOOCs, teaching (36%), cognitive (36%) and social (23% + 5% technical) presences were distributed nearly equally and the leading characteristics for success were instructors, activities, discussion environment and workload. The analysis of reviews focusing on teaching presence revealed that learners believed instructors are responsible for engaging learners and adjusting the course for learners' different levels of knowledge. Considering design and organisation of the course, learners also pointed out the important role of instructors in balancing the course difficulty level and planning activities to include all course content.

The common feature of studies investigating instructor activities through the CoI framework is that they are all case studies with limited potential for generalisability of findings, or they have employed only one or two of the presences rather than applying the entire framework.

2.3.4 The role of CoI in the study

The CoI framework has three key roles in the current study: it informs many aspects of the research design, it directs the data analysis, and it enables the interpretation of the findings. At the outset, the CoI framed the research design by providing a lens that shaped what to look at (three categories of social, teaching and cognitive contributions) and where to look (discussion forum transcripts). In other words, it provided directions for unfolding instructors' activities in discussions (Weston *et al.*, 2001; Abbott and McKinney, 2013). Once the data were collected, the CoI acted as the coding scheme for the content analysis of instructor-learner conversations and as a rubric for classifying the content of instructor contributions. In the second phase of this study, it enabled a directed

thematic analysis of instructor interviews. Considering this role, the CoI gives this study a priori theoretical orientation; i.e. it is placed at the beginning of the investigation and provides an explanation for the qualitative data analysis and interpretation while informing the results (Creswell, 2014). In addition to data analysis, the CoI helped with the interpretation of the findings, discussing the results, and proposing suggestions for practice. In summary, the CoI came at the beginning of the research, guided it, and gave it a deductive orientation (Bryman, 2016).

Since the CoI framework grounds learning and teaching in the interactions between learners and learners and instructors and recognises them as the means for establishing and maintaining social, teaching and cognitive presences, the next section will focus on interactions. In addition, it is essential to address this area, because this study relies on learner-instructor interactions to explore different aspects of instructors' contributions to MOOC discussions.

2.4 Interactions as the core of CoI

Constructivism as the underlying theory of the CoI framework, moves distance education beyond one-way transmission of knowledge through different forms of interactions. Interactions are seen as a critical component of meaningful learning and a quality online learning experience (Trentin, 2000; Garrison and Anderson, 2003; Garrison *et al.*, 2006; Anderson and Dron, 2011; Tolu and Evans, 2013). Their forms and educational properties, i.e. the extent to which they are reciprocal, voluntary, collaborative and exploratory, determine the quality of learning (Anderson and Garrison, 1998), and are important to facilitate understanding and cognitive development (Garrison and Cleveland-Innes, 2005). Garrison and Cleveland-Innes (2005) emphasise that if deep and meaningful learning is to be achieved, quality interactions must be designed into a course, and interactions must be supported and directed in a sustained manner. Interactions are also recognised as one of the three macro factors that can create a psychological and communication separation among learners and between learners and instructors. Based on the CoI framework, social and teaching presences are responsible for minimising this separation or *transactional distance,* which can potentially create misunderstandings "between the inputs of instructor and those of the learner" (Moore, 1993:23).

2.4.1 The forms of interactions

The interaction between the three elements of learning, i.e. learner, instructor and content, has created six types of interactions. The first three types make the learner-

centric trio of learner-learner, learner-instructor, and learner-content interactions, while the second three types make the more instructor-centric trio of instructor-instructor, instructor-content, and content-content interactions (Anderson and Garrison, 1998; Miyazoe and Anderson, 2013). Despite this study's focus on instructors, the learner-centric interactions and more specifically learner-instructor interactions are examined, since the aim is to understand instructors' contributions in relation to learning and learners' engagement with them. The learner-centric interactions are the foundation of Moore's (1989) Interaction Model, where critical interactions in educational contexts are defined as including the three components of learner-content, learner-instructor and learner-learner. According to Moore (1989), for meaningful and successful learning, instructors must ensure that they choose the most suitable interaction type for their learning tasks and subject field based on the learners' developmental stage, while ensuring the effectiveness of interactions is maximised by their planning.

2.4.1.1 Learner-content interactions

Learner-content interactions are central to learning, since it is the intellectual interaction with the content that changes and transforms learners' understanding and perspective (Moore, 1989). Learners' engagement with content can include agreeing or disagreeing with the material, seeking an understanding of it, relating it to existing knowledge, or realising confusions and lack of understanding that require further exploration of the content (Anderson and Garrison, 1998). As Moore (2016) states, learners' frequent and dynamic interaction with content is needed for them to demonstrate what they have learned and to apply it to real-life experiences. Based on Laurillard's (2002) conversational framework, this type of interaction is the internal conversation with self about the content, and is associated with the perceived quality of a course (Padilla-Rodriguez and Armellini, 2015) and course outcomes (Zimmerman, 2012). Berg (1999) labels this form of interaction as intra-personal, since learners process information in their minds to construct meaning. In most cases, they initiate the inquiry process and act as the *triggering event* for cognitive presence.

Learner-content interactions in MOOCs

In xMOOCs, learner-content interactions are often stimulated by viewing videos, slide presentations, interviews, or reading texts (Gregori *et al.*, 2018) and are very frequent as they are easily scalable once the MOOC is created (Miyazoe and Anderson, 2013). In cMOOCs, which are often designed around OERs and other reading and learning packages, learner-content interactions are at a medium to high level (Miyazoe and

Anderson, 2013) and are grouped into wayfinding and sense-making interactions (Siemens, 2015).

2.4.1.2 Learner-learner interactions

Learner-learner or peer interactions occur between learners individually or in groups with or without an instructor's presence. They are associated with learner satisfaction (Swan and Shih, 2005), and reducing attrition rates (Juwah, 2006), and can result in virtual learning communities that meet the social and academic needs of online learners (Anderson and Garrison, 1998). However, the occurrence of such interactions depends on learners' experience, level of autonomy (Moore, 1989) and proficiency as well as instructor's support (Anderson and Garrison, 1998). Hirumi (2006) adds to the mix a consideration of the cohort size and roles and responsibilities for effective in-group interactions.

According to Nylén *et al.* (2015), interactions among learners facilitate learning by allowing learners to explain, negotiate, argue or find mutual regulation. More specifically, through these interactions learners analyse and interpret content together, share information and opinions and solve problems (Hirumi, 2006). Nevertheless, Garrison and Cleveland-Innes (2005) draw attention to an important aspect of peer interaction frequency. They stress that high volumes of interactions among learners do not necessarily lead to meaningful engagement with the content, since there are many online learners who follow discussions, reflect on peer contributions and actively construct meaning independently, but do not interact or engage with peers explicitly. In their view, high levels of peer interactions can show group cohesion, but do not guarantee learners' cognitive and meaningful engagement. For these outcomes to be achieved, quality interactions are required, and learners must be provided with structure (through *design and organisation*) and academic leadership (through *direct instruction*) for deep learning.

Learner-learner interactions in MOOCs

Peer interactions exist in both c and xMOOCs, but to varying degrees (de Waard, Kukulska-Hulme, and Sharples, 2015). In xMOOCs, interactions among learners are low to medium despite learners being provided with several asynchronous and synchronous interaction opportunities (Miyazoe and Anderson, 2013). Tawfik *et al.* (2017) examined interactions among learners in a chemistry MOOC and found a low degree of learner-learner interactions, which did not go beyond comparing and sharing information and identifying areas of disagreement. This is a likely result of the optional and voluntary nature of these interactions as Margaryan, Bianco, and Littlejohn's (2015) analysis of 76 xMOOCs shows that a very small number of MOOCs *require* learners to interact. In

addition, learners are not usually provided with any instruction about interactions, group formation or member roles. Similarly, Miyazoe and Anderson (2013) attribute this low level to a lack of learner motivation and course incentive for such interactions, while stating that logistics for providing the necessary support for these interactions is challenging. The sheer volume of contributions can also discourage learners from sharing their views or seeking information (Hew, 2018). As Berg (1999) points out, this can lead to learner confusion and frustration, and eventually withdrawal from the course. Moreover, the diversity of learners' educational backgrounds and knowledge bases make interactions between learners difficult since they do not share similar learning profiles (Chen, 2014). In addition, difficulties caused by language, different cultures and even time zones are recognised as barriers to peer interactions in xMOOCs (Tawfik *et al.*, 2017). In contrast to xMOOCs, learner-learner interactions in cMOOCs are very high, since networked interactions are the core of cMOOC pedagogy (Miyazoe and Anderson, 2013). In effect, peer interactions are the main means of discovery, sense-making and sharing knowledge resources that facilitate and shape learning (Littlejohn, 2013). Nevertheless, they are still susceptible to some of the issues mentioned for peer interactions in xMOOC.

2.4.1.3 Learner-instructor interactions

Learner-instructor interactions are central to education at distance, and essential to evaluate learner understanding, diagnose misconceptions, and promote reflection (Anderson and Garrison, 1998).They have also been associated with learner engagement, motivation and satisfaction (Sher, 2009; Kop and Bouchard, 2011; Miyazoe and Anderson, 2013; Hew, 2018). Dabbagh (2003) views them as the main tool for scaffolding learning. In her view, these interactions enable instructors to establish a trusting and open learning environment (social presence), prompt interactions with peers and content, guide learners in learning tasks and activities, model think-aloud processes, and prompt analytical thinking (teaching presence). Identifying learner needs and preferences, providing feedback, and monitoring and evaluating learner performance are other, more instructor centric, functions of learner-instructor interactions (Thach and Murphy, 1995).

In the following section, the content and level (frequency) of learner-instructor interactions as well as the impact of MOOC openness and scale on them will be discussed.

Content of learner-instructor interactions

Dennen, Darabi, and Smith (2007) argue that learner-instructor communications cover a wide range of topics, since instructors hold several roles in online courses, including pedagogical, managerial, social and technical. Therefore, in addition to focusing on pedagogy and content-based topics, learner-instructor interactions are concerned with instructor expectations and feedback, learner motivation, and personalisation. Similarly, Anderson *et al.* (2001) classify learner-instructor interactions in terms of their functions, and specify social, organisational, facilitative and direct instruction interactions, which also link to the categories of social and teaching presences of the CoI framework.

Dennen, Darabi, and Smith's (2007) study showed that both instructors and learners believe that instructors' content-focused interactions, which provide reactive (e.g. feedback) and proactive (e.g. models) information are more important for learner performance. Considering learner satisfaction, interactions focusing on learner interpersonal communication needs and treating them as individuals are key to the online learning experience. This study also revealed that there is an interaction between different types of learner-instructor communications; that is, at the beginning of a course, learner-instructor interactions tend to focus more on managerial and technical aspects, while as the course progresses, the focus shifts to pedagogy.

Level (frequency) of learner-instructor interactions

Dabbagh (2003) states that the level of learner-instructor interactions depends on learner characteristics (e.g. prior knowledge, cognitive ability, motivation, degree of self-regulation), type of learning tasks and the learning context. She believes successful interactions between learners and instructors provide the right amount of guidance and structure for learners. In her view, too much learner-instructor interaction can reduce learner self-regulation, attempts towards meaning making, and efforts to achieve learning goals. Similarly, An, Shin, and Lim (2009) warn against too much instructor involvement, since it can hinder community formation as learners prioritise engaging with the instructor over interacting with peers. Dennen, Darabi, and Smith (2007) also emphasise that learner-instructor interactions do not follow a more-is-better pattern and should be based on a proactive response to learner needs. They state that although frequent learner-instructor interactions represent an attentive instructor, they may not essentially enhance learning or participation. This view is supported by Mazzolini and Maddison's (2003) findings that increased learner-instructor interactions do not lead to more participation, and more instructor communications can discourage learners from participating.

Conversely, too few interactions between learners and instructors can result in learner inability to complete learning tasks and can lead to learner frustration and demotivation (Dabbagh, 2003). Thus, finding the right balance is an important task for instructors and requires adequate support, time, and training. Moreover, as Garrison and Akyol (2013) state, factors such as course design and structure, medium of communication, course subject matter, instructor personality, and learner ability to participate in interactions are determining in the level and nature of learner-instructor interactions. For instance, Danish, Cayzer, and Madden (2017) emphasise that some subject fields whose audiences are mainly professionals require minimum input from the instructors, whereas in others with high levels of technical details (e.g. medical sciences), a very different level of learner-instructor interaction is needed.

In summary, too few or too many interactions can cause learner and instructor dissatisfaction, inadequate learning and poor performance (Hirumi, 2006).

Learner-instructor interactions in MOOCs

Learner-instructor interactions in xMOOCs occur in several forms including welcome and weekly emails to learners, engaging with learners in discussion forums, and responding to learners' technical questions (Gregori *et al.*, 2018). In addition, as Miyazoe and Anderson (2013) state, learners can have instructor-learner-like interactions from a number of sources such as recordings of instructors or automatic marking of tests and quizzes. They also add that this kind of interaction is limited in xMOOCs due to the cost, limited availability of instructors and a lack of scalability as well as the fact that "learners outnumber educators by 1,000 to one or even more" (Ferguson and Sharples, 2014:103).

The scale and openness of MOOCs have affected interactions between learners and instructors (Siemens, 2015) and have created some challenges. Chua *et al.* (2017) draw attention to the overwhelming number of learners for instructors to engage with, which results in a lack of in-depth interactions and many questions or comments remaining unaddressed (Ferguson and Whitelock, 2014; Haber, 2014; Almatrafi, Johri, and Rangwala, 2018). Large numbers of contributions have also made it difficult for instructors to decide when and where to intervene in order to provide the required information or resolve a problem (Arguello and Shaffer, 2015). In addition, many MOOC instructors have reported difficulties in navigating contributions effectively to find comments that require a response or are relevant to the discussion (Wise, Cui, and Vytasek, 2016; Almatrafi, Johri, and Rangwala, 2018). Along with the large numbers of learners, their diversity in terms of educational and cultural backgrounds, needs, motivations, language proficiency, and existing knowledge, challenges the learner-

instructor interactions (Wise and Cui, 2018). While learner diversity and heterogeneity can result in learning from various perspectives, it can also cause difficulties for engaging in meaningful and continued interactions (Tawfik *et al.*, 2017). Learner diversity creates cross-cultural interactions in MOOCs, and if learners or instructors are not aware of different communication patterns, cultures and values, misunderstandings and miscommunications will arise. This inhibits exploration and knowledge construction (cognitive presence), which can impede deep learning and a sense of community (Rovai, 2007). Another difficulty associated with interactions in MOOCs is participants' willingness to listen to alternative views and to accept those that aid in collective understanding of the topic. This dialogic aspect of interactions can improve learners' understanding, however in cases like MOOCs, where large numbers of learners are involved, the dialogue does not occur in an orderly and progressive way (Wells and Arauz, 2006). According to Wells and Arauz (2006), in such situations, an instructor's follow-up moves are critical to support and monitor interactions successfully.

Technology-related challenges are another group to be considered. Many instructors state that the MOOC platforms do not provide them with adequate and effective technological tools to create and facilitate interactions (Liyanaguawardena, Kennedy, and Cuffe, 2015; Atiaja and Proenza, 2016). For example, FutureLearn discussion areas are devised with functions such as sorting contributions (e.g. based on most-liked), following, bookmarking or pinning to provide learners and instructors with ways of navigating contributions (Ferguson and Clow, 2015; Manathunga, Hernàndez-Leo, and Sharples, 2017). However, these features do not seem efficient enough as they are limited in their functions for tagging and searching information for easier navigation (Smith, Caldwell, and Richards, 2016).

Similarly, in cMOOCs, the learner-instructor interactions are minimal and limited. However, it must be remembered that in these MOOCs, instructor roles are different from those in xMOOCs, and resemble more those of a "co-traveller along a multifaceted path of knowledge construction" (Miyazoe and Anderson, 2013:18), and the discussion facilitator or moderator who coordinates and summarises the content (Rodriguez, 2012; Schultz, 2014).

Tubman, Benachour, and Oztok (2018) created a new socio-cultural classification for learner-instructor and learner-learner interactions in FutureLearn MOOCs by considering the number of unique learners in an interaction or a conversation. According to this taxonomy, conversations can be divided into four types– *lone* (only one member), *Watercooler* (two members), *Cocktail party* (three-nine members) and *Conference* for conversations with more than ten members. Furthermore, they extended this taxonomy

by considering Chua *et al.* (2017) social dimensions of interactions and turn-taking dynamics. Possible conversation types based on this classification are: lone, Q&A, limited social and extended social as described in Table 2:

Table 2: Conversation types in FutureLearn MOOCs

	Initial post	1st Reply	Further reply	Initiator 1st reply	Initiator further reply
Lone	X				
Lone	X			X	X
Lone	X			X	
Q & A	X	X			
Limited Social	X	X		X	
Extended Social	X	X	X		
Extended Social	X	X		X	X
Extended Social	X	X	X	X	
Extended Social	X	X	X	X	X

(Tubman *et al.* 2018:1645)

This taxonomy is created to examine the likelihood of collaborations through conversations, and the length attribute plays a key role in estimating the extent of collaborations. For example, an extended social conversation that includes 16 comments made by two participants has more potential for collaboration compared to an extended social with the same number of comments made by eight participants.

In the next section, discussion areas where the majority of learner-instructor interactions occur are discussed.

2.4.2 Discussion areas (forums) as main interaction spaces

Learner-instructor and peer interactions mainly occur in discussion parts of the online courses. They are the main communication and support tools (Clarke and Bartholomew, 2014; Ramesh *et al.*, 2014; Siemens, Gašević, and Dawson, 2015; Zhang, Skryabin, and Song, 2016; Lin and Cantoni, 2018) and fulfil several roles in facilitating learning. They are the spaces where learners can exchange ideas (Sharif and Magrill, 2015), seek help, ask questions, clarify doubts (Chaturvedi, Goldwasser, and Daume III, 2014; Najafi *et al.*, 2015), reflect, and negotiate meaning (Stump *et al.*, 2013; Tawfik *et al.*, 2017), while they articulate what they have understood (Rodriguez, 2014). Through discussion areas, learners can also share personal and professional experiences on a topic (Garrison, 2009), which aids in overcoming the feeling of isolation (Chen *et al.*, 2016). As a result, they are a useful means by which to create a sense of community and engagement (Chandrasekaran *et al.*, 2015b). Taken together, these areas play a major role in meeting learners' cognitive and non-cognitive needs, providing peer-to-peer and instructor-led support, and building a community (Cui and Wise, 2015; Cho and Tobias, 2016)

Likewise, discussion forums are a key tool for instructors to facilitate learning. They are a vital source of knowing and understanding the group dynamics, learners, their activities, opinions, and the issues they face during the course (Stephens-Martinez, Hearst, and Fox, 2014; Najafi *et al.*, 2015; Nylén *et al.*, 2015; Wong and Zhang, 2018). Additionally, they enable instructors to identify parts of content that are understood well, and those that need to be addressed in more detail. Consequently, they help instructors "to become more adaptive to learners" and to create and deliver content more effectively (Murphy and Fortner, 2014:238).

Within discussions, communications are usually organised into "threads", which are a chain of postings where learners or instructors respond to one another and form a discussion (Murphy and Fortner, 2014). Unlike traditional discussion forums where the discussion is displayed in a threaded and tree interface that allows conversations to branch (Hewitt, 2001), in most MOOCs, threads are displayed chronologically in a flat-structured format and at a single level (Tu, Blocher, and Gallagher, 2010). However, some MOOC discussions, such as a number of Coursera forums, still have the constrained tree structure (Rossi and Gnawali, 2014). Regardless of thread display format in MOOCs, the number of threads in discussion areas is very high (Wen, Yang, and Rose, 2014b) and as a result, MOOC discussions are referred to as noisy, chaotic and difficult for learners and instructors to find, read and review information within (Brinton *et al.*, 2014; Almatrafi, Johri, and Rangwala, 2018). To overcome this issue, Wise, Cui, and Vytasek (2016) suggest creating sub-forums to organise threads and conversations and asking learners to tag their comments or questions (content tagging) to facilitate searching and locating relevant information. Another suggestion is pre-creating threads based on anticipated discussion topics in order to minimise off-topic or non-related conversations and to focus discussions.

In FutureLearn MOOCs, the discussion areas have a single hierarchical structure, i.e. an original post plus a single thread of replies, which displays contributions in a chronological order (Tubman, Benachour, and Oztok, 2018). By default, the platform shows the first level of comments, and learners can reveal more comments by clicking on the hidden replies. This function helps reduce learners' feeling of being overwhelmed by the scale of contributions (Ferguson and Sharples, 2014; Coleman, 2018). However, Smith, Caldwell, and Richards (2016) criticise the unthreaded structure of FutureLearn discussions, since it makes following long, complex discussions difficult and it does not foster in-depth discussions. Nevertheless, Chua *et al.*'s (2017) study shows that lengthy threads do not occur often in FutureLearn MOOCs. The results of applying their

proposed taxonomy[6] for FutureLearn discussion postings to a MOOC revealed that only a small number of conversations include at least ten turns (4%), and conversations with more than twenty turns are rare (1%). This suggests that in FutureLearn MOOCs, most comments do not develop into lengthy threads and therefore, the point raised by Smith, Caldwell, and Richards (2016) can be challenged.

2.4.2.1 Participation in MOOC discussion areas

Participation patterns in MOOC discussions are different from other online courses since discussion participation is optional and voluntarily (Zhang, Skryabin, and Song, 2016), and to some extent unpredictable as learners contribute at the time suitable for them. As a result, different topics can be discussed simultaneously or different groups of learners can discuss the same topic concurrently - known as multi-threading (Feenberg, Xin, and Glass, 2002). Moreover, participation in discussions varies considerably during a course (Wong and Zhang, 2018). Wong and Zhang's (2018) study shows that most MOOC learners are active in discussion areas for a short period of time, and there is only a small subgroup of learners, i.e. *core users*, that participate in discussions regularly and actively during a course. However, when the overall discussion participation is considered, research suggests that learner participation (i.e. number of learners) and the volume of discussions decline continuously during MOOCs (Brinton *et al.*, 2014; Gillani and Eynon, 2014; Tubman, Oztok, and Benachour, 2016). Shirvani Boroujeni *et al.* (2017:133) found an overall decrease in forum participation, particularly towards the end of MOOCs, and established that learners are often active for one or two phases of a course, and cases of active participation are infrequent. Their analysis also revealed that a large number of active learners in each phase are new joiners and concluded that "persistent discussion groups" are not common in MOOCs. Nevertheless, Brinton *et al.* (2014) argue that not all learners choose to contribute to discussions, and this group of lurkers engage with discussions without posting or engaging with peers or instructors. Similarly, Arnason *et al.* (2017) state that there are silent learners who prefer to only read and revisit other posts, who are unfamiliar with or unclear about participating, who may feel overwhelmed by extrovert learners or who are simply generally nervous or shy about participating. Fournier, Kop, and Durand (2014) attribute lurkers' non-activity to time restrictions and commitments such as work or family. However, some learners in their study indicated a

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[6] Their proposed taxonomy for FutureLearn discussion postings classifies comments into five categories: *lone posts* (which do not receive any reply), *initiating posts* (which receive a reply), *replies* (which include replies to others' initiating posts), *further replies* (which are learner replies more than one time under an initiating post) and *initiator's replies* (when the initiator replies to others under his or her own initiating post).

preference towards being listeners and reflectors and specified this as one of their learning strategies. Knox (2016b) warns against the complexities involved in understanding participation in MOOC discussions, since for example, lack of data or inability to access data showing active participation cannot provide a solid basis to label learners as passive. Overall, Nandi, Hamilton, and Harlad (2012) consider three levels of participation in MOOC discussions: participation with no interactions (i.e. lurkers), limited participation, where learners use the discussion areas as a means to share their ideas, yet have restricted interactions with peers, and interactive participation, where learners use the full potential of discussions and engage with peers and instructors.

Of note is that, in addition to a learner's decision, course subject (Brinton *et al.*, 2014), and course events such as assignment deadlines (Shirvani Boroujeni *et al.*, 2017), *discussion tasks or lead-ins* influence the level of participation and activity in the discussion areas. According to Andrews (1980), tasks or questions that encourage divergent thinking and can have several correct responses as well as questions that require evaluation, analysis and synthesis of information are more likely to encourage participation and create continuing discussions. By contrast, convergent thinking prompts limit learner involvement because of the fear of incorrect answers. In addition, once the right answer is shared, the discussion is likely to end. Similarly, tasks that ask learners to reflect on content and pose their own questions discourage learner contributions and inhibit extended discussions (Tawfik *et al.*, 2017).

Richardson, Sadaf, and Ertmer (2012) classify discussion prompts into eight categories based on the roles they play in learning:

Playground prompts	require learners to share their interpretation or analysis of a specific aspect of materials.
Brainstorm questions	invite learners to share ideas, viewpoints, solutions, or suggestions about a concept.
Focal questions	require learners to decide, take a position and justify it.
General invitations	encourage a wide range of comments and responses from learners within a broad topic.
Lower divergent	require learners to examine information for understanding and drawing conclusions.
Analytical convergent	learners must evaluate information to find the right answer.
Shotguns	learners are expected to respond to at least one of multiple questions or statements.
Critical incident tasks	represent a scenario and require learners to respond to it based on their experiences or information from the content.

When the functions of these discussion prompts are considered, it becomes clear that each type addresses a specific level of cognitive presence. For example, *general invitations* and *brainstorm questions* help learners explore a topic by giving and receiving information. Thus, they encourage critical thinking at the exploration level. By contrast, *critical incident* tasks tend to be the most influential in fostering higher-level thinking by requiring learners to evaluate and provide solutions for real-life problems, which map onto integration and resolution within cognitive presence.

It can be concluded that the level of participation in discussion areas in terms of the number of learners and volume of contributions varies during a MOOC although it generally shows a declining pattern as the course evolves. This level is influenced by several learner and course-related factors such as the learning preferences of learners, course topic and discussion activities.

2.4.2.2 Community formation in MOOC discussions

Another aspect of discussion participation in MOOCs that is different from other online courses is community formation. Garrison (2016:48) argues that because of learner numbers, diversity, and lack of shared goals as well as the focus on self-regulation, MOOC discussions do not foster the formation of a meaningful coherent learning community. He adds that optional participation in discussion areas and inadequate instructor presence mean that there is not a strong support mechanism to sustain learner engagement and ensure formation of a community. Gillani and Eynon's (2014) findings also show that instead of social communities, decentralised crowds are formed in MOOCs, since most learners participate in forums for a short time. In another investigation, Gillani, Eynon*, et al.* (2014) identified four crowds of learners within a MOOC cohort: *committed crowd engagers,* who are most responsive to conversations; *discussion initiators,* who have the highest elicitative dialogues with others; *strategists,* who are similar to the committed crowd engagers, although most of their conversations are argumentative and show higher-order thinking; and *individualists,* who read and post contributions less than other groups.

Shirvani Boroujeni *et al.* (2017) identify high fluctuation of active learners and inconstancy of contributions in discussions as main inhibitors of community development. From a social network perspective, they believe that such fluctuation results in incoherent networks that require maintenance and coordination of social relations. Learners' inability to identify themselves with a large cohort is another reason for formation of learning crowds instead of learning communities. Since learners do not feel strongly connected to others, group cohesion and persistence is also affected

negatively (Garrison, 2016). In short, as Anderson (2017) states, MOOC discussion areas encourage the formation of learner networks or crowds rather than learning communities because they are flexible in entrance and exit of members and do not provide the necessary support for community formation.

2.4.2.3 Instructor contributions to discussions

In order for instructors to support learning, they need to make informed decisions about how, when and how much[7] to contribute in discussion forums (Chandrasekaran *et al.*, 2015b). They have to consider what to respond to, and which misconceptions to clarify while allowing learners to find their path (Comer, 2014) and allowing themselves to reflect on learner needs (Chandrasekaran *et al.*, 2015b).

When the quality of instructor contributions is considered, learners seek contributions that constructively criticise their comments and lead to further or new understanding of the content. They also value contributions that share an instructor's experiences, prompt discussions, direct them to more resources or are encouraging in general, i.e. contributions that exhibit teaching presence (Clarke and Bartholomew, 2014). Sharif and Magrill (2015) found that learners return to discussions if they provide them with positive feedback or help maintain positivity. In addition to the content and purpose of instructor contributions, the temporal aspects are important particularly for a truly interactive discussion. They can help to understand for instance, whether it is more beneficial to have a reply or a clarification after a question or whether high levels of summarising in one contribution lead to a lower possibility of new ideas in the next contribution (Wise *et al.*, 2014). Taken together, these aspects help instructors monitor their contributions by considering whether their activities need to be condensed or spread over the course, and whether the order and sequencing of their contributions move learners through different phases of learning (Wise *et al.*, 2014).

In order for instructors to contribute to learner discussions, they require pedagogical and technological means to manage learning in MOOCs (Nacu *et al.*, 2014). The newness of MOOC structure and scale can mean that instructors' existing approaches or beliefs are not adequate to facilitate learning (Ross *et al.*, 2014). For example, for scaffolding and community building, instructors need an effective mechanism to identify and monitor urgent posts for an immediate response (Almatrafi, Johri, and Rangwala, 2018). However, many instructors have reported challenges related to providing such responses (Blackmon, 2016) due to the large number of exchanges and difficulty in

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7   These three aspects refer to the quality, timing, and quantity of instructor contributions respectively.

navigating them. Most MOOC platforms primarily provide a context for learners' learning activities and do not support instructors (Zheng *et al.*, 2016). Wong and Zhang (2018), Chaturvedi, Goldwasser, and Daume III (2014) and Stephens-Martinez, Hearst, and Fox (2014) suggest that instructors must be provided with visualisation tools to see learner activities in discussions. Similarly, Wise and Cui (2018) emphasise that learning analytics about instructor activities can be made available to instructors to enable them to better align their contributions with the learning goals.

In addition to technology-related challenges, instructors also face some difficult pedagogical decisions. These include accommodating learner differences (Evans and Myrick, 2015; Koutropoulos and Zaharias, 2015), finding and maintaining the right balance of participation to support learners (McAuley *et al.*, 2010; Clarke and Bartholomew, 2014), anticipating the amount of confusion in discussions (Comer, 2014), methods for having meaningful interactions with learners considering their numbers (Chandrasekaran *et al.*, 2015a), considerations about the cross-cultural element of MOOCs, and having a large number of second language English speakers (Comer, 2014).

Overall, studies that have investigated an aspect of discussion areas in MOOCs mainly focus on the structure of these areas, learner participation patterns in them and factors that affect their participation or challenges that instructors face in contributing and monitoring these areas. Little is known about what instructors do in these areas at different stages of a MOOC, and therefore this study aims to research this gap.

2.5 Summary of the literature review and research questions

This chapter covered research investigating different aspects of learning in relation to MOOC instructors. It looked at the roles and importance of instructors for facilitating learning, their interactions with learners and participation in discussion areas as well as the way MOOC openness and scale has affected different aspects of their activities. It also provided an overview of the CoI framework as the study's conceptual framework, the rationale for choosing it and the studies that utilised it to research learning or teaching in a MOOC context. From the literature, it became clear that MOOC research shows a noticeable gap related to MOOC instructors. The existing research into MOOC instructors has largely focused on instructors' motivations, their experiences of designing and delivering MOOCs and challenges associated with these experiences. Little research has been conducted on instructors' activities, and to the best of my knowledge, it has not engaged deeply with instructors' contributions to discussion areas and the way learners engage with them.

In addition, the review of studies examining learning and teaching based on the CoI indicated that the application of this framework (not its survey instrument) within MOOC settings is limited and is even more scarce when instructors' practices are considered. Moreover, most of these studies have applied the framework only partially. Therefore, it is timely to apply the entire framework in MOOCs and to examine its suitability for investigating learning and teaching in open and large-scale educational contexts. Furthermore, the existing studies have not investigated the development of the CoI presences in MOOCs and particularly where instructor activities are concerned. Thus, addressing this aspect will enhance the understanding of the dynamics of CoI presences and will shed light on the relationship between them over the course of a MOOC. Therefore, this study aims to address the aforementioned gaps by investigating the overarching question '*What do instructors do in MOOC discussion areas and how do learners react to them?'* through the lens of CoI framework.

The above central question is divided into the following sub-research questions:

RQ 1. How are instructors' contributions to the discussions in Massive Open Online Courses characterised based on the Community of Inquiry framework?
   a) To what extent and in what ways do instructors contribute to MOOC discussions?
   b) How do the level and type of their contributions change during a MOOC?
   c) What prompts instructors to contribute to learner discussions?

RQ 2. What roles do the instructors' contributions to discussions play in learning?

RQ 3. To what extent, and in what ways, do learners engage with instructors' contributions to discussions?

The next chapter outlines the research design and methodological choices to address these research questions.

Chapter 3 **RESEARCH DESIGN AND METHODS**

3.1 Introduction

This chapter outlines the research design and discusses the methodological choices and considerations made to address the research questions. It is divided into six main sections and covers the description of research settings, the rationale for the adopted research approach (mixed methods), the two phases of the study together with justification for each phase, the reliability of findings, and the ethical considerations. The chapter ends with a summary of research procedures. It must be noted that the necessary changes to research design and procedure informed by the pilot study are discussed within each of the main sections.

The chapter overall serves three purposes; firstly, it explains the research approach and the theoretical underpinnings of the study. Secondly, it details methodologies used to achieve the study objectives. Finally, it provides a clear "audit trail" (Guba and Lincoln, 1981) of how results were produced and allows replication of methods by describing the way research design was operationalised.

3.2 Research settings

This study focuses on instructor activities in MOOCs offered by FutureLearn in partnership with a UK university. The reason for choosing MOOCs from one university relates to timely access to the courses, their instructors and relevant databases within the restricted timeframe of the study.

To choose the courses, all the twenty-seven MOOCs offered by the target university up to the beginning of this project (September 2016) were considered (Appendix 1). From these courses, 16 MOOCs, known as School MOOCs, had to be excluded since they were designed with no instructor involvement in discussion areas. MOOC 2 was another MOOC to exclude due to its credit-bearing nature as, in this course, instructors and learners might have shown different contribution behaviours. Findings from Kursun's (2016) comparative study of credit bearing and non-credit bearing MOOCs show that *credit* plays a significant role in participants' motivations and achievements. In addition, MOOC 21 was not included given that it was delivered by practitioners, i.e. NHS experts, and not academics like other MOOCs in this study. Because of the lack of access to the lead educators of MOOCs 23 and 27 for the second phase of the study, these courses were also removed from the sampling procedure.

Among several iterations of a MOOC, it was decided to choose the first run to ensure, as much as possible, similar instructor motivation and discussion activities, and to minimise the effect of factors such as instructor fatigue due to several iterations of a course. From the seven MOOCs, four were first run in 2014 and one each in 2013, 2015 and 2016. To reduce the possible impact of different course running time on interview responses[8] (a weakness revealed by the pilot study), the four courses that first ran in 2014, i.e. MOOCs 18,19, 20 and 25 were chosen. At the initial stages of coding the data, it became apparent that nearly a third of the lead educator's contributions in MOOC 18 were emoticons, which could be coded under two categories of "social" and "teaching" presences. However, due to the absence of linguistic clues, this distinction was nearly impossible and could have led to a subjective coding and low reliability of the study findings. As a result, course 18 was also removed and three MOOCs formed the sample from which instructor-learner conversations were selected (Table 3).

Table 3: Sampled MOOCs

Course name	Subject area	Course length	instructors	participants	instructor-learner conversations*
MOOC25	History	3 weeks	LEd, 4xEd, 2xM**	12,340	666
MOOC20	Business	3 weeks	LEd, 3xEd, 7xM	13,618	1,482
MOOC19	Performing Arts	3 weeks	LEd, 5xM	3,830	684

* In addition to the instructors in each MOOC, there were non-teaching members such as hosts and FutureLearn designers whose conversations were not included as they did not have any teaching role and oversaw learners' technical inquiries.

**LEd= lead educator, Ed= Educator, M= Mentor

Considering the instructors involved in sampled MOOCs, it is important to note that FutureLearn defines three instructor roles: the *Lead educator*, an academic with specialist subject knowledge and responsible for several duties from leading the course design, interacting with learners, delivering feedback (through weekly emails) to supporting mentors; *Educators* are also instructors with course specialist knowledge, however, they often do not hold any leadership responsibilities; *Mentors* by contrast, have a good understanding of the course subject with varying responsibility levels (e.g. teaching and course creation vs facilitating discussions only). Nevertheless, these roles are practised differently in different MOOCs and a teaching team can include any combination of these roles, however each MOOC must have a lead educator (partners.futurelearn.com).

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[8] The greater the time gap between the course first run and the instructor interview, the less likely the instructors were to remember the details of activities within discussions.

Overall, the procedure used to choose sample MOOCs lent itself to non-probability and particularly accidental sampling of the courses. A part of excluding courses (e.g. school MOOCs) from the population was outside my control as these MOOCs did not meet the main requirement of the study, i.e. conversations between instructors and learners. Other exclusions were an attempt to keep factors such as the time gap between a course run and instructor interviews as similar as possible to minimise the influence of such factors on findings, and to ensure that instructor-learner conversations represent instructors' typical commenting behaviour in discussions.

3.3 Research approach

Positioning this study within a research approach has been challenging, particularly as scholars define these approaches differently; Johnson, Onwuegbuzie, and Turner (2007) for example, provide nineteen definitions for a mixed methods approach. Nonetheless, considering the core assumptions of quantitative, qualitative and mixed methods approaches, the current study is closest to a mixed-method of inquiry. However, when the continuum of mixed methods research is considered, it does not fit pure mixed research, where qualitative and quantitative components contribute equally to the study (Figure 3). In fact, it is mixed methods with a dominant qualitative orientation that can be symbolised as QUAL +quant[9]. In other words, it relies on a qualitative view of the research process whilst recognising the benefits of quantitative methods to the investigation (Johnson, Onwuegbuzie, and Turner, 2007).
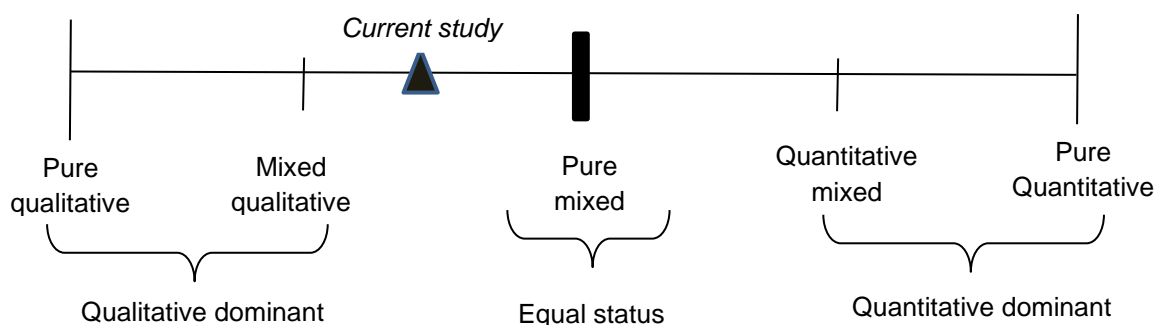
Figure 3: Current study's position based on the subtypes of mixed-methods research

(Adopted from Johnson *et al.* 2007:124)

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[9] Qual and Quant stand for qualitative and quantitative research respectively, and the use of capital letters denotes the dominant approach.

Moreover, when research paradigms are considered, it suitably fits pragmatism, which is based on the view that the approach best fitting the purpose and addressing the research questions is the most useful approach to the investigation (Johnson, Onwuegbuzie, and Turner, 2007; Cohen *et al.*, 2011).

Considering the research types (pure and applied), the current study is pure or academic, as is conducted to advance knowledge and to develop theoretical understanding of the CoI framework rather than to address a real-world problem that needs an immediate answer (Abbott and McKinney, 2013; Neuman, 2014). However, I have tried to avoid labelling the study overall, as, like Neuman (2014), I believe some of the research dichotomies, such as pure and applied, are overly simplistic, and additional types are needed, depending on the type of knowledge a study produces, and its research audience.

3.3.1 What is mixed and how

The study involves two distinct phases and the dimensions of mixing based on Greene's (2008) key elements of mixed designs, are outlined in Table 4. The first phase, which addresses the first and third research questions, is mixed itself and involves quantitative descriptive analysis of the discussion forums' dataset in addition to the hybridised content analysis of conversations between instructors and learners. The descriptive statistical analysis reveals the level of instructors' contributions to discussions and enables the exploration of changes to the level over the duration of courses. Within this phase, the qualitative component of content analysis uncovers the type of instructor contributions based on the CoI framework, whilst the quantitative element that deals with frequencies of contributions enables three types of comparisons:

     a) the comparison of contribution types

     b) the comparison of contribution types based on instructor roles (lead educators, educators and mentors), and

     c) the comparison of contribution types at three time segments (the beginning, middle, and end) of the course

Content analysis of discussion transcripts that goes beyond the "what", "how" or "how many" of instructors' activities (Miles, Huberman, and Saldana, 2014) is not purely qualitative. The adopted content analysis is a blend of qualitative and quantitative, since it uses counts of textual elements of instructors' comments in addition to the examination of the comments in the context and developing understanding about data (Berg, 2009). As Hughes *et al.* (2016) state, it is a hybridised content analysis that offers a better understanding of online communications.

Table 4: Mixing dimensions of current study

Methodology dimension	Hybridised content analysis and qualitative interviews
Time dimension	Sequential: Discussion transcripts must be collected and analysed first; interviews must follow to address questions raised by transcript analysis and areas that are not answerable through content analysis.
Relationship dimension	The research type and data are complementary, meaning that the interviews are informed by content analysis and play two roles: a) they help overcome the shortcomings of content analysis, that is exploring the explanation of or reasons for what happened in discussions b) they enable answering the questions about the role of instructors' contributions in learning.
Integration/ independence	The data collection for each phase is independent, but interactive in terms of sequencing of collecting and analysing data. Similarly, data analysis and reporting results of each phase is independent. The findings are integrated in the discussion of results.

The second phase addresses the second research question and provides additional information about two of the RQ1 sub-questions. It is purely qualitative and involves in-depth interviews with instructors. The need for this phase arose from the fact that the content analysis on its own would not provide further insight into the findings; for example, it would not explain why the numbers of instructors' contributions decrease at certain time segments of the course.

The data collection for the two phases is distinct, with rigorous probability sampling procedures in the first phase and purposeful sampling in the second phase. The data collection of the second phase partly builds on the first phase. Therefore, the design can be considered a "sequential design". I avoided using *explanatory sequential* design since the use of this term has been problematic for this study. Nearly all methods textbooks define an *explanatory sequential design* as a design where the collection and analysis of quantitative data is followed by the collection and analysis of qualitative data in order to explain the quantitative findings (Teddlie and Tashakkori, 2009; Bryman, 2016; Cohen, Manion, and Morrison, 2018). However, in the current study, the data is collected and analysed in sequence, yet it is the collection and analysis of mixed data (not purely quantitative) that is informing some aspects of the collection and analysis of the qualitative data. Moreover, the second qualitative phase is not only for the purpose of explaining the findings of the first phase, but also for addressing a separate research question.

3.3.2 The rationale for mixing

As Cohen, Manion, and Morrison (2018) stress, researchers need a rationale for mixing qualitative and quantitative approaches over choosing a mono-method design. Although in the current study the mixing is bottom-up and the research questions defined the mixed methods, two factors have affected the choice of this design. First and foremost is what Bryman (2016) calls "completeness", or one approach filling the gaps of another approach. The research area under investigation could not be fully understood by a pure qualitative or quantitative approach. A quantitative method would only have provided information about the level of instructors' contributions, the level of learners' engagement with instructors' contributions, and the changes to them over time. It would not have shed any light on the nature and type of instructors' contributions or the role they play in learning. Nor would it have been possible to identify the criteria for instructors' engagement with learner conversations and the strategies they use in discussions. In fact, the mixed methods design minimised the limitations of a pure qualitative or quantitative study (Creswell, 2014) by not restricting the instructors' actions to counts and frequencies while being systematic and allowing the examination of instructor activities by grounding such examination in the data (Berg, 2009; Lune and Berg, 2017). Secondly, as Teddlie and Tashakkori (2009) state, a mixed methods design is appropriate for addressing research questions that are concerned with an unknown aspect of a phenomenon - instructor activities in MOOC discussions in the case of this study - and can be answered in both narrative and numerical forms.

3.4 Research procedure: Phase one

3.4.1 Rationale for transcript analysis

In order to understand the extent to which instructors contribute to discussions and the ways they engage with learners, two options were available: asking instructors directly (interviews) and observing them in discussion areas (transcript analysis). The first possibility was not desirable due to its reliance on instructors' memory. Moreover, as Wise and Cui (2018) point out, instructors' judgement about their teaching activities is not always accurate. Consequently, it was decided to examine the records of instructors' engagement with discussions and then interview them for additional insight. As Bryman (2016:300) and Rodriguez (2014) state, examining records of postings to discussion forums as a rich data source provides immediate access to participant actions or opinions without being obtrusive, and as Teddlie and Tashakkori (2009) point out, they are non-reactive observations. Furthermore, this method allows systematic examination of online educational transactions (Garrison *et al.*, 2006) while saving a considerable

amount of time, as discussion forums provide an already transcribed account of conversations (Stump *et al.*, 2013; Creswell, 2014). This observational technique has been adopted extensively to gain insight into learning (Shea *et al.*, 2013; Richardson *et al.*, 2015; Scott, Sorokti, and Merrell, 2016; Stenbom, Jansson, and Hulkko, 2016; Evans, Ward, and Reeves, 2017; Pool, Reitsma, and van den Berg, 2017; Zhao and Sullivan, 2017) as it is believed that discussion postings are indicative of learning processes (Chua *et al.*, 2017). However, its application to the MOOC context is limited to a few studies, including Watson *et al.* (2016), Watson *et al.* (2017) and Kaul, Aksela, and Wu (2018).

3.4.2 Preparing discussion transcripts

FutureLearn datasets[10] do not provide ready-to-use discussion transcripts; therefore, some data processing work was required before sampling and coding. First, the total number of learner-instructor conversations was needed for sampling. To obtain this number, the conversations had to be reconstructed because the platform datasheet only provides individual postings, which are not in a conversation format. To rebuild conversations, first the instructor comments in each MOOC were identified through the "author id" and were colour coded to distinguish each instructor's postings (Screenshot 1). Then each instructor's comments were filtered, and the relevant conversation was identified through the comment's "parent id"[11] and the "find" function in Microsoft Excel. At this stage, the total number of comments in each conversation, and the total number and the order of the instructors' comments were recorded. Next, a summary of conversations by each instructor[12] was prepared, and the total number of conversations by all instructors involved in a MOOC made the population of learner-instructor conversations for that MOOC (Screenshot 2).

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[10] The dataset provided by FutureLearn is a spreadsheet that includes submitted text (individual posts), post id, author id, parent id, the step in which the text is posted, timestamp and the number of likes a post has received.

[11] Comments which did not have a parent id are considered as initiating comments. However, they are checked for false initiations. That is, if the comment does not have a parent id but the instructor addresses it to a particular learner, the comment is found on the platform and is added to the relevant conversation.

[12] In conversations where two or more instructors are involved, the conversation is counted towards the total number of conversations for the instructor who engaged with the conversation first.

498897	989f24ce-caff-46d0-b132-0a7f5580e56d	485902	1.19	on sources of	2014-03-14 17:04:39	0
498920	91860a82-49e6-434a-9ffa-44fd52566b85		1.8	and this course really is	2014-03-14 17:07:54	0
498969	c8942cc2-5b0a-437e-840b-2ef1800d487e	498626	1.8	Hi Matthew, and welcon	2014-03-14 17:18:02	0
498975	c8942cc2-5b0a-437e-840b-2ef1800d487e	498652	1.8	Hi Elizabeth, and Welcor	2014-03-14 17:19:29	0
498986	c8942cc2-5b0a-437e-840b-2ef1800d487e	498920	1.8	Welcome, Julie! I compl	2014-03-14 17:20:49	0
499011	7cce666d-695b-40d7-b116-e33024b96254		1.8	Hello I'm Kerra, and I am	2014-03-14 17:27:03	0
499018	778ffb54-6aa6-4e33-bca5-7326f5b70b08		1.8	Hi, my name is Igor and i	2014-03-14 17:27:50	0
499047	b586ee46-0299-4bec-bf11-6d918776ea1d	498696	1.21	not recommend bare	2014-03-14 17:34:48	1
499052	b586ee46-0299-4bec-bf11-6d918776ea1d	492113	1.21	Thanks Lowanna. Yes -	2014-03-14 17:35:39	0
499135	4bb402ad-ec3f-426d-b68b-a38730fcad3d		1.8	Hello, I am Gustavo and	2014-03-14 17:52:14	0
499207	8a7365c7-d976-44cd-a4d8-5d3dd6754285	487229	1.23	I have just noticed that c	2014-03-14 18:06:51	0
499299	80e08925-08be-4663-92e7-612dd3accc70		1.1	late...have always had	2014-03-14 18:25:52	1
499331	8bfbf86f-7881-4863-a94d-7c3368c537fa		1.1o	Theatre art could reflect	2014-03-14 18:34:03	0
499419	23eec38d-114f-4c17-9d98-ca868d848fa5		1.3	The Skills page is excelle	2014-03-14 18:52:13	0
499518	2cdc4cab-86fc-4f4f-9ffa-a1e62749d8a6		1.23	Clear and concise with	2014-03-14 19:24:25	1
499580	2a10357a-ae13-43ca-8e48-6bf1624e3ac9		1.8	i'm dave and although	2014-03-14 19:43:18	0
499651	3448e512-3cae-489d-812d-b6bc142d958a		1.13	Can we translate horizo	2014-03-14 19:55:56	0
499711	bdaeead6-0864-4d3b-a721-874cb93e416f		1.5	Extremely good idea to I	2014-03-14 20:05:56	3
499735	f80c9597-5d17-47b1-8b73-d48088e9d8c9		1.12	Russia seems to be a pa	2014-03-14 20:11:27	1
499751	7852c2ef-460d-4f6f-8daa-8eeb29693ab8		1.9	I think embodied knowle	2014-03-14 20:16:28	0
499752	cd9131e3-07d1-4288-aff0-d96d35aa4420		1.13	4. Yes, I agree that we a	2014-03-14 20:16:27	0
499850	5f9045c0-79dd-4248-9994-6feef76d31e2	499580	1.8		2014-03-14 20:36:50	0
499853	5f9045c0-79dd-4248-9994-6feef76d31e2	499135	1.8		2014-03-14 20:37:11	0
499865	5f9045c0-79dd-4248-9994-6feef76d31e2	499018	1.8	welcome.	2014-03-14 20:40:00	0
499866	41fe09fe-5aaf-43e7-8e73-134a39b68d68		1.8	Hi! I'm Caitlin, and I'm in	2014-03-14 20:40:13	0

Screenshot 1: Identifying instructor comments based on instructor roles

Educator	Ed initiating an conversations	conversations (2 comments)	conversations (3 comments)	conversations (4 comments)	conversations (5 comments)	conversations (6 comments)	conversations (7 comments)	conversations (8comments)	conversations (9 comments)	conversations (10 comments)	conversations (11 comments)	conversations (12 comments)	conversations (13 comments)	conversations (14 comments)	conversations (15comments)	conversations (16comments)	total name of conversations with ED
Lead educator	1	93	33	13	3	13	0	1	0	1	1	0	0	0	0	1	160
ED1	3	37	28	15	7	1	3	4	1	0	0	0	0	0	0	0	99
ED2	5	53	24	22	20	9	2	4	0	6	0	0	1	0	1	0	147
ED3	5	56	19	10	11	5	3	1	1	1	0	0	0	0	0	0	112
ED4	3	25	12	3	3	4	1	2	1	2	1	0	0	0	0	0	57
M1	4	36	14	4	2	1	0	1	0	1	0	0	0	0	0	0	63
M2	2	16	7	2	1	0	0	0	0	0	0	0	0	0	0	0	28
Total	23	316	137	69	47	33	9	13	3	11	2	0	1	0	1	1	666

Screenshot 2: Total learner-instructor conversations in MOOC 25

3.4.3 Sampling learner-instructor conversations

Following the above procedure, 2,832 learner-instructor conversations were identified. The length of these conversations ranged from 1-comment (e.g. instructor's initiation with a *like* as an implicit response) to 16-comment conversations. In order to have a comprehensive picture of conversation distribution in each MOOC for sampling, these conversations were grouped into *short* (1 to 5 comments), *medium* (6 to 10 comments) and *long* (11 to 16 comments). Grouping conversations in fewer or more categories would not have benefited sampling since categorising conversations into two groups (1 to 7-comment and 8 to 16-comment conversations) would not have accurately represented conversation lengths. Likewise, organising them into four groups of *short* (1 to 4 comments), *medium-short* (5 to 8 comments), *medium-long* (9 to 12 comments) and

long (13 to 16 comments) would have resulted in too many strata for the sampling procedure, which would have made some statistical analysis nearly impossible, as there would not have been enough conversations in each group.

Next, the distribution of conversations at three time segments of the course, i.e. the first (week 1), second (week 2) and final third (week 3) of the course[13], was mapped to ensure sample distribution represented population distribution. This was required for observing the changes to conversations over time. Table 5 shows the distribution of 2,832 conversations based on the conversation lengths and timing in each MOOC. This stratification of the population in advance ensures that the sample will have exactly the same proportions in each group as the population (Fowler, 2012).

Table 5: Distribution of learner-instructor conversations in each MOOC

		Short Conversations	Medium Conversations	Long Conversations
1st third (Beginning)	MOOC 25	263	26	4
	MOOC 19	418	9	2
	MOOC 20	919	26	2
2nd third (Middle)	MOOC 25	184	28	0
	MOOC 19	153	5	0
	MOOC 20	338	13	2
3rd third (End)	MOOC 25	146	14	1
	MOOC 19	96	1	0
	MOOC 20	171	9	2
Total	**2,832**	**2,688**	**131**	**13**

The distribution of conversations by three instructor roles is shown in Table 6. The reason for considering the instructor roles is to enable comparison of findings based on these roles.

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[13] All courses in the sample were three-week MOOCs and this is coincidental.

	Course	Short Conversations			Medium Conversations			Long Conversations		
		Lead educator	Educator	Mentor	Lead Educator	Educator	Mentor	Lead educator	Educator	Mentor
1st third (Beginning)	MOOC 25	78	123	62	6	19	1	2	2	0
	MOOC 19	286	0	132	7	0	2	2	0	0
	MOOC 20	72	196	651	3	12	11	1	0	1
2nd third (Middle)	MOOC 25	45	117	22	7	20	1	0	0	0
	MOOC 19	87	0	66	4	0	1	0	0	0
	MOOC 20	17	80	241	1	1	11	0	1	0
3rd third (End)	MOOC 25	22	120	4	0	13	1	0	1	0
	MOOC 19	49	0	47	1	0	0	0	0	0
	MOOC 20	10	88	73	2	1	6	1	0	1
Total	**2832**	**666**	**724**	**1298**	**31**	**66**	**34**	**6**	**4**	**3**

Table 6: Total learner-instructor conversations

3.4.3.1 Sample size

As many scholars suggest, there is no straightforward answer to the size of a sample (Jupp, 2006; Cohen *et al.*, 2011; Fowler, 2012; Bryman, 2016); and decisions about it are influenced by several factors such as the purpose of the study, the population size, the type and number of variables, the population homogeneity or heterogeneity, and the need to keep the proportionality of population in the sample (Cohen, Manion, and Morrison, 2018). Considering the categorical nature of the data and the heterogeneity of learner-instructor conversations in terms of length, timing and participants (i.e. lead educator, educator or mentor), the sample needed to be sufficiently large to enable quantitative analysis and to provide a rich enough description of the types and patterns of instructor contributions. Moreover, as Cohen *et al.* (2011) state, the sample must be representative of the population groups and spread, while every member of the population has an equal chance of being selected. Thus, a sampling strategy that considers both categorisation and randomisation while representing the conversation distribution at different time segments of courses was required.

The only sampling strategy that meets the above criteria is stratified random sampling with the advantage of enabling the generation of separate results for each stratum, which not only provides insight into individual strata, but also enables the comparison of results between them (Singh, 2007). The non-probability equivalent of stratified random sampling, i.e. quota sampling, was also useful. However, as Fowler (2012) argues, quota samples can be representative of the population in terms of the stratifying variables, but are not random due to the selection method (researcher's choice). This drawback could be adequately addressed by randomly selecting conversations from each quota, however the calculations to arrive at the sample size in these two methods are very different and quota sampling calculations do not possess the precision of stratified random calculations.

Three variables of the *instructor role*, *the length* and *the timing of conversations* are key to address the research questions and function as the strata. However, since the study focuses on the contributions of instructors, the three instructor roles form the three strata to calculate the sample size, whilst variation within each stratum in terms of conversation length and timing is considered in selecting conversations to ensure representativeness.

Considering that the strata are categorical variables, and the outcome of the content analysis also produces categorical data, a 5% margin of error and Alpha of 0.05 were used to determine the sample size, suggested as common practice by Cohen *et al.* (2011) and Teddlie and Tashakkori (2009). This was an important consideration as Cohen *et al.* (2011) emphasise the importance of variable type in determining the sample

size, given that categorical data require a larger sample than continuous data and most sample-size tables reflect this difference.

Table 7: Sample size based on stratified random sampling

Strata	Conversation Population	Sample size Confidence level: 95% Confidence interval: 5%
Lead educator	703	249
Educator	794	259
Mentor	1335	298
Sample size		**806**

The sum of sampled conversations, as can be seen in Table 9, is 818, which shows 12 conversations more than the calculated sample size of 806 in Table 7. This is due to the mathematical calculations that led to decimal numbers for some sub-categories. Since it was not possible to sample, for example 0.34 of a conversation, these numbers were rounded up. This is one of the practical constraints of this study and will be considered and dealt with cautiously in interpreting the results.

It is noteworthy to mention that originally a combination of length and timing of conversations was considered as strata. However, this choice had two drawbacks - firstly, because strata were a combination of categorical and continuous data, it was difficult to decide which mathematical calculation to use. Secondly, all the long conversations and to some extent, most of the medium length conversations, as shown in Table 8, would have been over represented.

Table 8: Sample size when strata are a combination of length and timing of conversations

Strata	Population	Sample size Confidence level: 95% Confidence interval: 5%
Beginning- short conversations	1600	310
Beginning- medium conversations	61	53
Beginning- long conversations	8	8
Middle- short conversations	675	245
Middle- medium conversations	46	41
Middle- long conversations	2	2
End- short conversations	413	199
End- medium conversations	24	23
End- long conversations	3	3
Sample size		**884**

	Course	Short Conversations			Medium Conversations			Long Conversations		
		Lead educator	Educator	Mentor	Lead Educator	Educator	Mentor	Lead educator	Educator	Mentor
1st third (Beginning)	MOOC 25	28	40	14	2	6	1	1	1	0
	MOOC 19	101	0	29	2	0	1	1	0	0
	MOOC 20	25	64	145	1	4	3	1	0	1
2nd third (Middle)	MOOC 25	16	38	5	2	7	1	0	0	0
	MOOC 19	31	0	15	1	0	1	0	0	0
	MOOC 20	6	26	54	1	1	3	0	1	1
3rd third (End)	MOOC 25	8	39	1	0	4	1	0	1	0
	MOOC 19	17	0	10	1	0	0	0	0	0
	MOOC 20	4	29	16	1	1	2	1	0	1
Total	**818**	**236**	**236**	**289**	**11**	**23**	**13**	**4**	**3**	**3**

Table 9: The distribution of sampled learner-instructor conversations

3.4.3.2 Sampling procedure

Once the sample size and the distribution of conversations in each MOOC were identified, a spreadsheet for each instructor role in each MOOC was created. The spreadsheet included nine tabs for all possible combinations of conversation length and conversation timings (e.g. 2nd short, 1st medium, 3rd long). Each instructor comment within a conversation was then given a random number using the Excel "RAND()" function. Next, based on the numbers for each combination in Table 8, the first *n* required conversations were chosen.

Following this step, the conversations were found on the platform, copied, and pasted into a Word document to be imported to NVivo for coding. The spreadsheets (Screenshot 3) showed which instructor(s) was/were involved in the conversation (e.g., colour orange represented Ed3 in MOOC 20), where the conversation could be found (e.g. step 2.16), when it occurred, and the total number of comments in the conversation.

Random NO.	Parent_id	Step	Comment	timetamp	Total No. of comments	No. of instructor comment	Order of instructor' comment
0.914649	1814564	2.16	Thank you Maure	2014-09-2	2	1	2
0.973332	1791872	2.5	And the complexit	2014-09-2	3	1	2

Screenshot 3: An example of a sampling spreadsheet

As it was nearly impossible to find every conversation on the platform due to the large numbers of conversations, "the step", "timestamp" (only day and month), "the instructor", and "the total No. comments in a conversation" were considered to select the most similar conversation to the ones chosen randomly by the spreadsheet. When searching on the platform, extra attention was given to the date in front of a comment to ensure the comment was made within the first, second or final third of a course as required. This was because late joiners could join a step outside the course timeline, or when the course was finished, and instructors would still engage with them.

Note that for each instructor role within a MOOC, a single Word document for the possible combinations of conversation time and length was considered. This facilitated comparison across roles and time segments within NVivo when conversations were coded.

3.4.4 Assessing the level of instructor contributions

As Anderson (2003) states, the level of interactivity in discussion forums can be measured by counting the number of times instructors or learners engage with the content or other participants, and it is largely a quantitative practice. Schrire (2006) also

points out that in computer conferencing environments, interactions are implicit or explicit responses to others' postings and should be differentiated from participation, which is represented by the average length of comments. Therefore, in order to assess the level of instructor activities in discussion areas, the total number of instructor postings, including both responses and initiating comments is considered. Since the platform does not provide any click-based data about instructors or information about the number of comments they liked, it was not possible to measure instructors' implicit interactions and engagement with learner conversations.

Given that the current research is interested in the level and the type of instructor contributions, it did not consider the length of their postings. Most similar studies such as Hara, Bonk, and Angeli (2000), Mazzolini and Maddison (2003, 2007), Arguello and Shaffer (2015), Rubio (2015), Zhao and Sullivan (2017) and Chen *et al.* (2016) utilised the frequency with which instructors post comments to measure instructor interaction and engagement with learners. This is also in line with Nacu *et al.* (2014) definition of contribution, which stresses commenting or sharing artefacts in discussion forums.

Nevertheless, Epp, Phirangee, and Hewitt (2017:48) criticise the attempts to quantify interaction, engagement or participation utilising simple counts since these metrics "only consider the frequency of discourse events rather than the content of discourse". Instructors in interviews also raised this shortcoming, as some of them strongly believed that numbers do not tell the full story of their activities. However, in the current study, this drawback is addressed by examining the type and content of instructor postings.

3.4.5 Assessing the type of instructor contributions

To identify the type of instructor contributions, the content of their postings was analysed based on the three CoI presences, i.e. social, cognitive and teaching presences, using a content analysis method (CA). This section provides the rationale for using content analysis and describes the type, unit of analysis, coding scheme, and the procedure for the conducted content analysis, as well as relevant reliability measures.

3.4.5.1 Rationale for using content analysis

From the three options of discourse analysis, conversation analysis and content analysis (see Table 10), discourse and conversation analyses, which focus on the process of communication and the linguistic nuance of conversations such as acts, moves, exchanges and transactions (Mercer, 2010) were not suitable to identify the content of learner-instructor conversations. In addition, considering the sample size and the number of researchers involved, these two methodologies were not feasible. Conversely, content analysis as "a research technique for making replicable and valid inferences from

texts to the context of their use" (Krippendorff, 2013:24), could provide information about instructor and learner contributions and the way they dealt with a topic in conversations (Henri, 1992). It is also a transparent method due to clearly presenting the sampling procedure and the coding scheme for replication studies. Additionally, it allows a certain degree of longitudinal analysis as in this study, it enables the examining of changes to instructor contributions over time (Bryman, 2016). Abbott and McKinney (2013) highlight lack of appropriate or sufficient materials for analysis as one of the weaknesses of the content analysis studies. However, since in the current study, the content analysis was conducted on discussion transcripts that include conversations in their naturally occurring settings, such a limitation did not exist.

Table 10: Possible analysis methods

Method	What it reveals	What it does not reveal
Conversation analysis	It reveals mechanics of interactions such as turn-taking, sequences and topic development and details such as length of pauses, sharp cut offs of words, rising inflection, emphasis of words to understand what is occurring in the interaction.	Dynamics of conversations or interactions in a written discourse (limited variability in application) and their contents.
Discourse analysis	It reveals social actions, establishment and maintenance of social relationships and individual's identity and attitude by understanding how people construct realities through language (by examining the connections among texts and between texts and contextual factors).	It focuses on the functions of a communication but not the topic or content of it.
Critical Discourse analysis	It reveals the interpretation of meaning and structure in relation to ideology and power dynamics. It focuses on conversational control, transitivity and intertextuality.	It often deals with the language associated with a political or ideological field or practice not an educational one.
Text analysis	It examines the texture of texts (genres, schematic organisation, reference, salience, cohesion).	It does not enable examination of the text at a micro level and in relation to its content.
Corpus analysis	It reveals the frequency of occurrence of words in a corpus of conversations as well as their co-occurrence to help reveal the way words construct meanings by the company that they keep.	It de-contextualises the conversations and limits the analysis to word/phrase level.
Content analysis	Enables categorising the content of conversations/interactions and making inferences about learning and teaching.	It does not reveal the social structures, the conversation patterns or the relationship among individuals.

For CoI studies, content analysis is the most employed methodology (Weltzer-Ward, 2011), and as Kovanović *et al.* (2017) and Garrison (2017) state, it is the primary approach for assessing the three dimensions of an online educational experience based on the CoI framework. Most CoI studies consider content analysis a qualitative method, since the CoI protocol for analysing interactions is qualitative, and assigning frequencies to the coded texts aids in understanding patterns. Although frequencies provide a quantitative sense, they are not for inferential statistical analysis (Gerbic and Stacey, 2005; Garrison *et al.*, 2006; Rodriguez, 2014). Nevertheless, the broader literature on research methodologies is moving towards the understanding that the distinction between qualitative and quantitative content analysis is a "mistaken dichotomy", as the analysis of a text requires both the systematic and objective qualities of quantitative methods and the interpretation of qualitative approaches (Krippendorff, 2013:88). Berg (2009) also strives for a blend of qualitative and quantitative analysis because he believes counts provide information about the frequency of forms, whereas the qualitative element deals with forms and interpretation of them in terms of examining topics, themes and ideological mind-sets. Moreover, Zhang and Wildemuth (2009) believe that the two approaches can be used in combination as they are not mutually exclusive, whilst Hesse-Biber and Leavy (2011) describe content analysis as an inherently mixed-mode approach.

When the content analysis in this study is considered, at one level, counting each type of instructor comment has produced a numerical description of the content of instructor contributions. At another level, identified types are interpreted as teaching strategies that instructors use to support learning in discussion areas. Therefore, the content analysis involves an interpretative and qualitative element. Moreover, it reveals learner engagement with instructor contributions by looking at the number of likes and responses that an instructor comment(s) receives in a conversation, or as Hughes *et al.* (2016) describe it, it includes analysis of "hard content". Given that the content analysis in this study deals with both soft and hard content, it can be concluded that it is a hybridised content analysis (Hughes *et al.*, 2016).

3.4.5.2 The type of content analysis

The content analysis in this study is directed and deductive, as categories and indicators of CoI are used as the coding scheme and predetermined categories to code learner-instructor conversations (Hsieh and Shannon, 2005; Satu and Helvi, 2008). Hsieh and Shannon (2005) claim that in directed content analysis the goal is to validate or expand a theoretical or conceptual framework; thus, such an approach benefits the study in terms of validating the CoI framework for the MOOC context. In other words, the findings

provide supporting or non-supporting evidence for the use of CoI for researching MOOCs.

Although the study relies on CoI for coding, it does not overlook the aspects of conversations that are not covered by the framework. Thus, while being directed by CoI, the analysis is open to new categories or modifying the existing ones to improve the framework for the context under investigation. As Creswell (2014) states, the analysis is guided by both predetermined and emerging codes.

3.4.5.3 Limitations of content analysis

As Chua *et al.* (2017) point out, the main limitation of content analysis is its lack of ability to reveal the dynamics of a conversation in terms of turn taking, responding, or initiating a conversation. While acknowledging this limitation, it was not within the objectives of this study to examine the dynamics of learner-instructor interactions in terms of linguistic moves such as turn taking. The investigation of such dynamics is planned in a follow-up study examining the effect of instructor contributions on learning.

3.4.5.4 The unit of analysis (or recording)

For content analysis studies, sampling and recording units are required to operationalise the analysis (Krippendorff, 2013). As explained in **3.4.3**, a complete "conversation" is considered as the sampling unit, and it was decided to use a single "posting" or "comment"[14] as the recording or coding unit. A "posting" as the unit of analysis has the advantage of being identifiable objectively and not requiring several coding decisions (Rourke *et al.*, 2001; Garrison *et al.*, 2006; Batardiere, 2015). In addition, coding at comment level reduces "decontextualisation of communication" (Garrison *et al.*, 2006:2) and as Schrire (2006) states, it provides data that can be interpreted meaningfully. Moreover, it helps retain consistency with most other CoI studies. However, in the majority of cases, instructors and learners include several topics in a single comment. Therefore, following Anderson *et al.* (2001), Zhao and Sullivan (2017), and Gutiérrez-Santiuste and Gallego-Arrufat (2017), multiple codes were allowed for a single comment as the following example shows:

Hi Margaret, thank you for your question, I meant operating in a planned and structured way, focused on a solution but still open minded and free thinking.

♡ Like 3   ↩ Reply   🔖 Bookmark

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[14] A comment or posting is defined as a learner or an instructor completing the action of posting a text or an emoticon by clicking on the "post" or "reply" icon in discussions. Comments vary in length and complexity from a single word or emoticon to multiple paragraphs.

"Hi"	Social Presence, Group Cohesion, Greetings
"Margaret"	Social Presence, Group Cohesion, Vocative
"Thank you for your question"	Teaching Presence, Facilitating Discourse, Acknowledging learner's contribution
"I meant operating in a …"	Teaching Presence, Direct Instruction, Providing clarifying information

Syntactical coding units such as words, sentences or paragraphs were not suitable, since words and sentences were too narrow and would decontextualise an instructor or a learner comment, despite allowing consistency in identification (Rourke *et al.*, 1999); paragraphs could become large or not well-formed and consequently become difficult to identify. Thematic or meaning units, on the other hand, do not lead to fragmentation of the coded text (Graneheim and Lundman, 2004) and their use in content analysis studies is growing. However, their main weakness is the difficulty and subjectivity involved in identifying them, which leads to inconsistencies with a direct impact on reliability (Donnelly and Gardner, 2011). Therefore, as can be seen, a posting as the unit of analysis is "a good compromise" (Garrison *et al.*, 2006:2) since it has the flexibility of the thematic or meaning unit to capture the exchange in its natural form, and the reliability of a syntactical unit in terms of identification (Rourke *et al.*, 1999).

Note that for each conversation at a macro level, referential units were also identified. A referential unit is defined as a comment posted by a particular person (Donnelly and Gardner, 2011). For the current study at the broadest level, it was required to identify whether a comment was posted by an educator, a lead educator, a mentor or a learner, and then to analyse it based on the coding scheme outlined in the next section.

3.4.5.5 The coding scheme (for instructor contributions)

As explained in **2.3**, the CoI framework is used as the coding scheme for the content analysis of learner-instructor conversations. It acted as the codebook and provided a list of pre-determined categories and sub-categories for coding. CoI as a coding scheme "is structured as a hierarchy of *presences, categories* and *indicators*". Teaching, social and cognitive presences are each divided into various categories and, in turn, categories include several indicators (Garrison *et al.*, 2006:5).

Given that this study focuses on massive and open educational courses, which possess unique features such as having no formal assessments, some of the indicators required revision and modifications to fit the context (Rodriguez, 2014). These refinements included both re-operationalisation and re-conceptualisation of indicators, i.e. in some cases the operational definition of an indicator was updated without any changes to its conventional interpretation (re-operationalisation), whilst in other cases, in addition to

changing the operational definition, the intended uses and interpretation were also modified to fit the MOOC settings (re-conceptualisation) (DeBoer *et al.*, 2014). These changes are outlined in the next section.

The modification of the CoI coding scheme

For the current study, the CoI framework set by Garrison and Anderson (2003) was chosen to enable a comparison of findings with most other CoI studies. Initially, it was decided to use the revised version of the framework by Shea *et al.* (2010), due to clarity in definitions and comprehensiveness; however, this was discarded after the pilot study since the coding scheme included too many indicators, which made analysis complex. Having too many codes can affect coding and its reliability negatively, as more coding decisions are required. Additionally, the suggested changes to the Teaching Presence (e.g. adding the category of *assessment*) were not beneficial in a MOOC context. Nevertheless, the changes suggested by Shea *et al.* (2010) and other studies are considered and applied where appropriate. Additionally, when necessary, new indicators are introduced to code activities that the CoI does not account for.

Social presence

Social presence is composed of three categories: Personal (affective) communications, Open (interactive) communications and Group cohesion, and eleven indicators (Table 9). Indicators of personal communications did not require any modifications. Indicators within open communications, on the other hand, required most changes:

1. *Continuing a thread,* which is defined as using the reply feature of the software, rather than starting a new thread, is removed because in this study, the focus is on conversations where learners and instructors have chosen to respond to a comment. In other words, nearly all instructor comments (with the exception of 13 initiating comments) would have been coded into this indicator because instructors replied to a learner.

2. *Quoting from others' messages* - defined as using software features to quote others' entire messages or cutting and pasting sections of others' messages - and *Explicitly referring to other's messages* are merged following Swan and Richardson (2017). The reason is that these two indicators were referring to the same concept. In addition, the term "message" is changed to "comment" to suit the context.

3. Following Zhao, Sullivan, and Mellenius (2014), *Asking questions* is narrowed to only include non-task and non-academic questions (with a social function), to differentiate it from asking questions in cognitive presence (*triggering event*) and *Drawing in*

participants within teaching presence for facilitating discourse. This is a re-operationalisation change.

4. *Expressing agreement* is narrowed to agreement on "non-tasks" because based on the Shea *et al.* (2010) revised CoI scheme, agreement or disagreement on task items are a part of *exploration* in cognitive presence. "Disagreement" is also included as suggested by Shea *et al.* (2010). Although expressing disagreement does not encourage open communication, in the pilot study there were a few instances of disagreement with a social function that did not fit any other indicators of the social presence (re-conceptualisation).

5. *Support for communication* - defined as clearing up communication misunderstandings or clarifying one's intended meaning - is a new[15] and emerging indicator for Open Communication. It is different from *Supplying clarifying information* within teaching presence, which focuses on clarifying content related misconceptions (e.g. *Well not absolutely. Vertical training can exist in all kinds of cultures. And indeed it is most commonly referred to when looking at the East Asian traditional forms of performance*).

Group cohesion, as the last category of social presence, required two adjustments:

1. Welcoming learners is added to *Phatic, salutations and greetings* since a large number of instructor contributions were devoted to welcoming learners on to the course.

2. *Course reflection* is an indicator that does not belong to the original CoI. It was first introduced by Swan *et al.* (2001) and is defined as reflecting on the course itself. Shea *et al.* (2010) study also provided evidence of this indicator. Recurrent instances of this indicator in learner comments caused this study to include it in the coding scheme. Note that reflecting on the learning process and outcomes are coded under "learner presence" indicators.

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[15] New indicators are discussed in detail and as findings in **Chapter 4**.

Category	Indicator	Code	Definition	Example
Personal Communication (AF) [Affective]	Expression of Emotions	[AF1]	Conventional or unconventional expressions of emotions and feelings; includes repetitive punctuation, conspicuous capitalisation and emoticons	*I'm really annoyed :(* *I am very EXCITED. My husband actually recommended it to me!!!!!! :-)*
	Use of Humour	[AF2]	Use of humour, teasing, cajoling, irony, sarcasm, understatement	*A: IKEA…..Innovative food ingredients aside ;-p* *B: Apparently one of their most sold "products" are the Swedish meatballs in the cafe :-)*
	Self-disclosure	[AF3]	Presenting details or disclosure about life outside the course (current events in their lives/educational or family background/ hobbies/ expressions of likes, dislikes and preferences/reasons for doing the course) Or expressing vulnerability	*I am Sam from Ireland. I am a Business Analyst in an International Spirits & Wine Company*
Open Communication (I) [Interactive]	Asking questions	[I1]	Asking **(non-task, non-content)** questions of learners and instructors, making non-task requests	*Anyone else had experience with FutureLearn?* *How can I get a certificate?*
	Quoting from others' comments/ referencing explicitly to others' comments	[I2]	Referring directly to the content of others' comments and quoting from others' comments	*As you say a key question is 'is the concept of heroism (itself) propaganda'. The media gives us certain ideas, the academics and writers present their findings.*
	Expressing agreement/disagreement	[I3]	Expressing agreement or disagreement with others on **(non-task)**	*Agree with you that FutureLearn is a user-friendly platform!*
	Complimenting and expressing appreciation	[I4]	Complimenting, expressing appreciation, offering praise and encouragement.	*Congratulations to the team for the excellent materials and the content delivery.* *Thank you so much for your notes Mark and Louisa. I have never thought I will get reply from you all. I do appreciate it.*
	Support for communications*	[I5]	Clearing up communication misunderstandings or clarifying one's intended meaning **(non-content)**	*It might have come out wrong, but I was not trying to point out any "mistakes", of course. What I was trying to say was exactly what you are saying.*
Group Cohesion (CO) [Cohesive]	Phatic, salutations, greetings and welcoming	[CO1]	Salutations, greetings, closure (communication that serves purely social function), welcoming learners on the course	*Welcome to the course. I hope you enjoy your time with us and learn things that you can apply in your workplace.*
	Vocatives	[CO2]	Addressing or referring to learners/educators by name	*Thanks for the comments Jennifer. Great idea to compare the UK and German trailers.*
	Group reference	[CO3]	Refereeing to the groups as "we", "us", "our", "group"	*Is it at all possible for **us** to review play scenes of Meyerhold's transcripts?*
	Course reflection	[CO4]	Reflecting on the course or a part of it, provide feedback and recommendations	*This course gave us a fine mixture of theoretical knowledge and practical examples, which both increased my understanding of innovation, invention, process from idea to product, sustainability issues, etc.*

*indicates new indicators

Table 11: Coding scheme for social presence

(Goshtasbpour, Swinnerton, and Morris, 2019)

Teaching presence

Teaching presence consists of three categories - Design and organisation, Facilitating discourse and Direct instruction, with twenty-one indicators (Table 10). Indicators of this presence, particularly Design and organisation required most re-operationalisation and re-conceptualisation of definitions due to the differences between course design and pedagogy in MOOCs and traditional online courses. The reason for modifying the definitions rather than creating new indicators is that the original indicators of Design and organisation exist in MOOCs, although some of them have acquired new meanings. Nevertheless, where required, new indicators are introduced.

1. In addition to "communicating important course information and outcomes"*, Setting curriculum* includes providing information about how the course operates and how learners can navigate the course and material. Therefore, the operational definition of this indicator is extended. "Communicating assessment methods" (added by Shea *et al.* (2010)) within this indicator is also limited to self and peer-assessment as formal assessment in the traditional sense does not exist in MOOCs.

2. The definition of *Design methods* is expanded, since this indicator in MOOCs should include information about the use of learning materials in terms of downloading them, instructions for late joiners, information about obtaining certificates and details of a MOOC's reiterations, in addition to what *Design methods* originally includes, i.e. providing information about participating in learning activities and completing the course successfully. The name *Design methods* is also not elaborative of the function of this indicator. *Learning design and organisation* or similar labels are more suitable; however, for later comparison with other CoI studies, the label is not changed (re-operationalisation).

3. MOOC design also necessitates a new description for *Establishing time parameters*, as this indicator no longer includes information about course deadlines; it mainly covers course schedule and the timeframe for activities. In fact, rather than setting time parameters, the instructors inform learners of the course timeframes, i.e. what is covered when. A more appropriate label for this indicator is *Advising course timeframe* (re-conceptualisation).

4. Following Shea, Vickers, and Hayes (2010), *Responding to technical concerns* from the Direct Instruction category is moved to "Design and Organisation" and merged with *Utilising medium and technology effectively,* since they are addressing the same concept and were not mutually exclusive. Moreover, as Shea, Vickers, and Hayes (2010) state, technical support is not a conventional component of direct instruction.

5. *Marketing the course and institution* is a new addition to Design and Organisation and is defined as marketing the course or institution's courses and encouraging

learners to explore other offered courses/products. This indicator has emerged from the analysis of instructor contributions and will be fully discussed in **Chapter 4**.

Indicators related to Facilitating Discourse did not require any changes. The only modification has been adding the definition of *seek understanding* from the CoI survey instrument to this indicator for clarity purposes. By contrast, due to the different nature of teaching and learning in MOOCs compared to other online courses, Direct Instruction indicators required several modifications.

1. *Presenting content/questions* is originally defined as presenting content and directing questions to learners (Anderson *et al.*, 2001). However, in MOOCs, especially those that this study focused on, content presentation mainly occurs through videos, and questions are directed to learners through discussion tasks. Instructors do present content in discussion areas, but it is mainly in the form of providing additional information to learners. Therefore, it was decided to separate *presenting content* from *presenting questions. Presenting content* is also relabelled as *supplying additional information and content* to be consistent with *supplying clarifying information* within this category. However, these two indicators are mutually exclusive in that *supplying clarifying information* provides information to reduce learners' misconceptions and misunderstandings, while *supplying additional information* occurs when the instructor adds to what a learner posted.

2. *Supplying clarifying information* is adopted from Shea *et al.* (2010) since in the majority of cases, after instructors diagnose learners' misconceptions, they attempt to clarify them by providing more information or directing learners to learning materials.

3. *Injecting knowledge from diverse sources* is renamed as *making explicit reference to outside material* for clarity (Shea *et al.*, 2010; Shea, Vickers, and Hayes, 2010).

Category	Indicator	Code	Definition	Example
Design and Organisation (DO)	Setting curriculum and communicating assessment methods	[DO1]	Communicating important course information and outcomes, e.g. course goals, topics, and expectations and communicating self and peer assessment methods to be used in the course	*In this MOOC we focus on innovation in a business context. We do look at allowing failure as part of the innovation process later in the course.*
	Designing methods	[DO2]	Providing clear instructions on how to participate in course, learning activities and use online material, e.g., clear explanation of how to complete course successfully as well as information about course runs or guidelines for late joiners	*The idea is to take it step by step and fill in the Realise your vision document with notes you are interested in as you go along.* *You might consider re-joining this course in January when I will be rerunning it.*
	Establishing time parameter	[DO3]	Communicates time frames for the course and learning activities	*We look more at Roger's Diffusion of Innovation in week 3.*
	Utilising medium/technology effectively	[DO4]	Assisting learners to take advantage of the online environment to enhance learning e.g., using platform features for learning activities and resolving technical problems	*If you follow educators, you can filter their comments and see their responses.* *If you feel overwhelmed by the number of comments in discussion, look at the "most-liked" first.*
	Establishing netiquette	[DO5]	Helping learners understand and practise the kinds of behaviours that are acceptable in online learning, e.g., directing learners to guidelines on polite forms of online interaction	*Remember, all uppercase letters is the equivalent of "shouting."*
	Making macro-level comments about course content	[DO6]	Providing rationale for topics, tasks and activities	*This discussion is intended to give you a broad set of tools which you will be able to use in deciding when and how to use different research techniques*
	Marketing the course and institution*	[DO7]	Marketing the course or institution's courses, encouraging learners to explore other offered courses/products	*I hope you're also aware of the X programme; this is available to all entrepreneurial University X students, providing support for those who want to start their own business.*
Facilitating Discourse (FD)	Identifying Areas of agreement/disagreement	[FD1]	Identifying areas of agreement and disagreement on course topics in order to enhance learners' learning	*Joe, Mary has provided a compelling counter-example to your hypothesis.*
	Seeking to reach consensus/ understanding	[FD2]	Guiding learners toward understanding course topics in a way to help learners clarify their thinking; guiding learners toward agreement about course topics	*So, what is the meeting point between these two forms of traditional theatre? Stylisation!*
	Encouraging, acknowledging or reinforcing student contributions	[FD3]	Acknowledging learners' participation in the course, e.g., replies in a positive encouraging manner to learners' submissions	*Great comments and thoughts Brian.* *Thanks for your comment Robert.*
	Setting climate for learning	[FD4]	Encouraging learners to explore concepts in the course, e.g., promotes the exploration of new ideas	*It will be really interesting to see how you view the innovations developed at M&S that are discussed in the case studies.*
	Drawing in participants, prompting discussion, presenting follow up topic for discussion	[FD5]	Drawing in participation; helping keep learners engaged and participating in productive dialog.	*Any thoughts on this issue?* *I'd like to see what others think about this?* *Does anyone agree with me?*
	Assessing the efficacy of the process	[FD6]	Evaluating the effectiveness of communications to keep learners on task	*I think we are getting a bit off-track here.*

Direct Instruction (DI)	Presenting questions	[DI1]	Posing and directing questions to learners	*How does this tension between vertical and horizontal get played out in an online environment?*
	Focusing (re-focusing) discussion on specific issues	[DI2]	Helping focus the discussion on relevant issues, keeping participants on topic	*I think that's a dead end. I would ask you to consider…* *Be sure to address the differences between theory and practice.*
	Summarising the discussion	[DI3]	Reviewing and summarising discussion contributions to highlight key concepts and relationships to further facilitate discourse	*From your comments, it sounds like information, resourcefulness and attention to those most excluded are key components of inclusion in innovation.*
	Confirming understanding through assessment and explanatory feedback	[DI4]	Explicitly evaluating discussion/offering feedback that help learners understand their strengths and weaknesses	*Your analogy of music is exactly right. And (upbeat), one, two! Where the upbeat can be emphatic or tiny.*
	Diagnosing misconceptions	[DI5]	Diagnosing misconceptions to help learners learn	*Remember Bates is speaking from an administrative perspective, so be careful when you say…..*
	Supplying clarifying information	[DI6]	Reducing confusion or misconceptions about course content by providing additional explanations (clarifies and explains academic concepts, topics or processes)	*I meant operating in a planned and structured way, focused on a solution but still open minded and free thinking.*
	Supplying additional information and content *	[DI6B]	Providing additional information to broaden learner's thinking about their responses (e.g. providing alternative perspectives or parallel examples)	*Interesting thought - one of the challenges with newness is trying to predict un-intended consequences of the innovation.*
	Making explicit reference to outside material	[DI7]	Providing useful information from a variety of sources, e.g., articles, textbooks, personal experiences, or links to external web sites.	*Hi Nicola, perhaps the following can be of assistance to you.http://www.forbes.com/sites/timworstall/2014/04/20/using-apples-iphoneinnovation/*

*indicates new indicators

Table 12: Coding scheme for teaching presence

(Goshtasbpour, Swinnerton, and Morris, 2019)

Cognitive presence

Cognitive presence includes four categories - Triggering events, Exploration, Integration and Resolution, which are the four stages of cognitive development, and thirteen indicators (Table 11). The first and last stages, i.e. *triggering events* and *resolution*, are applied to the data without any modifications. However, for the *exploration* and *integration*, Shea *et al.* (2010) definitions are adopted.

1. Within exploration, divergence within the online community and divergence within a single comment are replaced by "exploration within the online community" and "exploration within a single comment" following Hosler and Arend (2013) and Shea *et al.* (2010). Similarly, for *Integration*, convergence within the online community and within a single comment are replaced by "integration within the online community" and "integration within a single comment". This is because divergence and convergence of ideas do not occur necessarily in an orderly and linear pattern one after the other. However, the depth of convergence and divergence within integration is more than exploration.

2. As suggested by Shea *et al.* (2010), "brainstorming" and "information exchange" within exploration are merged since these two indicators overlap and it is very difficult to distinguish them, particularly in learners' contributions. In other words, these two indicators were not mutually exclusive.

Category	Indicator	Code	Definition	Example
Triggering events (TE)	Recognising Problem	[TE1]	Presenting background information that can end to a question or presents a problem/ issue	*It is great news but can have adverse effect on dentist practice and pharmaceutical industry. How much does it cost this gel? Every person can afford it? In the future, there will be less dentists.*
Triggering events (TE)	Sense of puzzlement	[TE2]	Asking task and content-related questions or postings that take discussion in a new direction	*Can an innovation be disruptive without being radical? I'm struggling to think of an example.*
Exploration (EX)	Exploration within the online community	[EX1]	Unsubstantiated agreement or disagreement; supporting or contradicting previous ideas. Includes "good point" or "I agree" with or without unsubstantiated elaboration	*I absolutely agree with you about the geometry of his movement. And suprematism is very much about geometry.*
Exploration (EX)	Exploration within a single comment	[EX2]	Presenting many different ideas/themes in one posting	*Someone should tell the Royal Shakespeare Company about the truce: their Xmas play is 'The Christmas Truce' and the poster shows soldiers playing footie in no-man's-land! Myths are hard to shift.* *I think Germany has struggled with their past, but they have tried to confront it, e.g. the Holocaust Memorial near the Brandenburg Gate. 'Downfall' and, to a lesser extent 'Das Boot', were big steps for Germany.*
Exploration (EX)	Brainstorming and information exchange	[EX3]	Exchanging information and views, personal narrative or description (not necessarily regarding personal experiences) or facts (i.e. from sources such as websites, articles). Adds points but does not systematically defend/justify/develop situation.	*As far as I can tell, embodied knowledge implies that our experiences create some sort of "physical memory" that impacts and influences our attitudes. It's difficult to locate its proper source because we live in a web of ideas, concepts and senses which are intertwined*
Exploration (EX)	Suggestions for consideration	[EX4]	Explicitly characterising a comment as exploration (e.g. Does that seem about right?" or "Am I way off the mark?"	*Could we suggest that many of the essential teachings of various actor trainers and directors are embodied in the work they created? I know from my own training that many of the physical exercises that I do were initially developed to address problems in rehearsals.*
Exploration (EX)	Leap to conclusions	[EX5]	Drawing unsupported conclusions	*In the UK, M&S have lost reputation for innovation at least with product and services.*
Integration (IN)	Integration among group members	[IN1]	Referencing to previous comment(s) followed by substantiated agreement or disagreement (I agree/disagree because…); building on, adding to others' ideas	*I disagree with you about needing lots of money and being a big company. If you sell ideas, like consulting or accountancy, you do not need the overheads of a shop or office, or loans, nor a lot of staff to develop an idea. It helps to if the company can generate sufficient income from cash cow jobs to pay the staff and fund the research.*
Integration (IN)	Integration within a single comment	[IN2]	Providing justified, developed, defensible yet tentative hypothesis	*Leadership is certainly a key factor. In the case of Japan, Japanese corporations tend to be more long-term focused than Western companies in terms of corporate goals as well as compensation packages and employment practices. In addition, non-bank shareholders generally lack the power to exert major influence on management, so management can focus more on long-term goals. However--and perhaps ironically--conservatism and strict hierarchical corporate culture in Japan often stifle innovation and risk taking. Conversely, US corporations are generally*

				more open to risk taking but also tend to suffer from employment short-termism and knee-jerk reactions to quarterly income statements. I wonder if we can have the best of both worlds.
	Connecting ideas (synthesis)	[IN3]	Integrating information from one or more sources- textbook, articles, personal experience, other post or peer contributions	*For me, Meyerhold and the teaching of staged combat can be seen to parallel each other (perhaps this is an obvious connection?). The need to connect the mind and body, awareness of space, and the communication of intention is critical to pulling off a stage combat episode safely, and the follow-through and reaction is what 'sells' it to the audience. In his book, "Text and Presentation" by Stratos E. Constantinidis, the author expands on this idea:* *Each step in this technique has very different significance to actors and audience. To the actors, each step is either a cue or the mechanical execution of a performance technique, while to the audience each step is part of the story unfolding onstage. (p. 115)* *Inasmuch as my understanding of Meyerhold's techniques so far (I admit more ignorance of it that I would like), there are signals or signs that the actors give and take from each other, and staged combat seems to build upon these principles. Similarly, the idea of rhythm, as mentioned previously by the instructor, XX, is vital to stage combat as well.*
	Creating solutions	[IN4]	Explicitly characterising a posting as a solution	*I think a solution to stay ahead of the competition in the coming years is the M&S take a position related to sustainability, reuse of waste to make new products through the team of style. And always keeping the customer's trust, creating strategies that bring the brand to the user. After all, today, more than ever people are attracted to products that pass emotion, lifestyle similar to theirs and experience (Olfactory, Sensory and visual).*
Resolution (RE)	Various application to real world testing solutions	[RE1]	Providing examples of how problems were solved.	*An excellent example for converting wasted food is the Dhapa area, which is a dumping ground in East Kolkata. It consists of landfill sites where the solid wastes of the city of Kolkata are dumped. "Garbage farming" is encouraged in the landfill sites. More than 40 per cent of the green vegetables in the Kolkata markets come from these lands.*
	Defending solution	[RE2]	Defending why a problem was solved in a specific manner.	*No example available*

Table 13: Coding scheme for cognitive presence

(Goshtasbpour, Swinnerton, and Morris, 2019)

3.4.5.6 The coding scheme (for learner contributions)

To understand the dynamics of learner-instructor conversations, the content of the entire conversation, including learner comments, is analysed. Considering that CoI emphasises the shared instructional roles and responsibilities of instructors and learners and considers "teachING" rather than "teachER" presence (Anderson *et al.*, 2001; Garrison, 2017), the CoI coding scheme was also applied to learner comments. However, whilst coding learner contributions, it became clear that a number of learner postings did not fit within the framework, or as Shea *et al.* (2012) and Scott, Sorokti, and Merrell (2016) describe, they could not be coded as indicators of social, teaching or cognitive presences. These comments included instances of learners' self-regulation and planning activities. Consequently, the new "learner presence", introduced to the CoI model by Shea *et al.* (2012), Shea *et al.* (2013) and Shea *et al.* (2014), was added to the coding scheme for the learner comments. This presence has three categories: Forethought, Performance and Reflection, which are associated with self and co-regulation in learning (see Appendix 2).

However, the large numbers of learners in MOOCs do not allow group work and collaborations in the same way as the traditional online courses, and as a result, the definition of some learner presence indicators required some modification.

1. *Assigning tasks to self/others* within Forethought and Planning originally included coordinating and assigning tasks to self and others. Since in the studied MOOCs there were no group tasks or projects, *co-ordinating* is removed.

2. *Advocating effort*, described as encouraging others to contribute or focus on tasks, materials and activities, is removed from Monitoring since it overlaps with *Drawing in participants* and *Encouraging and acknowledging learner contributions* within Teaching Presence.

3. From *Offering and seeking clarification/additional information* within Strategy use, *offering* is eliminated and only *seeking* is kept since offering clarifications is covered by *supplying clarifying information within* Direct instruction (teaching presence). Note that for clarity, personal questions or questions about the course are addressed by *asking non-task questions* within Social Presence; subject-related questions are coded under *sense of puzzlement* within Triggering events (cognitive presence) and *seeking clarifications* within learner presence deals with task-related questions.

4. *Reflecting on learning process and learning outcome* is added to the indicator of Reflection since there were many instances of reflection in learner comments. For the definition of this sub-category, Redmond (2014) description is used, i.e.

learners identifying their increased knowledge and skills in the subject area or reflecting and evaluating themselves and their planning and organisation.

3.4.5.7 The coding procedure

The process of coding included identifying instances of CoI indicators in an instructor or learner contribution. To this end, each posting was read carefully and evidence of each indicator within a comment was coded into the relevant indicator. Therefore, coding was conducted at the most granular level of CoI, i.e. indicators. Some scholars, such as De Wever *et al.* (2006), criticise coding at this level due to the high number of codes for content analysis. Garrison *et al.* (2006) also believe coding at this level is difficult because each comment often includes more than one category of each presence or more than one indicator of each category. They suggest that if answering the research questions does not require such a level of analysis, coding can be done at category level and the most salient category for each presence can be chosen when multiple presences exist. However, coding at indicator level was essential for the current study in order to capture the content and dynamics of conversations fully and to reveal instructors' social and teaching strategies (e.g. to find the most and least common facilitating and direct instruction strategies in MOOCs). This would not have been possible if coding had been stopped at the "presence" or "category" level. According to Garrison *et al.* (2006), it would have limited insights in exploratory research. In addition, one of the main aims of this study is to examine the suitability of the CoI coding scheme for a MOOC context; therefore, methodologically, it was necessary to examine the existence and non-existence of CoI indicators and the emergence of new ones. As a result, it was decided to code at the indicator level.

As justified in **3.4.5.4**, multiple coding was allowed to capture the real dynamic of conversations and to mitigate against the loss of a contribution's content, since heuristic approaches, where indicators are chosen based on the importance or the highest exhibited indicator in a comment (Wanstreet and Stein, 2011; Kovanović, Gašević, and Hatala, 2014; Rodriguez, 2014), were biased towards one presence. Moreover, different indicators within a comment may be equally important. In contrast, multiple coding or cross classification allowed for understanding the complexity of learner-instructor conversations by providing information about the type and degree of the co-occurrence of CoI indicators within a comment. This in turn led to an understanding of the interaction between CoI categories and presences (Gutiérrez-Santiuste and Gallego-Arrufat, 2017). Throughout coding, there were comments or segments of a comment that did not fit any indicator (e.g. when an instructor asks for the details of an event to attend or when a learner offers to send an instructor a book), as the CoI did not account for them. These

comments were placed in the "others" category and at the end of coding this category was examined to group similar comments and create new indicators. *Marketing the course*, *support for communications* and *providing additional information* were three new indicators that emerged from the "others" category. The number of remaining comments in "others" was not sufficient to support the formation of a new indicator. These comments remained as "others".

Another aspect of coding was keeping a record of the coded data. Coding was conducted via NVivo for efficient assigning and reassigning of codes and storage of the coded data. However, NVivo could only provide categorised coded comments (with frequencies) where relevant conversations were not identifiable in a helpful way for analysis. Therefore, along with coding within NVivo, a spreadsheet was created to record coded data in a conversation format (Appendix 3). The spreadsheet includes demographic information about the conversation such as the length and timing of the conversation, the instructor involved, and the number of likes an instructor comment received, in addition to coded content of each comment within a conversation. The spreadsheet also outlined the number and order of comments before and after an instructor comment. This enabled an understanding of the relationship between a learner's initiating comment and an instructor's contribution, as well as the co-occurrence of CoI presences and categories in an instructor's contribution.

NVivo provided counts or frequencies for each code (indicator) that helped summarise data that would be difficult to recognise otherwise (Hannah and Lautsch, 2011). These frequencies were then used to calculate percentages in order to facilitate an understanding of patterns and to comprehend results. They are intended to make comparisons across three instructor roles, and between CoI categories and indicators possible and more manageable (Miles, Huberman, and Saldana, 2014). As Garrison *et al.* (2006) suggest, the use of frequency of CoI presences and their indicators provides a quantitative sense of what is occurring and aids in understanding patterns while not making the analysis quantitative. It must be noted that frequencies are for displaying the content of learner-instructor conversations and do not hold any statistical significance. The goal is to describe and explore and not to predict. Furthermore, using numbers facilitated keeping the interpretations analytically honest and protected them against bias (Miles, Huberman, and Saldana, 2014). Likewise, they allowed for confirming hunches about the potential obsolescence of some CoI indicators in MOOCs.

The final aspect of coding to be discussed in this section is the manifest and latent meanings of contributions. Instructor and learner contributions are the exact representations of their actions in discussions; therefore, most of the interpretations required for the coding of hidden messages or meanings in other types of document are

neither applicable nor necessary (Abbott and McKinney, 2013). Hence, in the majority of coding instances, the manifest meaning of comments was considered.

3.4.6 Assessing the relationship between learners' initiation and instructor contributions

In order to explore how instructors respond to different types of learner comments, the instructor contribution in relation to the learner's initiating comment is examined. To this end, the content of the learner's initiating comment and the instructor's response at presence level was considered (e.g. SP-CP[16]). Then, the top three instructor responses to each learner initiation were analysed. Fourteen types of learner initiations were identified (See appendix 9) and the five most recurring types, which make up 92% (n=713) of their overall initiating comments, and the way instructors respond to them were reported.

3.4.7 Assessing changes to instructor contributions over the course duration

To examine the impact of time on instructors' contributions, variations in the level and type of instructor contributions at three time[17] segments of the course, i.e. the *beginning* (first third), *middle* (second third) and *end* (final third) of a MOOC, are examined. For this purpose, the overall percentages of each contribution type based on each instructor role were studied at three time periods. Mapping instructor activities over the course of a MOOC explains how instructor contributions flow in discussions over time and allows for examining patterns of contributions and their rise and fall. In addition, it enables the understanding of whether contribution types or instructor roles interact with each other during a course. Further, it facilitates comparing the findings of the current MOOC study with other CoI studies focusing on the development and dynamics of social, cognitive and teaching presences over time in traditional online courses.

3.4.8 Assessing learner engagement with instructor contributions

After examining instructor contributions, it was important to explore whether learners engage with the contributions, and if so, in what ways. From the three possible data sources, i.e. surveys, clickstream data and discussion posts (Wen, Yang, and Rose, 2014a), discussion posts were utilised to address the last research question about learners' engagement, since learners were not accessible to be surveyed or interviewed

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[16] SP, TP and CP represent "Social", "Teaching" and "Cognitive" presences respectively.

[17] Stein *et al.*'s (2007:106) conceptual definition of time as "points on a scale that represent a discrete beginning and ending" is used.

at the time of the study. Clickstream data would not have provided the type of engagement data that this study required. Therefore, the available discussion data, i.e. the number of learner comments after an instructor's contribution, and the number of times an instructor contribution was liked, are used to identify four engagement behaviours, from the most to least active engagement. However, the comments after an instructor's contribution were not necessarily a response to an instructor's post - they could represent a reply to other learners or the conversation initiator. Therefore, all comments after an instructor's contribution were checked within each conversation for cases where the reply was not in response to the instructor's post, and then the following classification was applied to the data:

(1) Engagement by both liking and responding to an instructor's contribution

(2) Engagement by responding to an instructor's contribution

(3) Engagement by liking an instructor's contribution

(4) No engagement

Based on this classification, responding to an instructor's contribution represents an explicit interaction between a learner and the instructor, and signifies a higher level of engagement compared to liking, which indicates an implicit interaction where the learner reads a comment and acknowledges this by liking it. According to Thair (2015), learners like a comment to show their appreciation, empathy or agreement with the comment or instructor/learner.

It should be noted that in 2017, FutureLearn introduced the new feature of "bookmarking", which can also represent a learner's implicit engagement with a comment. According to Thair (2018), learners "can use bookmarks to remind themselves of certain contributions that they might wish to refer back to at a later stage". However, this feature was not available for the courses in this study and was consequently not included.

Learner engagement was then examined in terms of engagement with instructor contributions based on the instructor roles, the content of instructor contributions and the changes to learner engagement over the course of a MOOC.

3.5 Research procedure: Phase two

3.5.1 Interviews with instructors

After examining the learner-instructor conversations, instructors were interviewed. Interviews provided opportunities to ask for explanations of instructor actions in discussion areas as well as to address the second research question in relation to instructor roles in supporting learning in discussions. They provided in-depth information (Teddlie and Tashakkori, 2009) about the how and why of instructor contributions to discussions and elicited instructors' views on their roles.

Interviews were semi-structured to accommodate both asking standard questions about the role of instructor contributions in learning and asking instructor-specific questions in relation to their conversations with learners. In addition to variation in questions, they enabled variation in prompts to "draw [instructors] more fully into the topic under study" (Galletta, 2013:45). In summary, the interviews included a fixed part to enable comparison across instructors, and a flexible part to maintain openness and exploration (Creswell, 2014). All interviews were conducted in-person with the exception of one, which was through email correspondence due to the instructor's illness.

3.5.1.1 The number and selection of instructors for interviews

Brinkmann and Kvale (2015) state that researchers must interview as many participants as necessary to answer the research questions. While they emphasise that the number of interviewees depends on the purpose of research, they suggest a number around 15 +/-10 for interview studies. They produced this number based on factors such as time, resources and participants' availability for a study, while they point out that after a saturation point, including more participants will not generate new information. Since this study is not entirely based on interviews, it was decided to interview 15 instructors; however only twelve instructors agreed to participate.

Overall, twenty-four instructors were involved with the delivery of the MOOCs in this study. From this number, six instructors were not included in the interviewee list as they contributed fewer than 15 comments throughout the courses and their low engagement would not have enabled them to answer most interview questions. Two instructors were in other countries and did not respond to the invitation for a Skype interview. From the sixteen remaining instructors, 12 agreed to a face-to-face interview. As Table 14 shows, all lead educators and a balanced number of educators and mentors were interviewed. The aim was to interview a representative sample of instructors in terms of instructor

roles and courses. Nevertheless, due to practical reasons such as lack of access to mentors on MOOC 25[18], this was not always possible.

Table 14: List of interviewees

Name	Course	Gender	Role at university	Education	Teaching experience (Yrs)
LEd 1*	MOOC19[19]	Male	Professor	PhD	22
LEd 2	MOOC 20	Male	Senior Teaching Fellow	BSc	10
LEd 3	MOOC 25	Female	Professor	PhD	18
Ed 1	MOOC 20	Male	Lecturer	EngD	3
Ed 2	MOOC 20	Male	Lecturer	MSc	7
Ed 3	MOOC 25	Female	Senior Lecturer	PhD	22
Ed 4	MOOC 25	Female	Senior Lecturer	PhD	30
Ed 5	MOOC 25	Male	Professor	PhD	19
M1	MOOC19	Female	Lecturer	PhD	3
M2	MOOC19	Female	Doctoral student	MA	3
M3	MOOC 20	Female	Doctoral student	PGCE	5
M4	MOOC 20	Female	Senior Teaching Fellow-Doctoral student	PGCE	10

*LEd= Lead educator; Ed= educator; M=mentor

3.5.1.2 Interview questions

Based on the study aims, existing literature, and observations from the content analysis of learner-instructor conversations, a number of questions were formulated to answer the research questions. These questions were then audited for overlaps or missing aspects and were grouped into seven main areas:

1. *Demographic questions*: These questions elicit information about the years of instructors' teaching experience, their online learning and teaching experiences before delivering the MOOC, and the relevant training to develop and deliver a MOOC.

2. *Warm-up questions*: Two general questions about discussion areas were devised as ice-breakers to begin the interviews.

3. *Engagement with discussions*: Ten questions specifically addressed different aspects of instructors' activities in discussion areas. They included questions about the frequency and duration of instructors' engagement, instructors'

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[18] Since most mentors were graduate students, they were not accessible at the time of study.
[19] MOOC 19 originally includes only a lead educator and four mentors. No educator was involved.

priorities for discussions, prompts to respond to a learner, the types of comment they made, and the type of comments that learners engaged with most.

4. *Division of work*: These questions were planned to understand the dynamics of collaborative teaching in MOOCs and also to shed light on why some instructors contributed less than others.

5. *Reasons for contributing to discussions*: Four questions under this heading were posed to understand what outcomes instructors try to achieve by contributing to discussions and the role they play in learning.

6. *Feeling and attitudes towards contributing to discussions*: This heading included two questions to indirectly examine whether the reasons for engagement with learner conversations, or lack of it, are related to instructors' attitudes and feelings.

7. *Changes over time*: Two questions within this category addressed the changes to instructors' level of contributions and engagement strategies over the course of a MOOC.

There was also a concluding question before thanking the instructor for their time and participation in the study.

Within each topic area, questions were arranged in such a way that a natural conversation about the topic would flow. All questions were open-ended to aid exploration whilst allowing instructors to take the direction they wanted (Seidman, 2006; Tashakkori and Creswell, 2007). In addition, a variety of question types was considered to elicit as much information as possible. Descriptive questions such as "*Can you tell me about how you approached discussions in the course…..*" were asked to obtain a general picture of instructors' activities, whereas structural questions were used to obtain more detailed information, for example about the "when" of discussion activities. Moreover, following O'Brien and Toms (2008) suggestion, prompting questions were considered for two of the important questions in case instructors found it difficult to articulate their experience.

During pilot interviews[20], it was noted that instructors had difficulty in remembering some information due to the time gap between the course run (2014) and interview dates (2017). As Brinkmann and Kvale (2015) state, in interviews where the interviewee is asked about past experiences, the issue of a participant's recall must be addressed through paying attention in developing interview questions. To minimise this effect,

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[20] Two pilot interviews were conducted with lead educators from similar courses. They resulted in reducing the number of questions, removing overlapping questions and finding difficult questions that instructors were unable to answer.

interview questions did not focus on specific details of conversations that required much reliance on memory. Also, a summary of information about the course (e.g. instructors involved, course length, topics covered) and a sample of instructor conversations were taken to the interviews to remind instructors of specific information when required.

3.5.1.3 Interview protocol

Before interviews

Instructors were invited to the interview through an email (Appendix 4) detailing the purpose of the interview and providing them with the project information sheet (Appendix 11). After instructors expressed their willingness to participate, they were interviewed during April-May 2017.

During interviews

At the beginning of the interviews, instructors were introduced to the project and to myself and were briefed about the interview in terms of the question areas. They were reminded of the focus of the study, i.e. discussion activities, since during the pilot interviews instructors redirected the focus to designing the MOOC on many occasions. They were then asked to sign the consent form (Appendix 10) and confirm that the interview could be recorded.

All instructors were asked the same questions, as outlined in Appendix 5, with slight modifications depending on their course and role. For example, lead educators were better positioned to answer Q1 about the division of discussion activities within the teaching team. After asking questions under a heading, I added a few concluding statements based on the instructor's responses to check whether I understood their answers correctly.

After addressing the first set of standard questions under "engagement with discussion", instructors were shown a summary of their engagement activities from the discussion dataset and some of their conversations with learners which I had questions about. This part of the interview was instructor-specific.

The interviews lasted between an hour and an hour and a half, and were audio recorded.

After interviews

Interviews were transcribed fully by an independent transcriber. I then checked each transcription against the recording for accuracy, and against a checklist (Appendix 6) to ensure the inclusion of all required information and the depth of information provided in responses. Afterwards, the interview transcripts were sent to the instructors for two

purposes: firstly, to check the transcript for possible misinterpretation of their responses (Weston *et al.*, 2001), and for any addition or omission of information, and secondly, to request any information which had been missed or needed clarification. Six out of twelve instructors replied with more information and some changes to the transcriptions.

Up to this point, four out of five stages of an interview, i.e. thematising, designing, interviewing, and transcribing, as outlined by Brinkmann and Kvale (2015) are described. Analysing and verifying will be covered in the following section, while "reporting" is dealt with in **Chapter 5**.

3.5.1.4 Coding and analysing interviews

To code interviews, a modified version of Miles, Huberman, and Saldana (2014) coding procedure for qualitative interviews was applied (Figure 4). The first stage of coding was "creating codes" and it was decided to use the CoI indicators as predetermined codes to a) enrich the findings from the analysis of discussions and b) create constancy between the two phases of the study and tell a unified story of instructors' contributions to discussions. Therefore, the process of creating codes was deductive or, as Creswell (2013) describes, it had a priori theoretical orientation. Nevertheless, the coding process was open to emerging codes during analysis to accommodate for new variables and categories. This is strongly encouraged by Creswell (2013) when pre-figured codes are used as he believes these codes limit the analysis.
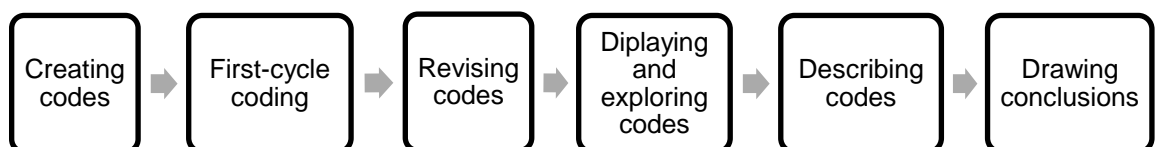
Figure 4: Coding process based on Miles, Huberman and Saldana's (2014) model

The second step was assigning codes to instructor responses (first cycle coding). Among the 25 approaches[21] to first-cycle coding, a combination of protocol coding and process coding was utilised. Based on protocol coding, a list of predetermined codes was used to assess if roles and discussion activities described by instructors fell into the CoI framework. Additionally, process coding, which uses gerunds (-ing words) to indicate observable and conceptual actions (e.g. supplying additional information or marketing the course), was employed to code data that the CoI does not consider (Miles,

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[21] Twenty-five approaches to first-cycle coding include: 3 elemental, 3 affective, 1 literary and language, 3 exploratory, 2 procedural and 4 grammatical methods.

Huberman, and Saldana, 2014). It is of note that the thematic or meaning unit defined as the unit of expression of an idea was used for coding.

Once all the interview transcripts had been coded, the data within each code were checked (revising codes) for conceptual unity to ensure all codes worked and to identify codes which declined or flourished. At this stage, CoI indicators that did not attract any instructor responses were removed and data coded to the "others" category were revised for the purpose of forming new codes. This revision enabled a richer understanding while in some instances leading to re-coding sections of the transcripts (Weston *et al.*, 2001). Since the CoI as a coding scheme is hierarchical itself and includes three levels - presences, categories and indicators, the second cycle coding, where codes are grouped into a smaller number of themes, was not required. It should be mentioned that second cycle coding was only applied to identify instructor priorities for discussions that were contextual and were not covered by the CoI framework, as well as to determine instructor criteria for engaging with a learner conversation.

Subsequently, the coded data in each node were displayed in a "content-analytic summary table" where related data from all instructors (multiple cases) were summarised (Screenshot 4). This was also the first step of exploring data and determining how many instructors shared similar opinions. When more than one instructor mentioned a point, it was noted numerically for later reporting. Tabulating coded data in this way also enabled comparison across instructor roles and in fact, the table also acted as a contrast table.

Screenshot 4: Content-analytic summary table

The data under each heading of CoI were then summarised to create a more coherent understanding of instructors' actions or opinions relevant to the heading. In the

meantime, any differences among the three instructor roles for each heading were noted for later reporting. Afterwards, all research sub-topics, concepts and variables were brought together in a conceptually clustered matrix that produced an "at-a-glance summative documentation and analysis" (Miles, Huberman, and Saldana, 2014:161). In order to draw conclusions from instructor responses and report findings, the following techniques were used:

- Noting patterns and clustering to see "what goes with what"
- Making contrasts and comparisons to understand differences between discussion activities based on instructor roles and timing of activities
- Partitioning variables to gain insight into instructor strategies
- Counting to see what exists and what is absent
- Noting the relationships (if any)

For reporting, counts are used not for any statistical purposes but for obtaining a general view of the findings and to keep analysis protected against bias. In addition, they aid ordering when reporting findings. Creswell (2013) is against using counts in qualitative analysis since he believes they imply a quantitative orientation, which is against qualitative research principles. He asserts that frequencies suggest all codes are given equal emphasis and disregard the fact that the coded data may represent contradictory views. However, frequencies and percentages in reporting interview findings are accompanied with a thick description of results and examples, which also provide accounts of contradictory views. The counts do not mean that one indicator is more important or significant; rather they indicate which indicators instructors pay more attention to or use more often. Despite this, Auerbach and Silverstein (2003) claim that if an idea is important, it will be mentioned by more than one participant.

3.6 Reliability of findings

3.6.1 Reliability of content analysis

Garrison *et al.* (2006) identify transcript analysis as one of the challenging analysis methods due to difficulties associated with the validity and reliability of the coding procedure (i.e. the efficacy of the coding scheme and consistent understanding and interpretation of the codes by different coders). However, they state that most of these deficiencies can be alleviated by using a valid coding scheme with discrete, mutually exclusive, and clear categories. As discussed in **2.3.2**, the validity of the CoI framework and its coding scheme has been empirically confirmed by several studies. To ensure that indicators are mutually exclusive after the changes they underwent to fit the MOOC

context (see **3.4.5.5**), reliability checks were conducted at two stages of coding. First, when the coding of conversations from the first MOOC (n=393) was finished, 10% of conversations (n=40) were randomly selected and coded by a trained[22] independent coder. This check at the early stages of coding aimed to a) check how consistently the CoI coding scheme had been applied to conversations, b) identify areas of disagreement, and c) discuss disagreements and reach a consensus. After identifying disagreements, the definitions of some indicators were made clearer and more specific. For example, it became clear that most disagreements are related to *asking questions* which could be coded under two different presences (See **3.4.5.5** for full details). Then, the revised coding scheme was re-tested on 20 conversations and a percentage agreement[23] of 91% was achieved. Krippendorff (2013:275) suggests employing three or more coders and considering *majority judgments* or *ex post facto consensus* to deal with disagreements instead of negotiating and reaching an agreement on the interpretation of codes. He believes this approach prevents code definitions being reinterpreted. However, considering resource limitations for this study, employing two other coders was not feasible. Therefore, it was decided to apply the revised coding scheme (after agreement) to the complete dataset, including the already coded conversations, to militate against reinterpreting the codes.

The initial checking of coding also revealed human errors when manually entering coded data into an Excel spreadsheet (see Appendix 3). Therefore, once the coding was completed, I went through the spreadsheet and checked all the entered codes against the coded comments in NVivo. The second or main interrater reliability check was conducted when the coding of conversations was completed. At this stage, the important decision was to choose the most appropriate reliability measure since there is disagreement in literature about the most appropriate inter-coder reliability coefficient (Lacy *et al.*, 2015; Bryman, 2016). *Percentage agreement* (the percentage of all coding decisions that coders agree) has the major weakness of not considering agreement that occurs by chance (Lombard, Snyder-Duch, and Bracken, 2002). *Cronbach's alpha* is known as a conservative measure because it only "gives credit for agreement beyond the distributions of values in the marginal" (Lombard, Snyder-Duch, and Bracken, 2002:592) and is not appropriate for evaluating the reliability of coding (Krippendorff, 2013). *Krippendorff's Alpha* (kalpha) is known as "the most general agreement measure

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[22] The independent coder is a data scientist who coded two sets of sampled conversations at two time periods during the study. The training provided to her involved explaining the CoI framework, its presences and their categories and demonstrating how to apply the coding scheme (Tables 9, 10, 11 and appendix 2) to comments. The training was delivered in two 2-hour sessions.

[23] The sample was too small to use other measures such as Kalpha.

with appropriate reliability interpretations in content analysis" (Krippendorff, 2013:278). Krippendorff (2011) argues that it is more enhanced than kappa since it considers coders as independent, reflects chance agreement and is designed for measuring different variable types (e.g. nominal, ordinal, ratio). In addition, it adjusts for small samples (Krippendorff, 2004). The only drawback of kalpha is complexities in by-hand calculations (Lombard, Snyder-Duch, and Bracken, 2002). However, this was not problematic in the current study as SPSS was used.

Another consideration for the reliability of the conducted content analysis, was the appropriate sample size for kalpha to be meaningful. Assuming reliability to exceed 0.8 (i.e. the smallest acceptable alpha) at 0.05 significance level, $P_{coding}= 1/V$[24] was calculated and P_c of 0.1 based on Krippendorff's (2013) table suggested 294 comments as the sample size. The independent coder coded randomly selected comments and alpha was calculated through executing macro kalpha in SPSS. The kalpha of 0.83 at category and 0.79 at indicator levels showed a good level of reliability. Although according to Lacy *et al.* (2015), there is no firm answer to the acceptable minimum level of reliability, Krippendorff (2013) states that alpha values equal or above 0.80 indicate reliable results and reliability values between 0.66 and 0.79 are only for tentative conclusions. Considering the large numbers of CoI indicators, i.e. 46 coding categories and the exploratory nature of study (Lacy *et al.*, 2015), kalpha of 0.79 at indicator level is acceptable and firm conclusions can be drawn.

Nevertheless, some researchers suggest using multiple measures to overcome the weakness of different reliability measures (De Wever *et al.*, 2006; Lacy *et al.*, 2015). Lacy *et al.* (2015) propose calculating two measures of simple agreement and Krippendorff's alpha and reporting the simple agreement in a footnote while remembering that percentage agreement should not be used for determining the reliability of coding. Following this suggestion, simple agreement at category (87%) and indicator (83%) levels was also calculated.

A further aspect to check for reliability was consistency in identifying the coding or analysis unit. Since a *comment* was chosen as the unit of analysis and it is identifiable objectively (Donnelly and Gardner, 2011; Rodriguez, 2014), there has been no need to check the consistency in demarcation of the analysis unit or what Krippendorff (2013) calls reliability for unitising. Thus, weaknesses associated with identifying the unit of data to code (e.g. interpretation bias) were eliminated in this study.

In addition to the described reliability measures, the coding scheme, which includes the definition of each CoI indicator with an example together with the coding procedure

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[24] "V" represents values or categories. Considering that CoI includes a total of 10 categories (3 SP, 3 TP and 4 CP), P_c equals to 1/10=0.1.

described in **3.4.5.7,** provides instruction that can be shared with other researchers for the replication of results.

3.6.2 Reliability of interviews

According to Cohen *et al.* (2011), piloting the interview protocol and inter-rater reliability in the coding of responses can enhance the reliability of interviews. Therefore, before conducting interviews, the interview protocol (Appendix 5) was piloted by interviewing two instructors, and necessary adjustments were made to the protocol before the main interviews (see **3.5.1.2**). In addition, after interviews and before coding them, interview transcripts were sent to instructors for accuracy checking and for ensuring their beliefs and ideas are accurately captured (Creswell, 2014). Half of instructors (n=6) approved the transcripts or suggested some changes. The remaining instructors did not respond to the invitation for member checking.

To check the reliability of coding responses based on the CoI coding scheme, the same procedure and measurement as described for the content analysis of discussion transcripts were applied. Assuming reliability to exceed 0.8 at 0.05 significance level, P_{coding}[25]= 0.083 was identified. The suggested sample size for P =0.083 based on Krippendorff's (2013) table, is 336. Since the unit of coding for interview responses was a thematic or meaning unit and its identification is quite subjective (Kvale, 1996), I coded interviews first and then from three randomly selected interviews, I chose 336 meaning units for the independent coder to code. This removed any disagreement on identifying a unit and focused the independent coder's attention on finding the instances of CoI presences and indicators in instructors' responses. The kalpha was then calculated and 0.83 at a category level and 0.81 at an indicator level were achieved. Both values show a good level of reliability. The simple agreement at category and indicator levels was 90% and 85% respectively.

Since the study has a qualitative orientation, in addition to the above measures, audit trails of procedures to reach the current results are provided (Guba and Lincoln, 1981). This includes a detailed description of methodological procedures from data collection to data analysis and facilitates the replication of method.

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[25] Two categories (one for engagement criteria and one for "non-CoI" indicators) in addition to the 10 CoI categories were considered. The calculated P_c equalled to 0.083.

3.7 Ethical considerations

Since there are two sources of data for this study, i.e. discussion transcripts and instructor interviews, two separate sets of ethical considerations were required: one to deal with participants' comments in discussion areas, and another to place measures for instructors' anonymity, confidentiality, and the right of withdrawal from interviews. Furthermore, the study had to comply with FutureLearn research ethics in place in 2016 when the ethical approval for this study was obtained and data collection began. In the meantime, the approval of the FutureLearn partner institution whose MOOCs are examined was also required. The approval was obtained by emailing the leader of the partnership at the target university. A full ethical application was submitted to the University of Leeds Research Ethics Committee, and proposed ethical measures were approved (reference AREA15-119). Copies of the ethical approval letter, the participant information sheet, and the consent form, are available in Appendices 10, 11 and 12.

According to FutureLearn terms (FutureLearn, 2016), participants are informed that "*8.3 You consent that we and our Partner Institutions may conduct research studies that include anonymised data of your interactions with the website, including learner content*". Consequently, consent was not required from individual learners or instructors to study discussion comments. However, note that when learner and instructor comments were coded, as explained in **3.4.5.7**, the coded comments were summarised in code format (see Appendix 3). Therefore, learner comments were not identifiable for analysis and reporting. On a few occasions where it was essential to provide examples of an instructor posting in relation to a learner comment for reporting the results, learners and instructors' comments were fully anonymised. This is in line with Lewis, Comas-Quinn and Thomas' (2015:56) suggestion about using MOOC discussion data. They emphasise that although learner postings are made for sharing and "with implied consent that others could treat that information as public", due to the global community of learners with different cultural and personal sensitivities around the issue of privacy, effort should be made to anonymise discussion contributions in order to minimise distress to learners.

With reference to data storage, all research data were stored on the university secured M drive (which can only be accessed through my University account) and on an encrypted external drive as a backup copy until the conclusion of this doctoral study. All relevant documents and spreadsheets are password protected.

Instructors gave their informed consent for interviews by signing the consent form. To protect instructor identities, instructor data were anonymised as much as possible and were unlinked from individual instructors. This was done by using course discipline instead of course name (e.g. Fine Arts), using a code instead of an instructor name,

which only specified their role (e.g. Ed1, M5, LEd3), and by removing any references to their contact details. At the conclusion of the project, the links between real names and instructor codes, as well as interview audio files, will be destroyed. However, anonymised interview transcriptions will be kept securely for up to ten years for additional or subsequent studies based on the consent granted by the instructor(s). Direct quotations from discussions or interviews were also anonymised.

3.8 Summary

This chapter has provided a detailed description of the research design, approaches and procedures of this study. It presented the key considerations and rationale behind the methodological choices for every stage of the research as well as the lessons learned from the pilot study to enhance the current research design. It aimed to fully document the steps taken, supported by existing literature, to provide a clear audit trail for the purposes of transparency, replication and trustworthiness. In summary, it detailed how research questions posed at the beginning of this study could be addressed methodologically.

The following two chapters will report the findings from the two phases of the study. **Chapter Four** will focus on the results from the content analysis of learner-instructor conversations, and **Chapter Five** will report what interviews with instructors revealed about their contributions to MOOC discussions. These two chapters are brought together in **Chapter Six,** where findings are discussed.

Chapter 4 RESULTS 1: WHAT INSTRUCTORS DO AND SAY IN DISCUSSION AREAS

4.1 Introduction

This chapter presents the findings from the analysis of learner-instructor conversations in MOOC discussion areas and sheds light on different aspects of instructors' contributions to discussions. It is divided into four themed sections to address the first and third research questions:

RQ 1. How are instructors' contributions to the discussions in Massive Open Online Courses characterised based on the Community of Inquiry framework?

    a) To what extent and in what ways do instructors contribute to MOOC discussions?

    b) How do the level and type of their contributions change during a MOOC?

    c) What prompts instructors to contribute to learner discussions?

RQ 3. To what extent, and in what ways, do learners engage with instructors' contributions to discussions?

The first section provides a holistic view of the conversations that instructors participate in. It is followed by the findings about the level and type of instructors' contributions to learner conversations and their changes over the course of a MOOC. Additionally, it presents the new indicators of the CoI framework that emerged from the content analysis process and reports the interrelation between the CoI presences in instructors' contributions. The characteristics of learners' comments that prompt instructors' contributions are examined in the third section. The final section of the chapter explores the learners' engagement with the instructors' contributions. The changes to each reported aspect over time are covered within each of the four sections.

4.2 Instructors' contributions to discussion areas

The analysis of learner-instructor conversations reveals that mentors contributed the most to conversations (37%) compared to educators (32%) and lead educators (31%), who contributed to discussions relatively equally as Table 15 shows.

Table 15: An overview of instructors' conversations

Instructor	Short* conversations		Medium* conversations		Long * Conversations		Total	
	N	%	N	%	N	%	N	%
Lead educators (n=3)	236	94%	11	4%	4	2%	**251**	**31%**
Educators (n=7)	236	90%	23	9%	3	1%	**262**	**32%**
Mentors (n=12)	289	95%	13	4%	3	1%	**305**	**37%**
Total	761	**93%**	47	**6%**	10	**1%**	818	100%

* 1-5 comment, 6-10 comment and 11-16 comment exchanges represent short, medium and long conversations respectively.

(Goshtasbpour, Swinnerton and Morris, 2019:6)

Table 13 also illustrates that the majority (93%) of the conversations involving instructors are characterised as being short and include between one and five-comment exchanges, whereas medium (6-10 comments) and long conversations (11-16 comments) are less frequent. While educators and lead educators contributed to equal numbers of short conversations, their participation in medium exchanges is different. Educators make twice as many contributions to such conversations as lead educators.

A closer examination of short conversations revealed that they mainly consist of two-comment exchanges (520 out of 761, 68%) with a much smaller number of three and four-comment conversations (Figure 5). What also stands out in Figure 5 is the low number of 1-comment exchanges. They are conversations where the instructor initiates the interaction, but no further discourse is generated as no learners respond to the instructor. This can mean either that the instructors' intention is imparting information and not having conversations or that instructors' initiations are not continued by learners. Mentors made most initiations with no response from learners (8 out of 12), whereas lead educators and educators (1 and 3 out of 12 respectively) rarely post an initiating comment that learners did not respond to.
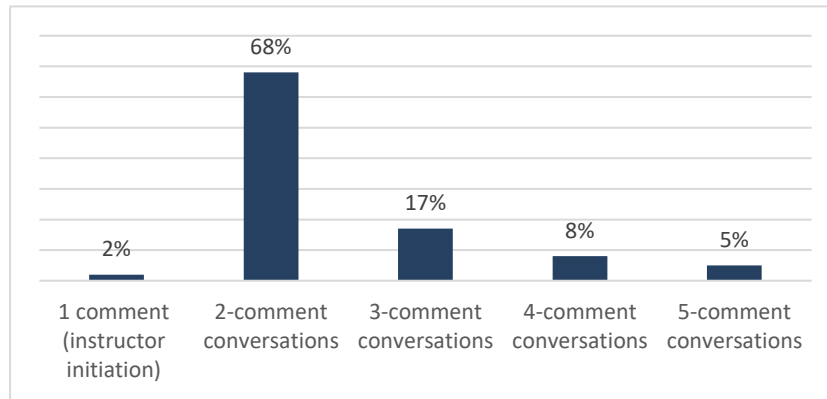
Figure 5[26]: The breakdown of instructors' short conversations
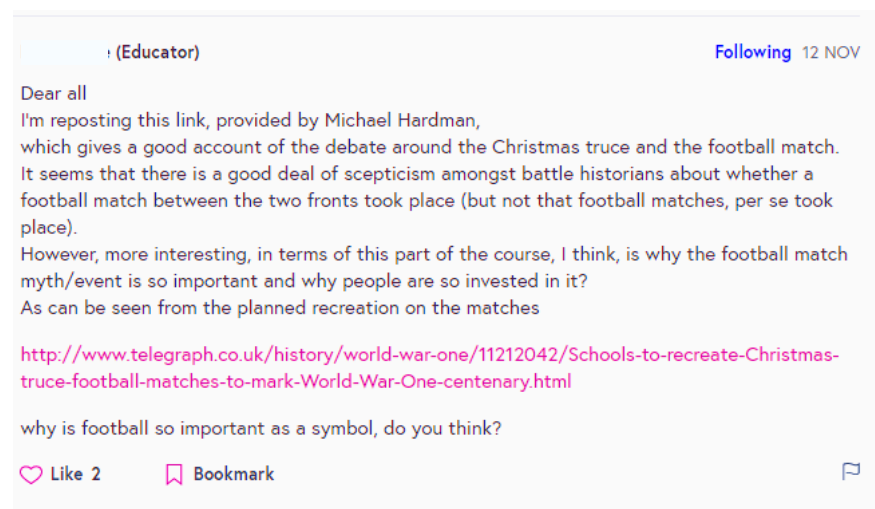
Screenshot 5: An example of an instructor's initiation (1-comment exchange)

The level of instructors' engagement with conversations during the courses shows a declining trend in the number of conversations from the beginning to the end of courses (Figure 6). As displayed in Figure 6, more than half of the instructors' conversations occur at the beginning of a MOOC, and this proportion is more than halved in the middle of the course and reaches its lowest level at the end of the MOOC.

In summary, instructors largely contribute to short conversations and at the beginning of MOOCs. Among the three instructor roles, mentors contribute most to conversations while lead educators' and educators' levels of contribution are lower but similar to each other. The findings also show that instructors' contributions reduce as courses progress.

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[26] One-comment exchanges are considered as conversations because learners engage with them implicitly (See **3.4.8**) by liking the instructors' comment.
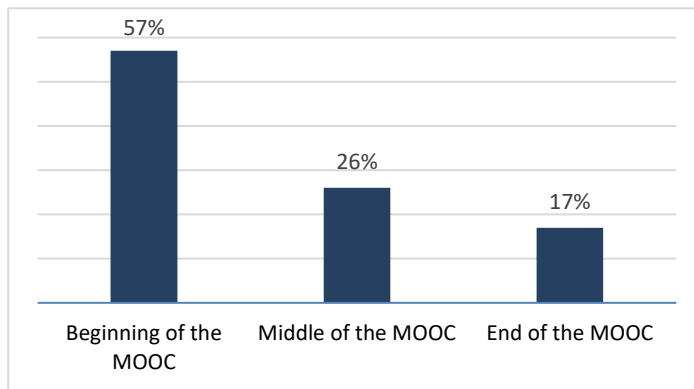
Figure 6: The overview of conversations over the course of MOOCs

4.3 The type of instructors' contributions to discussions

To identify the type of instructors' contributions, the content of their comments is analysed according to the three CoI presences and their indicators. They include "social presence" with the three categories of personal communications, open communications and group cohesion, "teaching presence" comprising design and organisation, facilitating discourse and direct instruction and "cognitive presence" consisting of triggering events, exploration, integration and resolution categories. Within 818 conversations, the instructors made 885 comments, which are coded into 2,365 instances of social (n=1326, 56%), teaching (n=938, 40%) and cognitive (n=101, 4%) presences.

Social contributions account for more than half of the instructors' contributions and aim at helping learners communicate purposefully in a trusting environment, develop interpersonal relationships, and identify themselves with the community (Garrison, 2009). However, note that 85% or the largest proportion of social contributions (Table 16) are *phatic communications and greetings* (38%), and *vocatives* (47%), which make nearly half of the total coded instances (1,128 out of 2,365). This extremely high frequency of greetings and addressing others by name is observed because most instructors use greetings or a learner's name in the majority of their contributions, irrespective of the contribution purpose. The extracts below show two cases where instructors use these social devices with other presences:

Following 22 MAR

Oh yes Chris - that's exactly right. I agree. This is probably the most significant loss for me in the translation of these ideas to an online environment. Instead we have a kind of asynchronous ensemble developing perhaps - where people are reflecting on the experiences out of sync with each other but in a shared space. I'm not saying this is the same of course, but it is definitely interesting, taking us back to ideas of horizontality again.

Vocative+ cognitive and teaching presences
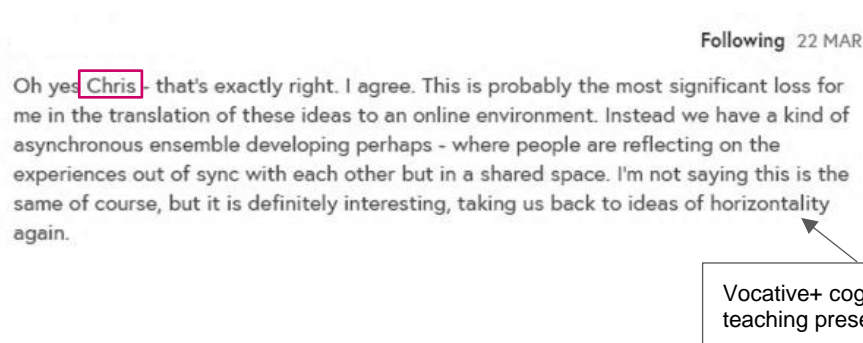
Moreover, the results of the word frequency query of instructors' social contributions (Table 16) also show high linguistic representations of *phatic communications and greetings* when instructors' top ten most frequent words are considered.

Table 16: Instructors' top ten most frequently used words in discussion areas

Word	Count	Weighted Percentage (%)	Similar Words
hi	372	6.04	hi
course	284	4.61	course, courses
hope	244	3.96	hope
enjoy	200	3.24	enjoy, enjoyed, enjoying
welcome	180	2.92	welcome, welcoming
thanks	168	2.73	thanks
great	92	1.49	great
hear	68	1.10	hear, hearing
interesting	64	1.04	interest, interesting, interests
find	56	0.91	find

The social contributions and their co-occurrence with teaching and cognitive indicators will be reported in detail in the next section.

The second most frequent type of instructors' contributions are related to teaching presence (40%), which includes comments showing instructors facilitating the learning discourse (e.g. *So perhaps the next question is, how do you define the call of duty in the First World War? Was that how it was defined at the time?*), providing direct instruction (e.g. *Research, whether it is competitor or market, should be an ongoing process. I believe that it is about limiting the risk, as it is impossible to remove it altogether. There are good examples of consumers being persuaded they need a product, but it is much safer if you can bring them something that research suggests they will want*) and overseeing the organisation of the course (e.g. *The theory starts with the fundamentals and we have chosen case studies which we think make the learning interesting for all taking part*).

Contributions representing instructors' cognitive presence are relatively infrequent and account for only 4% of the overall contributions.

For me it would be television services. Remember the days where there were only 4 channels (I'm not old enough to remember fewer...) well now you are spoiled for choice and not only that but the functionality has dramatically improved. You can now buy movies, view free programmes On Demand, catch-up, record, pause, rewind, fast forward, rate programmes for recommended viewing etc what consumer would not expect the same standards from all tv service competitors? It will be interesting where this goes next, will we be able or order cinema steamings to our living rooms? I would like to see that, what a great way to attract couples with young families who could still enjoy 'night's out' when unable to secure a babysitter? genius :)

♡ Like 1   ⤺ Reply   🔖 Bookmark   🏳

(educator)   Following   20 SEP

I remember just 3 channels! Who would have predicted the number of channels and the multitude of devices which could be used to watch tv - using your phone to watch Dr. Who?

♡ Like 2   ⤺ Reply   🔖 Bookmark   🏳
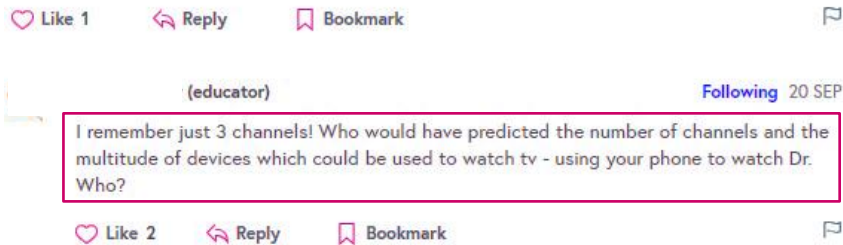
Screenshot 6: An example of instructors' cognitive presence

4.3.1 Type of instructor contributions by roles

Amongst the three instructor roles, educators make most of the teaching (37%) and cognitive (38%) comments, while their social contributions are the lowest compared to mentors and lead educators. Unlike educators, mentors mainly contribute socially and make 43% of total social contributions, with a nearly equal proportion of teaching and cognitive postings (29% and 30% respectively), as Table 17 illustrates. In fact, their teaching and cognitive presences are the lowest amongst the three roles. This reveals the contrasting participation pattern of educators and mentors, which can be complementary and provide a balanced level of all presences for learning. The data also indicate that lead educators have equal presences although their cognitive presence is slightly lower than teaching and social presences.

Table 17: The overview of instructors' contributions to learner conversations

Instructor	Social Presence		Teaching Presence		Cognitive Presence	
	N	**%**	**N**	**%**	**N**	**%**
Lead educators	451	34%	319	34%	32	32%
Educators	300	23%	351	37%	39	38%
Mentors	575	43%	268	29%	30	30%
Total	1326	**56%**	938	**40%**	101	**4%**

(Goshtasbpour, Swinnerton and Morris, 2019:10)

4.3.2 Type of instructor contributions by time

The instructors' contributions over the course duration (3 weeks) are also examined. As the distribution of CoI presences in Figure 7 shows, each contribution type constitutes a

different proportion of the total instructors' postings at three points of the courses. What stands out from this analysis is that whilst the volume of three contribution types decreases over time, instructors' cognitive comments do not decrease considerably and as a result their relative importance increases modestly from the beginning to the end of a course. In other words, while their cognitive comments represent 3% of their total contributions at the beginning of the course, this proportion increases to 5% and then 7% as the course progresses.
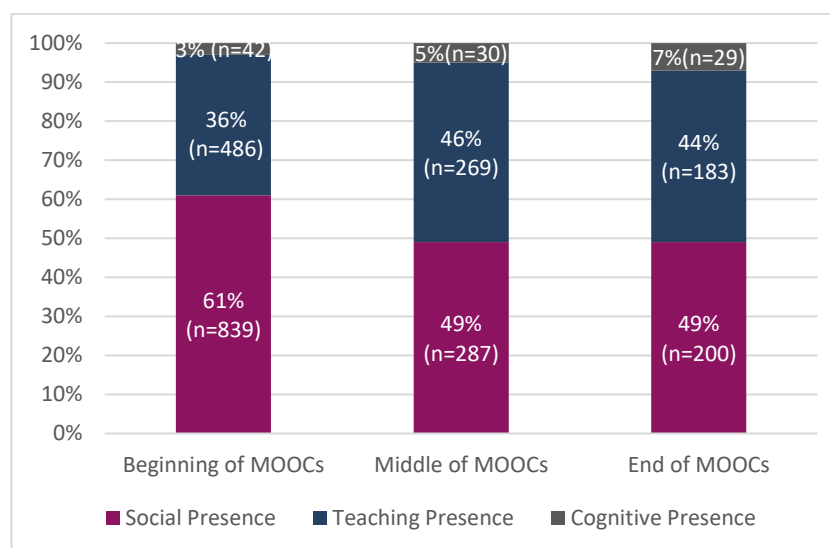
Figure 7: Changes to instructors' contributions within three time periods
(Goshtasbpour, Swinnerton, Morris, 2019:11)

The pattern emerging from the overall percentages of social and teaching contributions over time shows a contrary development dynamic. The social contributions are most noticeable at the beginning of a course (61%) when the instructors try to build an open and trusting environment for learner conversations. However, they lose their prominence considerably as the course progresses, although their percentage stabilises from the middle of a course. On the other hand, although the number of teaching contributions declines during a course, they are relatively less salient at the beginning of a course and rise to their highest level in the middle of a course (46%). Their relative importance then decreases slightly towards the end of the MOOC (43%). In summary, there seems to be an interaction between instructors' social and teaching presences; the higher proportion of social presence gives way to instructors' teaching presence as the course progresses. This is particularly noticeable from the beginning to the middle of a MOOC. However, towards the end of a MOOC, this interaction is more evident between instructors' teaching and cognitive presences, since their teaching presence decreases moderately and their cognitive presence increases, while their social presence remains at the same level.

To obtain a deeper insight into instructors' social, teaching, and cognitive contributions to the discussions, instructors' comments are coded into the categories and indicators of CoI presences. This analysis reveals insights about the strategies instructors use in MOOC discussion areas to foster learning and sheds light on the "how" of their discussion participation.

4.3.3 Instructors' social contributions

4.3.3.1 The overview of instructors' social contributions

Group cohesion

The social contributions of instructors, as Table 18 shows, are largely focused on group cohesion (88.5%), which accounts for building and sustaining a sense of group commitment and enabling learners to identify themselves with the community (Garrison and Aykol, 2008; Garrison, 2017). *Phatic communications and greetings* and *vocatives* represent a clear majority of cohesive communications as explained in the previous section. However, the weak evidence of *group reference* (Screenshot 7) that requires the use of cohesive devices (e.g. inclusive pronouns) to create a sense of community is noticeable. This indicates that the instructors use simple cohesive behaviours such as greetings and addressing learners by name very often, yet do not take group cohesion and association to the next level by making group references. Of note is the fact that mentors' group reference is so small as to be negligible.

These are good questions - I hope we can develop our ideas on these points as the course progresses.

♡ Like 1   🔖 Bookmark   ⚑
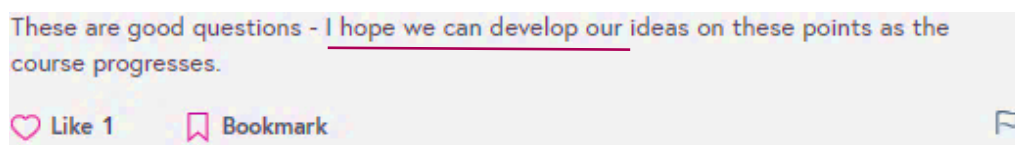
Screenshot 7: Instructors' group reference by using inclusive pronouns "we" and "our"

Table 18: Instructors' social contributions

Social Presence	Lead educators		Educators		Mentors		Total	
	N	%	N	%	N	%	N	%
Personal Communication (Affective)	**18**	**4**	**12**	**4**	**3**	**<1**	**33**	**2.5**
Expression of Emotions	3	<1	4	1	0	0	7	<1
Use of Humour	5	1	2	<1	0	0	7	<1
Self-disclosure	10	2	6	2	3	<1	19	1
Open Communication (Interactive)	**53**	**12**	**33**	**11**	**33**	**6**	**119**	**9**
Asking questions (non-task)	4	1	4	1	3	<1	11	1
Quoting from others' messages	2	<1	2	<1	5	1	9	<1
Expressing agree/disagreement	11	2	4	1	3	<1	18	1
Complimenting and expressing appreciation	34	7	20	7	21	4	75	6
Support for communication*	2	<1	3	1	1	<1	6	<1
Group Cohesion (Cohesive)	**380**	**84**	**255**	**85**	**538**	**94**	**1174**	**88.5**
Phatic and Greetings	148	33	105	35	249	43	502	38
Vocative	207	46	136	45	283	49	626	47
Group reference	25	5	14	5	7	1	46	3
Course reflection	0	0	0	0	0	0	0	0
TOTAL	**451**	**34**	**300**	**23**	**575**	**43**	**1326**	**100**

(Goshtasbpour, Swinnerton and Morris, 2019:7)

Course reflection within group cohesion is an indicator that did not attract any instructors' comments. Although it is not an indicator of group cohesion in the original CoI – introduced by Swan *et al.* (2001) - and is not employed by most CoI studies, the learners' comments in this study required its inclusion, and 9% of their cohesive responses were coded into this category. This indicator is originally defined as "reflecting on the course itself" (Shea *et al.*, 2010). Nevertheless, since in MOOCs many learners do not complete the course and may reflect on only a part of it, this definition is amended to "reflecting on the course or a part of it".

I have enjoyed the course immensely. It has provided me with a clear framework of how best to innovate - people, collaboration, LEAN - iterating and prototyping as often as possible, organisational culture; who best to innovate collabortion, multi-disciplinary, open innovation, consumer and user feedback essential; what to innovate - wicked/ tame/ disruptive/ radical/ incremental; why - all the excellent M&S case studies tells the story why - stay competitive, create new demand/ markets/ create new products/ stay 50 years ahead! When - Rogers, future scanning, i-teams, now; Where - in organisations, small entrepreneurial businesses, universities, crowdsourcing etc.

I have valued the different learning styles incorporated into the online package making it more 'experiential' than I thought possible. So, I've found the format inspiring - videos and additional videos - short enough but wonderfully packed with key information. Supporting reading material, quizzes - really good, particularly for identifying when I hadn't been concentrating hard enough and encouraging me to go back and revisit.

Liked the variety of presenters and their gravitas. I also enjoyed the written parts. Thank you

♡ Like 6   ↩ Reply   🔖 Bookmark   ⚑

> This is my first time using any MOOC and I have loved every minute so far. The activities are well pitched and allow for differentiation and personalisation of responses, allowing all learners to engage with the material at their level of prior knowledge or interest. The materials are varied and well chosen, and have introduced me to resources I hadn't used before, such as Padlet and the BBC My Paintings. The intellectual depth of the course is much greater than I expected and, although 4 hours per week is probably a reasonable estimate of time investment, one could spend much longer, even without an extensive reading list. Including thinking time, I have probably done about 10 hours this week and even then felt that I had rushed some tasks, notably the exhibition. Most importantly, I have learnt a lot, both about concepts of heroism and some aspects of the war, but also about how I learn. Really impressed.
>
> I spend half of next week leading some 16 year olds on a tour of Ypres and the Somme. I know that I will approach the memorials, cemeteries and battlefield remains in a new way because of what I have learnt this week; my only worry is when I will complete the next activity!
>
> ♡ Like 3   🔖 Bookmark   ⚑

Screenshot 8: Examples of learners' *course reflection*

Open communications

The data in Table 18 also show that 9% of the instructors' social contributions are centred on creating an open and interactive environment for discussions. Within this category, *complimenting and expressing appreciation* (75 out of 119) is the most commonly used indicator and enables instructors to express appreciation or offer social praise and encouragement (as opposed to pedagogical encouragement represented in facilitating discourse).

> EDUCATOR   Following 01 OCT
>
> Thanks Nigel, really pleased that you have enjoyed it and gained something from it. Thanks also for your feedback, we can think about that for the next course.
>
> ♡ Like 1   ↩ Reply   🔖 Bookmark   ⚑
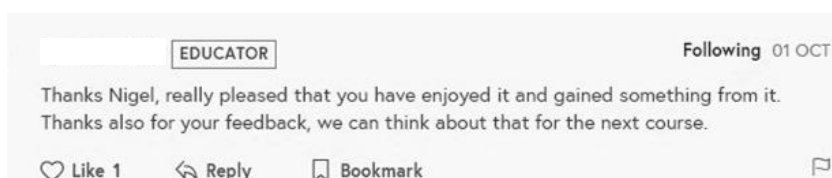
The second most frequently used social indicator is *expressing agreement and disagreement on non-content matters*. Comments such as "*I agree, Emily's case is extremely interesting*" or "*And I completely agree. Wouldn't it be great to pool our collective minds and create a wiki-glossary on Meyerhold!*" are some examples. Table 16 also reveals that the proportion of educators' and lead educators' interactive responses are nearly the same (12% and 11%), whilst mentors' interactive contributions are at around half this level.

Personal communications

Affective and personal responses represent instructors' least common type of social contributions (2.5%) (Table 18), which indicate that they do not tend to express their emotions and feelings or disclose information about themselves in MOOC discussions. Their use of humour associated with this indicator is also minimal.

The analysis of personal communication indicators shows that instructors' *self-disclosure* tends to focus on disclosing information about their research interest or academic and professional experiences rather than personal information. Comments such as "*I'm currently working on a book with a colleague mapping Stanislavskian transmission across the world*", or "*I am also currently taking part in an intensive workshop with Rob running concurrently with this course.*" are cases in point. Furthermore, it was found that contributions coded as *use of humour*, only occur in short conversations and are restricted to the use of humour and sarcasm, as no cases of using teasing, cajoling or irony (as included in the definition of this indicator) were observed.
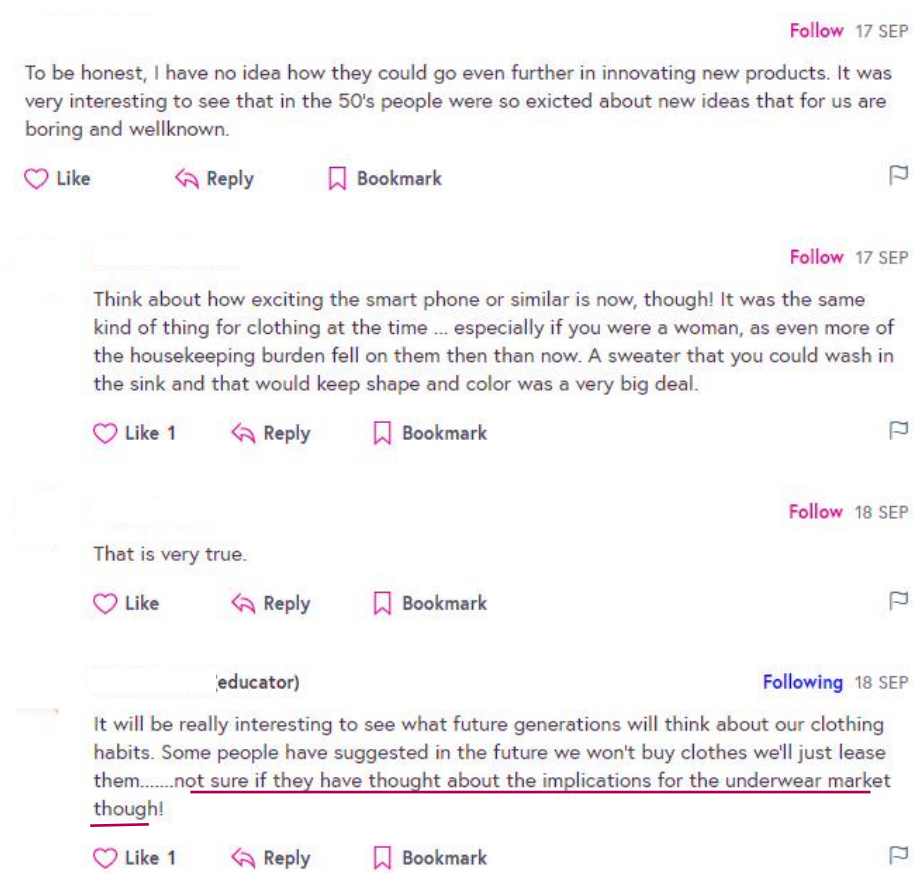
Screenshot 9: An example of *use of humour* by instructors

4.3.3.2 Newly emerged social indicators

Throughout the process of coding instructors' contributions, there were contributions (n=97) that did not fit into any of the CoI categories or indicators. Therefore, where necessary, new indicators are introduced to provide a more comprehensive analysis of instructors' contributions to learner conversations.

The newly emerged indicator related to social presence captures participants' attempts to clear up communication misunderstandings or to clarify their intended meaning and helps towards creating the conditions for open communication.

e.g. it might have come out wrong, but I was not trying to point out any "mistakes", of course. What I was trying to say was exactly what you are saying.

Although the CoI framework considers an indicator for *supplying clarifying information* under teaching presence, it only addresses clarifications about the content with a direct instruction function and not the social aspect of communications. Therefore, instructors' and learners' postings that fulfil this function are coded into a new indicator called *support for communication* and constitute 6% of learners' and 5% of instructors' interactive responses or open communications. What is noticeable about this indicator is that all instructors' contributions coded into this indicator were from medium length conversations (6-10 comment exchanges). It is possible that the communication misunderstandings led to longer exchanges of comments. The extract below is from an 8-comment conversation where an educator tries to clarify what she meant in her first reply:

Learner 1
……

(Educator)   Following 07 NOV

Looking at Russia is an excellent idea. While not the focus of the course, much could be said about experiences and changing views there.

♡ Like 1   ⯗ Bookmark   ⚑

Follow 08 NOV

- Looking at Russia an excellent idea? Wasn't it in Russia where heroes were created for each emergency. If they were short of coal then a mining hero was created who shovelled more coal than anybody else. If they were short of bread then a farming hero appeared who grew and harvested more wheat than any other farmer. And in the factories other heroes appeared who made more tanks ... etc. Orwell's Boxer was based on the struggle to achieve such impossible things. Therefore the concept of heroism is propaganda?

♡ Like 2   ⯗ Bookmark   ⚑

(Educator)   Following 13 NOV

Len, I did not mean to suggest that Russia provides 'excellent' examples of heroism, but rather that it is a good idea to include examples from Russia.

Louise, defining propaganda has been difficult. One way is to say that propaganda is an intentional effort or campaign (by a state, organisation, party, group of people) with the aim to induce a certain behaviour or create a particular attitude that will lead to a certain behaviour. In previous centuries, the word was used in the context of propagating the Catholic faith through missionary work. Our modern understanding of the term dates back to the First World War, but influencing people or advancing a cause would always have required propagandistic means. Distortion, exaggeration and omission can be employed in propaganda to strengthen the argument.

♡ Like 1   ⯗ Bookmark   ⚑

4.3.3.3 Changes to instructors' social contributions during a MOOC

Exploring the impact of time on instructors' social contributions during a MOOC reveals whether and to what extent instructors make an effort to sustain or develop their social presence in MOOC discussion areas.

As outlined in section **4.3.2**, social postings make up 61% of the total contributions at the beginning of the courses, however as the courses progress, they constitute a smaller proportion of the overall contributions (49%). Although the number of such contributions decreases from the middle to the end of a course, their relative importance remains the same until the course ends. Nevertheless, when social contributions are considered independently, they show a clearer declining trend from the beginning to the end of a course. The majority of social postings occur at the beginning of the course (63%) as Table 19 illustrates, while their share of total social contributions is cut by around two thirds in the middle of the course (22%) and reaches its lowest level at the end of the course (15%).

Table 19: The breakdown of instructors' social contributions over time

Social Presence	Beginning		Middle		End	
	N	%	N	%	N	%
Personal Communication (Affective)	**20**	**61**	**9**	**27**	**4**	**12**
Expression of Emotions	1	3	4	12	2	6
Use of Humour	4	12	2	6	1	3
Self-disclosure	15	45	3	9	1	3
Open Communication (Interactive)	**58**	**49**	**35**	**29**	**26**	**22**
Asking questions (non-task)	5	4	4	3	2	2
Quoting from others' messages	5	4	1	1	3	3
Expressing agree/disagreement	10	8	2	2	6	5
Complimenting and expressing appreciation	36	30	24	20	15	13
Support for communication	2	2	4	3	0	0
Group Cohesion (Cohesive)	**761**	**65**	**243**	**21**	**170**	**14**
Phatic and Greetings	341	29	89	8	72	6
Vocative	388	33	145	12	93	8
Group reference	32	3	9	1	5	<1
Course reflection	0	0	0	0	0	0
TOTAL	**839**	**63**	**287**	**22**	**200**	**15**

Likewise, the three categories of social presence, i.e. personal communications, open communications and group cohesion decrease over time (Figure 8). However, this decrease is more evident from the beginning to the middle of the courses than from the middle to the end of them.
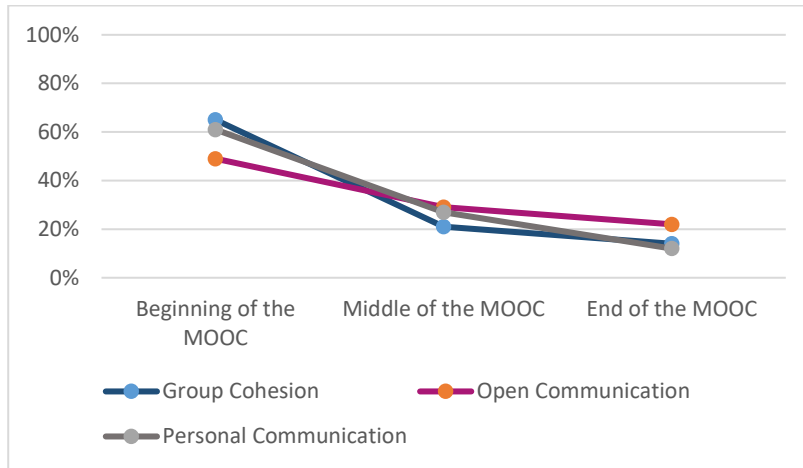
Figure 8: Instructors' social contributions over time

When the indicators of each category are considered, some indicators show a V-shape or a reverse V-shape development pattern over time. *Quoting from others' messages* and *expressing agreement or disagreement* within open communication follow a V-shape pattern and occur least in the middle of the course. Conversely, *expressing emotions* within personal communications and *support for communications* under open communications are most noticeable in the middle of the course.

What stands out in Table 19 is that all indicators of group cohesion without exception lose their relative importance as the course progresses, although the degree of this loss for *group reference* is less. When the content of instructors' group references is examined, it becomes apparent that their group reference at the beginning of the course is mostly about what the learners and instructors will learn or do as a group, whilst their group reference at the end of a course can be characterised as a summary or a reflection on what they discussed, learned or accomplished (Screenshots 10 and 11).
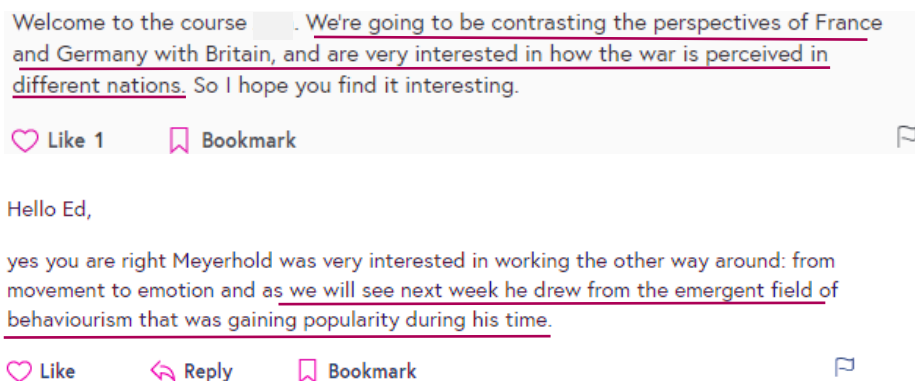
Screenshot 10: Examples of instructors' *group reference* at the beginning of a course

Yes I ___ this is definitely an argument - for embodied documentation. In a sense this course has been about exploring the complementarities and tensions between documentation approaches, and has invited you as learners to consider these, without forgetting the embodied. Of course the problem with embodied documentation, is that its dissemination route or transmission is confined and restricted. For many, including part of myself, this is a good thing, as it ensures a kind of authenticity of experience. But documentation serves <u>many purposes, as we are debating in this</u> particular thread, and those who have not had an embodied experience, might still be able to engage with the problematics of the materials. For me, transparency of purpose is everything. I'm enjoying this range of inputs. Thanks very much everyone.

♡ Like 4   ↩ Reply   ⊓ Bookmark   ⚑

Thanks ☐ : - as the others have said, <u>we've all learnt a lot.</u> That's the great things about MOOCs, which have the ability to tap in to such rich resources of knowledge, perspectives & experiences from learners from all sorts of different backgrounds and places.

♡ Like 2   ⊓ Bookmark   ⚑

Screenshot 11: Examples of instructors' *group reference* **at the end of a course**

4.3.4 Instructors' teaching contributions

Analysing and understanding the instructors' pedagogical contributions is of particular importance, since they can reveal the way instructors establish their teaching presence in MOOC discussions and the strategies they use to fulfil their academic role.

4.3.4.1 The overview of instructors' teaching contributions

Facilitating discourse

Facilitating discourse is the primary focus of instructors' pedagogical comments and accounts for 43% of their total teaching contributions as shown in Table 20. This suggests that instructors emphasise managing and monitoring the discussion discourse to build understanding. The most commonly used indicator of this category is *acknowledging, encouraging and reinforcing learners' contributions*. It is adapted by instructors in the same way as the *cohesive devices* within social presence. In other words, many instructors begin their contributions, particularly the pedagogical ones, by acknowledging learners' postings, and then provide direct instruction or some information about the course organisation, as the following extracts illustrate:

Acknowledging learners' contribution

Reinforcing learners' contribution

Setting curriculum

Thanks for you comments   and .   . I agree business or legistlative constraints can
be a great driver for innovation. In this MOOC we focus on innovation in a business
context.
We do look at allowing failure as part of the innovation process later in the course , do
you have any examples of innovations which have failed in one market and
revolutionised another. I would be interested in those. I love the content of your link Ian.
I totaly agree. We do teach this sort of skill on our product design course, in fact we
have a whole week dedicated to it! Better not get me onto design and creativity in the
school curriculum, there's only 1200 characters allowed! Ian it would be great to have a
little about your interests on your futurelean profile but only if you would like to!

♡ Like   ↩ Reply   🔖 Bookmark   ⚑

Encouraging learners' contribution

Supplying additional information

Interesting points - the training given to soldiers often aimed at overcoming their
reluctance to kill by making them hate the enemy. However, we find a lot of soldiers who
felt no animosity towards the soldiers on the other side as they saw them as very much
like themselves. Hatred and bloodlust was much more common among those who were
not actually fighting.

♡ Like 1   🔖 Bookmark   ⚑

The second most frequent indicator of facilitating discourse is *drawing in participants and prompting discussions*, which educators and mentors use more often than lead educators (Table 20). All instructors tend to prompt a response or draw in participants in a conversation by two main strategies: a) by inviting other learners to the conversation, particularly by using inclusive words such as *everyone else* or *other learners,* and b) by encouraging the learner(s) who have already been involved in the conversation to provide more information (Figure 9). In other words, instructors either use inclusive prompts such as "*I wonder what the thoughts of the other members of the course are?",* "*What do others think?" and "other suggestions are very welcome",* or they are more specific and use prompts such as "*Can you describe how and why this sense of pride diminished over time?"* or *"Would you like to explain in a bit more detail? I think it is an important point".*


L: Learner   *I: Instructor*
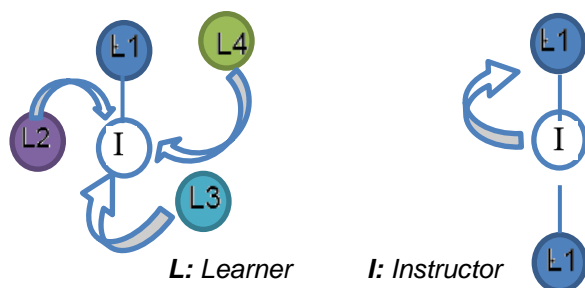
Figure 9: Instructors' facilitating strategies to prompt discussions

However, as Figure 10 illustrates, the use of the two strategies by instructor roles are not the same. While lead educators use both strategies equally, educators and mentors tend to rely more on inviting other learners to the conversation in order to extend it. This is more evident in the educators' case.
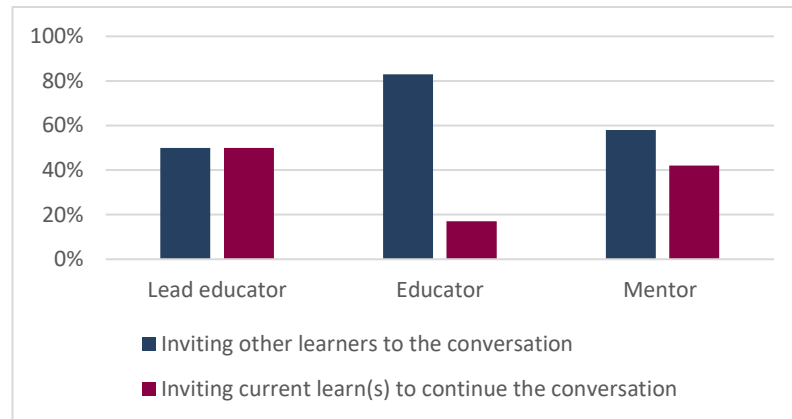

Figure 10: Use of prompting strategies by instructor roles

Setting climate for learning is the third most occurring facilitating contribution, where instructors attempt to encourage learners to explore course topics and new ideas. Comments such as *"If you'd like to get ahead of the game, there's a list of films, TV shows and books you might want to discuss in this week's 'dig deeper'"* or "*There is an amazing range of images available on line for exploring this topic. Do follow the links under 'See Also' at the bottom of each step and share any that you find particularly intriguing or useful"* exemplify this type of instructors' contributions, which largely occur at the beginning of the MOOCs (see Table 19).

A closer examination of facilitating discourse also revealed that some indicators such as *identifying agreement/disagreement* or *assessing the efficacy of the process* are not present in MOOCs. The non-existence of such indicators is likely a result of the characteristics of MOOC discussions, such as the large numbers of learners' comments and the length of conversations (mostly short exchanges).

Table 20: Instructors' teaching and pedagogical contributions

Teaching Presence	Lead educators		Educators		Mentors		Total	
	N	%	N	%	N	%	N	%
Design and Organisation	**71**	**22**	**59**	**17**	**46**	**17**	**176**	**19**
Setting curriculum	32	10	30	1	10	4	72	8
Design methods	21	7	6	2	17	6	44	5
Establishing time parameter	10	3	13	4	8	3	31	3
Utilising technology effectively	5	2	2	<1	4	1.5	11	1
Establishing netiquette	0	0	0	0	0	0	0	0
Making macro-level comments about the	3	1	5	1	2	1	10	1
course	0	0	3	1	5	.2	8	1
Marketing the course or institution*								
Facilitating Discourse	**131**	**41**	**125**	**36**	**154**	**58**	**409**	**43**
Identifying areas of dis/agreement	0	0	0	0	2	1	2	<1
Seeking to reach	4	1	13	4	8	3	25	3
consensus/understanding	111	35	78	22	86	32	275	29
Acknowledging, encouraging or reinforcing								
learners' contributions	10	3	10	3	15	6	34	4
Setting climate for learning	6	2	24	7	43	16	73	8
Drawing in participants, prompting								
discussions, presenting follow-up topics	0	0	0	0	0	0	0	0
Assessing the efficacy of the process								
Direct Instruction	**117**	**36**	**168**	**48**	**68**	**26**	**353**	**38**
Presenting content-question	5	2	24	7	33	12	62	7
Focusing (refocusing) discussions	0	0	0	0	0	0	0	0
Summarising discussions	1	<1	2	<1	1	<1	4	<1
Confirming understanding through	21	7	16	5	5	2	42	5
explanatory feedback								
Diagnosing misconceptions	0	0	0	0	0	0	0	0
Supplying clarifying information	40	12	48	14	5	2	93	10
Supplying additional information*	32	10	51	15	12	5	95	10
Making explicit reference to outside	18	7	27	8	12	5	57	6
material								
TOTAL	**319**	**34**	**351**	**37**	**268**	**29**	**938**	

(Goshtasbpour, Swinnerton and Morris, 2019: 9)

Direct instruction

Following facilitating discourse, direct instruction is the second most frequent type of teaching contribution (38%), and manifests instructors' academic leadership in dealing with specific content issues. The most commonly used strategies within this category are *supplying clarifying information*, *supplying additional information*, *presenting questions* and *making explicit reference to outside materials* with 10%, 10%, 7% and 6% of teaching presence codes respectively. Conversely, there has been no evidence of some indicators, such as *focusing and refocusing of discussions* in MOOCs, since the concept of "discussions" as defined in traditional online courses and adopted by the CoI hardly exist in MOOCs. In addition, as noted earlier, most conversations are short, and therefore the instructors cannot focus or refocus them. This is also applicable to *summarising*

discussion, which occurs only rarely. Likewise, the instructors do not tend to "diagnose misconception" explicitly or directly in MOOCs.

Design and organisation

Contributions related to the design and organisation of the course are instructors' least common pedagogical contributions (19%). These postings, which address learners' questions about the course content, activities, learning environment or course time parameters, prove to be different in MOOCs due to their different course design and structure compared to traditional online courses (e.g. lack of formal assessment or deadlines). As a result, this category of teaching presence required some changes and rephrasing of indicators to fit the context of MOOCs. The reason for rephrasing and modifying rather than creating new indicators is that the original indicators of design and organisation do exist in MOOCs but have acquired a new meaning due to concepts that are specific to MOOCs (e.g. course reiterations or downloadable material). *Design methods* and *establishing time parameters* are two examples of such new meanings. As the following extracts show, *design methods* in MOOCs not only encompasses instructions about participating in learning activities and completing the course successfully, but also proved to include information about the use of materials, specifically in terms of downloading course materials, instructions for late joiners, and information about obtaining certificates, as well as the re-run of a MOOC. Similarly, *setting time parameters* is no longer about course deadlines; it covers course schedule and the timeframe for activities. In fact, rather than setting time parameters, the instructors inform learners of the course timeframes, i.e. what is covered when. Similarly, *setting curriculum* addresses how the course operates and how learners can navigate it, in addition to traditional aspects of informing learners of course outcomes, goals and important topics.

Hi _____, I hope you are enjoying the course so far. Please feel free to post any questions you might have, as you progress through the course. Various mentors and educators will be at hand to help with any queries you might have. You might also find it helpful to download some of the free learning resources, which are available in pdf, audio and video formats. They are very useful revision tools. _____

♡ Like 1   ↩ Reply   🔖 Bookmark   ⚑

Thanks for your comments Michal. In case you find it a bit lonely without the rest of the participants, you might consider rejoining this course in January when I will be rerunning it. We had a very robust set of debates and discussions in March this year and I'm anticipating the same next year.

♡ Like   ↩ Reply   🔖 Bookmark   ⚑

> Amy, please do not put yourself under pressure. You can still access the course after the three weeks and progress at your own pace. You can also choose to skip some course readings as they are meant to be additions rather than core readings.

♡ Like 2   ▢ Bookmark   ⚑

Screenshot 12: Examples of instructors' *design methods*

> Yes, I agree Hilary. The question of how those designed by others as heroic thought of themselves is also interesting, and something we touch in week 2.

♡ Like 1   ▢ Bookmark   ⚑

> The Red Baron is the case study in Week 3...will be really interested to hear what you think of Ingrid's take on the ways he has been remembered.

♡ Like   ▢ Bookmark   ⚑

Screenshot 13: Examples of instructors' *setting time parameters*

> I would say they might be added features, rather than pure innovation. In the next videos we look at types and levels of innovation. These videos may help to clarify this issue as they show how innovations may be categorised. Do let me know what you think.

♡ Like   ↩ Reply   ▢ Bookmark   ⚑

> Thank you for your feedback, Andrew. It is one of the aims of the course to show that there are differences in the way the First World War was - and still is - understood and thought about in Britain, France and Germany.

♡ Like 1   ▢ Bookmark   ⚑

Screenshot 14: Examples of instructors' *setting curriculum*

Within design and organisation, *setting curriculum* (8%), *design methods* (5%) and *establishing time parameters* (3%) are the most common contributions, which shows that learners require some information about the running of the course. Unlike these three indicators, *establishing netiquette* did not occur at all. This is a likely result of FutureLearn hosts dealing with this aspect of conversations.

When the instructor roles are considered, the analysis of teaching contributions shows that mentors use facilitating discourse strategies more frequently than educators and lead educators. It is their major pedagogical contribution, since they provide the fewest direct instructions or comments about course design and organisation. In contrast, educators contribute least to facilitating the learning discourse while providing the highest proportion of direct instruction comments. Considering the design and organisation of the course, lead educators direct learners most, seemingly because of their leading role in the course design and delivery.

4.3.4.2 Newly emerged teaching indicators

Supplying additional information (Direct Instruction)

While coding the instructors' pedagogical contributions, it became apparent that on many occasions, instructors provide content-related information, although this is not necessarily for the purposes of reducing confusions or misconceptions, i.e. *supplying clarifying information* as the CoI defines. Rather it is for providing learners with additional information about a topic or a part of the content. Therefore, a new indicator of *supplying additional information or content* has been added to capture this difference. In most cases, an instructor's clarification is preceded by a question or a doubt and uncertainty in the learner's comment, while instructors normally provide additional information when a learner's comment contains an opinion or a perspective. This is illustrated in the conversations below; in the first example, the learner is not sure about two concepts and is checking her understanding, and therefore the instructor's response is coded as *supplying clarifying information.* However, in the second example, the learner is giving his opinion and the instructor adds more information to it.

Learner's question

Can I just clarify the definitions of these terms - "horizontal" and "vertical" - please? When we refer to "vertical", we refer to something that is definitely British or French or Russian, but when we refer to "horizontal", we're talking more about a mix of influences and practices? Is that right?

If this is the case then I absolutely agree that 21st century actor training has been characterised by "horizontal" training. As teachers within schools and colleges we are constantly referring to one particular practitioner as the focus but then we bring in another practitioner from another country to give other examples and possibilities so that students have a wider context in which to learn and understand. I sometimes think that this gets a little confusing, however, and sometimes it would be nice just to be able to learn about one practitioner and what he/she thought without having to back up their ideas with someone else's. This, I suppose, might be the leisure of teaching in higher education as opposed to at GCSE and A-Level.

♡ Like 1   ↩ Reply   🔖 Bookmark

Instructor's clarifying information

Following 11 MAR

Hi ___ Well not absolutely. Vertical training can exist in all kinds of cultures. And indeed it is most commonly referred to when looking at the East Asian traditional forms of performance. But yes the 21st-century is much more characterised by horizontal training, as you say, a mix of influences and practices. Vertical training is really very much a master- pupil model, where embodied practices are passed on in the studio from person-to-person. I think you might say that the British tradition has been horizontal for some time, as it hasn't had figures like Stanislavsky to lead it. That may be contentious!

♡ Like 5   ↩ Reply   🔖 Bookmark

Screenshot 15: An example of *supplying clarifying information*

> Interesting to learn that many of the fibres were not necessarily created for clothing. This would seem to demonstrate a particularly enhanced sense of innovation in the M&S technology department if they were able to visualise them as clothing fabrics.
>
> ♡ Like 1   ↩ Reply   🔖 Bookmark
>
> ┌─────────────────────────────────┐
> │ Instructor's clarifying information │
> └─────────────────────────────────┘
>
> (educator)   Following 18 SEP
>
> And this continues to happen. Fibres developed for industrial use (cordura) have made it into M&S products. I know at one stage Kevlar was being looked at for clothing!
>
> ♡ Like 4   ↩ Reply   🔖 Bookmark

Screenshot 16: An example of *supplying additional information*

In addition, as explained in **3.4.5.5**, the element of presenting within *presenting content and questions* is merged with *supplying additional information,* since in MOOCs presenting content and directing questions to learners does not occur in the way that CoI describes for traditional online courses.

Marketing the course or institution (Design and Organisation)

Another new indicator situated within the design and organisation of teaching presence relates to marketing the course or institution and captures the instructors' efforts to promote the institution and its courses or services. At times, instructors posted contributions such as "*Hope this course inspires you to come and study at X University Business School and you can visit the X archive*" or "*Please feel free to participate in some of the other MOOCs facilitated by the University of X in the near future*". These comments, which are only made by educators and mentors, are less common and constitute only 1% of the overall teaching contributions.

> I live in Leeds and have recently begun my teacher training, I will be teaching WW1 to my students and I hope this course will deepen my understanding of what I find an interesting topic in a way that I can use with my students. It is so easy to just teach the what why where and when without relating it to the students. I hope through this course I will be able to share some deeper thinking with the students about how they view WW1, how there ideas have been shaped and the impact that something which happened 100 years ago can still have.
>
> ♡ Like   🔖 Bookmark
>
> Educator)   Following 02 NOV
>
> Hi Esther, I'm currently designing a workshop for primary school pupils on medicine and the war. Lotherton Hall is also offering a workshop on convalescent hospitals in the war. Do get in touch if you would like more details.
>
> ♡ Like   🔖 Bookmark
>
> (Educator)   Following 04 NOV
>
> Welcome   Can I just join   in saying that there are lots of projects and learning opportunities the city of Leeds and at the   sity of   . The MyLearning website also has good WWI resources for teachers:
> http://www.mylearning.org/firstworldwarcentenary/

Screenshot 17: An example of instructors' *marketing the course or institution*

4.3.4.3 Changes to instructors' teaching contributions during a MOOC

As with other types of instructors' contributions, changes to their teaching contributions are examined to understand their developmental pattern over time and to explore whether indicators of teaching presence interact with each other during the course of a MOOC.
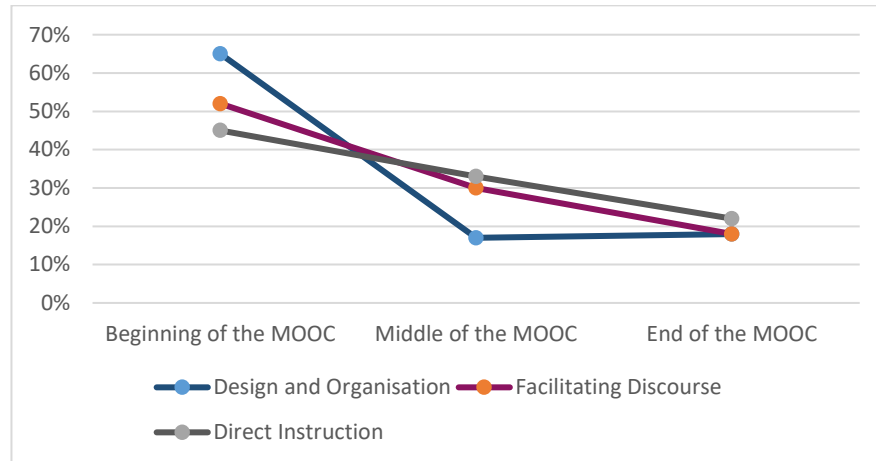
Figure 11: Instructors' teaching contributions over time

Consistent with the overall decrease in the number of instructors' pedagogical contributions over the course of a MOOC, the three types of teaching contributions also decline (Figure 11). However, the pattern of this decrease for contributions related to the course design and organisation is different. Postings related to this category are highest at the beginning of the course and drop considerably in the second time period whilst both their number and relative importance level out as the course approaches its end. In contrast, comments associated with facilitating discourse and direct instruction show a declining pattern throughout a MOOC.

Nevertheless, not all the indicators of teaching presence show a falling trend over time (Table 21). Within design and organisation, for example, *marketing the course or institution* is least salient in the middle of the course while its importance increases slightly from the middle to the end of the course. Similarly, the relative importance of *presenting questions* and *making explicit reference to the outside materials* within direct instruction increases in the final time period of the course. *Confirming understanding through explanatory feedback* is the only indicator within teaching presence that is highest in both level and importance in the middle of a course. Moreover, there are some indicators such as *design methods* and *establishing time parameters* whose relative importance drops marginally in the last two time periods of the course, or in the case of *making macro level comments about the course* and *seeking to reach consensus or understanding* even remains the same.

For contributions related to *design methods*, a qualitative difference was found between *design methods* in the first and last time periods of a course. At the beginning of a MOOC, most of the contributions provide instructions on how to complete activities, whereas the majority of instructors' comments coded into this indicator for the last week of the course provide instructions for the late-joiners or give information about the re-run of the course and future MOOCs. The following conversations show this difference:

As I am new to this course, I would like to ask few questions. I'm little lost.
Are we suppose to fill out "Realise your vision" before of after the 1rst week's topic videos and case studies? Or should I do this part first? I want to complete each section and take it step by step.
Thank you for your response in advance.

♡ Like   ↩ Reply   ☐ Bookmark   ⚑

EDUCATOR   Following 17 SEP

Hi Mary. The idea is to take it step by step and fill in the Realise your vision document with notes you are interested in as you go along. It is entirely up to you though. Welcome and I hope you enjoy the course.

♡ Like 1   ↩ Reply   ☐ Bookmark   ⚑

Screenshot 18: An example of *design methods* at the beginning of a course

I am glad to find that I am not alone in being a late stater! I hink I was overkeen as I registered a month or so ago and missed the reminder email. Duh! Still hopefully there are enough of us who have stated late to keep the discussions active. I'll try and scroll though some of them but apologise if I end up asking or repeating things as it might be difficult to trawl though them all. I completed my actor training at a small drama school five years or so ago. Lack of work and the need to pay the bills has meant that I have more or less left the industry but the passion is still there. I hope that the course can re-invigorate me. I wonder if there is going to be anyone local to practise with.... Brighton UK?

♡ Like   ↩ Reply   ☐ Bookmark   ⚑

Following 25 MAR

Hi   _   No you are not alone in starting later! Plenty of discussion is still going on in all the weeks. Don't worry about repeating things, or feel that you have to trawl through. I hope you soon feel re-invigorated!

♡ Like   ↩ Reply   ☐ Bookmark   ⚑

Screenshot 19: An example of *design methods* at the end of a course

Table 21: The breakdown of instructors' pedagogical contributions over time

Teaching Presence	Beginning		Middle		End	
	N	%	N	%	N	%
Design and Organisation	**115**	**65**	**30**	**17**	**31**	**18**
Setting curriculum	54	31	6	3	12	7
Design methods	25	14	10	6	9	5
Establishing time parameter	17	10	8	4	6	3
Utilising technology effectively	8	4	3	2	0	0
Establishing netiquette	0	0	0	0	0	0
Making macro-level comments about the course	6	3	2	1	2	1
Marketing the course or institution*	5	3	1	<1	2	1
Facilitating Discourse	**213**	**52**	**123**	**30**	**73**	**18**
Identifying areas of dis/agreement	1	<1	1	<1	0	0
Seeking to reach consensus/understanding	15	4	6	1	4	1
Acknowledging, encouraging or reinforcing learners' contributions	130	32	91	22	54	13
Setting climate for learning	29	7	4	1	1	<1
Drawing in participants, prompting discussions, presenting follow-up topics	38	9	21	5	14	3
Assessing the efficacy of the process	0	0	0	0	0	0
Direct Instruction	**158**	**45**	**116**	**33**	**79**	**22**
Presenting question	33	9	13	4	16	5
Focusing (refocusing) discussions	0	0	0	0	0	0
Summarising discussions	1	<1	1	<1	2	1
Confirming understanding through explanatory feedback	13	4	21	6	8	2
Diagnosing misconceptions	0	0	0	0	0	0
Supplying clarifying information/content	39	11	34	10	20	6
Supplying additional information*	47	13	33	9	15	4
Making explicit reference to outside material	25	7	14	4	18	5
TOTAL	**486**	**52**	**269**	**29**	**183**	**19**

4.3.5 Instructors' cognitive presence

As pointed out at the beginning of this section, the instructors' cognitive presence is quite low and constitutes only 4% of their overall contributions. The breakdown of instructors' cognitive comments (Table 23) indicates that most of their contributions with instances of cognitive presence are associated with the exploration phase of inquiry development (93%). They specifically join learners for *exploration within the online community*, where they support or contradict previous ideas and show unsubstantiated agreement or disagreement with learners. This explains why "agree" is the most reoccurring word in instructors' cognitive contributions (Table 22).

Table 22: Instructors' top ten most frequently used words in cognitive contributions

Word	Count	Weighted Percentage (%)	Similar Words
agree	140	2.24	agree, agreed
think	88	1.41	think, thinking, "thinking"
yes	83	1.33	yes
interesting	70	1.12	interest, interested, interesting
like	64	1.02	like, likes
people	56	0.89	people, peoples
also	52	0.83	also
feel	52	0.83	feel, feeling, feels
innovation	52	0.83	innovation, innovative
really	42	0.67	really

It is also found that this type of exploration is predominantly contributed by lead educators (81%) and mentors (77%), while educators do not appear to be as eager to make such contributions (33%).

My innovation was the internet and I believe that the internet was a change, an evolution in technology drive by costumers and their need of communication

♡ Like 2   ↩ Reply   🔖 Bookmark   ⚑

                    (Mentor)   Following 26 SEP

Hi   I agree, the internet is certainly an innovation that has dramatically canged the way in which we live and communicate.

♡ Like 1   ↩ Reply   🔖 Bookmark   ⚑

                                                                Follow 26 SEP

I share the same point of view

♡ Like 1   ↩ Reply   🔖 Bookmark   ⚑

Screenshot 20: Examples of instructors' *exploration within the community*

Based on the data in Table 23, instructors also actively contribute to learners' brainstorming and exchanging information (30%), although amongst the three roles, educators are the main contributors. Lead educators' and mentors' contributions to this category are a quarter of educators'. Moreover, it was noticed that nearly all (28 out of 30) of these postings occur in short conversations. The analysis also highlights the increase in the predominance of instructors' *brainstorming and exchange of information* from the beginning (26%) to the end of the course (38%).

Considering the third phase of cognitive development (integration), instructors do not appear to provide much support to learners with synthesising and integrating information (3%). As Table 21 illustrates, mentors do not engage with aiding learners to integrate or link information at all, while educators and lead educators are more active in this regard. No evidence of the resolution phase, which is characterised by providing examples of solutions to a problem or testing and applying the solution were found. This is not surprising as learners are responsible for such activities, and instructors' efforts aim to move learners to this level.

Table 23: Instructors' cognitive presence

Cognitive Presence	Lead educators		Educators		Mentors		Total	
	N	%	N	%	N	%	N	%
Triggering Events	**0**	**0**	**3**	**8**	**2**	**7**	**5**	**5**
Recognising problems	0	0	0	0	1	3	1	1
Sense of puzzlement	0	0	3	8	1	3	4	4
Exploration	**31**	**97**	**34**	**87**	**28**	**93**	**93**	**93**
Exploration within the online community	26	81	13	33	23	77	62	61
Exploration within a single message	0	0	0	0	0	0	0	0
Brainstorming and information exchange	5	16	20	51	5	17	30	30
Suggestions for consideration	0	0	1	2	0	0	1	1
Leap to conclusion	0	0	0	0	0	0	0	0
Integration	**1**	**3**	**2**	**5**	**0**	**0**	**3**	**3**
Integration among group members	1	3	1	3	0	0	2	2
Integration within a single message	0	0	1	3	0	0	1	1
Connecting ideas (synthesis)	0	0	0	0	0	0	0	0
Creating solutions	0	0	0	0	0	0	0	0
Resolution	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Various application to real world/ testing solutions	0	0	0	0	0	0	0	0
Defining solution	0	0	0	0	0	0	0	0
TOTAL	**32**	**32**	**39**	**39**	**30**	**30**	**101**	**100**

(Goshtasbpour, Swinnerton and Morris, 2019:9)

What is also interesting about instructors' cognitive presence is that educators and mentors also indicate some instances of triggering events where they ask questions or make comments that change the direction of a conversation.

Screenshot 21: Examples of instructors' *triggering events*

4.3.5.1 Changes to instructors' cognitive presence during a MOOC

As shown earlier in Figure 7, comments representing instructors' cognitive presence make up a higher proportion of the total contributions as a course progresses. However, individual categories of cognitive presence show a different development pattern over time (Figure 12).

Comments with instances of exploration show a clear decline from the beginning (49%) to the middle of a course (29%), yet their level and relative importance remains nearly the same (28%) until the course ends. Comments representing integration of ideas and information do not occur in the first time period of the course, but are most noticeable in the second time period, and become less prominent again at the end of the course. In contrast, instances of triggering events decrease and lose their relative importance from the beginning to the middle of the course, and they rise considerably from the middle to the end of the course. In fact, they rise to the same level as the beginning of the course.
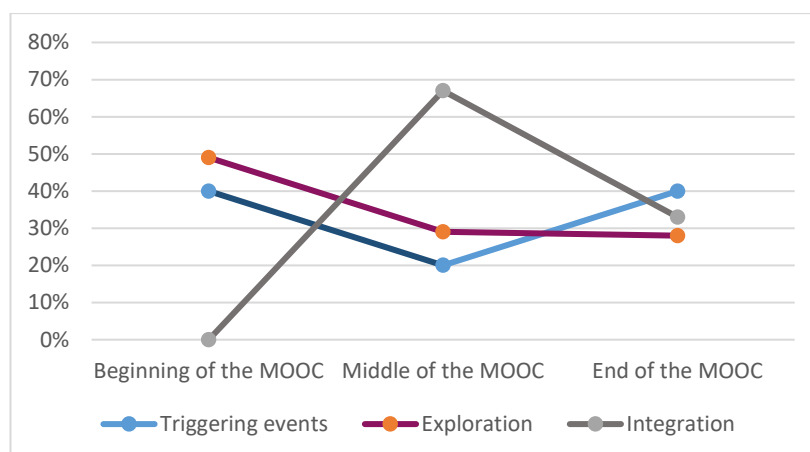
Figure 12: Instructors' cognitive contributions over time

Although the pattern that emerges from the overall percentage distribution of instructors' cognitive presence does not show a clear interaction between the indicators of this presence, there appear to be some communications between integration and triggering event or exploration comments. While the exploration and triggering event postings are at their highest level at the beginning of the course, there are no instances of integration. Yet, when triggering events reach their lowest level in the middle of the course, postings indicating integration of ideas reach their highest level, and then this trend is reversed as the course ends. This means that in the middle of the course, instructors have a tendency towards helping learners integrate and synthesise information and ask questions or leave comments that change the direction of conversations less. On the other hand, as the course approaches its end, they seem to reduce their support with

integrating information and ask questions or change the direction of conversations more often. In addition, they appear to make no contributions indicating the integration phase of practical inquiry at the beginning of a course, although they are heavily involved with exploration, brainstorming and exchange of information.

Table 24: The breakdown of instructors' cognitive contributions over time

Cognitive Presence	Beginning		Middle		End	
	N	%	N	%	N	%
Triggering Events	**2**	**40**	**1**	**20**	**2**	**40**
Recognising problems	1	20	0	0	0	0
Sense of puzzlement	1	20	1	20	2	40
Exploration	**40**	**43**	**27**	**29**	**26**	**28**
Exploration within the online community	29	31	19	20	14	15
Exploration within a single message	0	0	0	0	0	0
Brainstorming and information exchange	11	12	8	9	11	12
Suggestions for consideration	0	0	0	0	1	1
Leap to conclusion	0	0	0	0	0	0
Integration	**0**	**0**	**2**	**67**	**1**	**33**
Integration among group members	0	0	2	67	0	0
Integration within a single message	0	0	0	0	1	33
Connecting ideas (synthesis)	0	0	0	0	0	0
Creating solutions	0	0	0	0	0	0
Resolution	**0**	**0**	**0**	**0**	**0**	**0**
Various application to real world/ testing solutions	0	0	0	0	0	0
Defining solution	0	0	0	0	0	0
TOTAL	**42**	**42**	**30**	**30**	**29**	**29**

4.3.6 The co-occurrence of social, teaching and cognitive contributions

When the content of instructors' contributions was analysed, most comments were assigned to more than one presence of the CoI and often to several indicators of one or more presences. This double classification reflects the layers and the complexity of instructors' contributions. Therefore, in order to capture this complexity, the kind and degree of co-occurrence of the CoI presences in instructors' contributions are examined. The results show four types of interrelation between presences, which are presented in Table 25.

**Table 25: An overview of interactions between CoI presences in instructors'
contributions**

Interrelation type	Co-occurrence type	No. of instances	Percentage %
Interrelation between indicators of one presence (N=312, 36%)	SP-SP	245	28%
	TP-TP	67	8%
Interrelation between indicators of two presences (N=401, 46%)	SP-TP	373	43%
	TP-CP	19	2%
	SP-CP	9	1%
Interrelation between indicators of all presences (N=31, 3%)	SP-TP-CP	31	4%
No interrelation or co-occurrence (N=133, 15%)	TP	74	8%
	CP	32	4%
	SP	27	3%

*SP: Social Presence; TP: Teaching Presence; CP: Cognitive Presence

As the table shows, co-occurrence appears most between the indicators of two
presences (46%). Amongst the possible combinations, the highest percentage of co-
occurrence is between indicators of social and teaching presences (43%). This
proportion is substantially lower when teaching (2%) and social (1%) presences co-occur
with cognitive presence. A more detailed analysis of the interrelation between indicators
of social and teaching presences revealed that 90% of the overall SP-TP combinations
include a cohesive response. In addition, the most recurring category of teaching
presence in these combinations is facilitating discourse. This suggests cohesive
responses are becoming a fixed component of instructors' responses when they provide
any teaching or pedagogical comments. In addition, the noticeable and frequent
presence of facilitating discourse indicators shows the emphasis instructors give to
making learner-learner, learner-content and learner-instructor interactions easier.

Screenshot 22: An example of interrelation between indicators of two presences

**Table 26: The co-occurrence of social and teaching indicators in instructors'
contributions**

Co-occurrence Type	SP-TP	No. of instances	Percentage %
Interrelationship	CO-FD-DI	92	25
between indicators	CO-FD	73	20
of social and	CO-DO	72	20
teaching presences	CO-DI	38	10
	CO-FD-DO	20	5
	CO-DO-I	17	4
	CO-FD-DI-DO	15	4
	CO-DI-DO	7	2
	CO-FD-I	7	2
	CO-FD-DI-I	5	1
	Others	27	7
Total		373	100

CO: cohesive responses   *AF: affective responses*   *I: interactive response*
FD: facilitating discourse   *DI: direct instruction*   *DO: design and organisation*

The second most common type of double classifications occurs between the indicators
of one presence (36%). Various indicators of social presence co-occur more than
indicators of teaching presence, while there is no interaction between the indicators of
cognitive presence. The analysis also reveals the dominance of different aspects of
cohesive response when social indicators co-occur (Table 26). This is most likely
resulting from the instructors starting and ending their comments with greetings and also
using learners' names.

Table 27: The interrelation between indicators of one presence

Co-occurrence type	Presence type(s)	No. of instances	Percentage %
SP-SP	Cohesive-Cohesive	185	75
	Cohesive-Interactive	46	19
	Cohesive-Affective	10	4
	Affective-interactive	2	1
	All three indicators	2	1
TP-TP	Facilitating Discourse-Direct Instruction	46	69
	Direct Instruction-Direct Instruction	10	15
	Facilitating Discourse-Facilitating Discourse	4	6
	Facilitating Discourse-Design & Organisation	5	7
	Direct Instruction-Design & Organisation	1	1.5
	Design & Organisation-Design & Organisation	1	1.5

When the interaction between indicators of teaching presence is considered, facilitating discourse indicators mainly co-occur. A more granular level of analysis revealed that the most frequent combination consists of a facilitating discourse indicator and a direct instruction (69%). It is also noted that most of the combinations contain the facilitating discourse indicator of *acknowledging, encouraging and reinforcing learners' contributions*. This suggests the idea that the instructors use this indicator as an opening to provide direct instruction or to facilitate the learning discourse as the examples below illustrate:

FD- acknowledging and encouraging

(Mentor)   Following 22 SEP

Hi Harriet, some really interesting points and examples here. I wonder if colleagues on the course have any examples of their own?

♡ Like 1   ⤺ Reply   ⊓ Bookmark

FD- Draw in participants
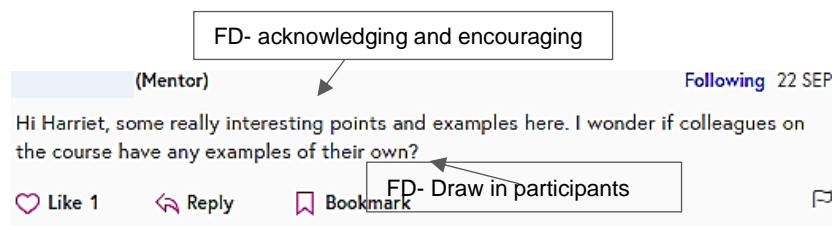
Screenshot 23: An example of facilitating discourse-facilitating discourse co-occurrence

FD- acknowledging, reinforcing and encouraging

Yes indeed Chris. Many thanks for raising this. William James as the father of Objective Psychology - or the precursor of behaviourism. A strong influence on Meyerhold. The etudes can be considered as a kind of practical exploration of this phenomenon. Find the external form of the etude and this will lead to a feeling - thus control can be assured.

♡ Like 1   ⤺ Reply   ⊓ Bookmark

DI- providing additional information

Screenshot 24: An example of facilitating discourse-direct instruction co-occurrence

Furthermore, 15% of the overall contributions, as Table 25 shows, do not have any crossing with other presences and include only one presence. Teaching presence indicators appear to have the highest percentage of single occurrence (8%) followed by cognitive (4%) and social (3%) presences respectively. Finally, the occurrence of indicators from all three presences in contributions is infrequent and is observed in only 3% of the total instructors' contributions.

Table 28: The overview of single occurrence of CoI presences in instructors' contributions

Single occurrence type	Presence type(s)	No. of Instances	Percentage %
TP	Direct Instruction	50	67
	Facilitating Discourse	20	27
	Design & Organisation	4	5
CP	Exploration	29	91
	Integration	2	6
	Triggering event	1	3
SP	Cohesive	21	78
	Interactive	6	22

Up to this point, several aspects of instructors' contributions to learner conversations have been explored, and the type, level and changes of their contributions over time have been examined. The final part of this section will report findings about the learners' initiations that prompt instructors' contributions before this chapter covers learners' engagement with instructors' contributions.

4.3.7 The relationship between learners' initiations and instructors' responses

After examining the instructors' contributions in terms of the type, level and variation over time, their relationship with learners' initiating comments is explored to understand how instructors respond to different types of learners' initiations. The analysis of learners' initiating comments revealed fourteen initiation types based on the CoI indicators (See appendix 9). In this section, the five most recurring learners' initiations, which make up 92% (n=713) of their overall initiating comments, and the way instructors respond to them, are reported.

Most learner initiations are purely cognitive (n=277, 36%) or a combination of social indicators (n=272, 35%) as shown in Figure 13. First postings that possess both instances of social and cognitive presences (n=65) or only social indicators (n=61) are made equally and constitute learners' second most frequent initiations (8%). Less common learner initiations are comments that indicate instances of social and learner indicators together (n=38, 5%). Note that "learner presence" is an additional CoI presence that is included only for analysing learners' contributions (Please see **3.4.5.6**). It has four categories which will be covered in more detail in the next section.
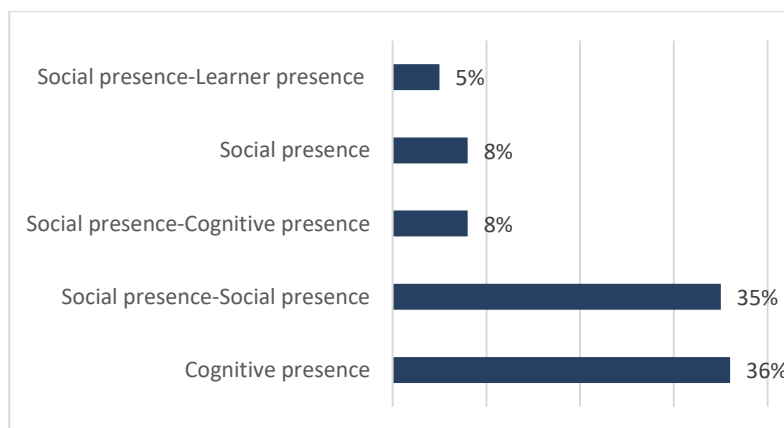
Figure 13: Five most frequent learner initiations

The analysis of instructors' responses to learners' initiating comments indicates that when a learner's comment shows a phase of cognitive presence, the instructors tend to

respond with comments possessing a combination of teaching and social indicators or solely teaching indicators (Figure 14a). Their predominant responses in order are:

Cohesive responses + facilitating discourse + direct instruction
Facilitating discourse + direct instruction
Direct instruction only

This shows that instructors largely use comments with a pedagogical focus to address learners' cognitive initiations. This means that by facilitating the discussions or providing direct instructions or both, they attempt to help the development of learners' cognitive presence, i.e. their higher order thinking. It is noted that design and organisation indicators within teaching presence are absent in these responses.
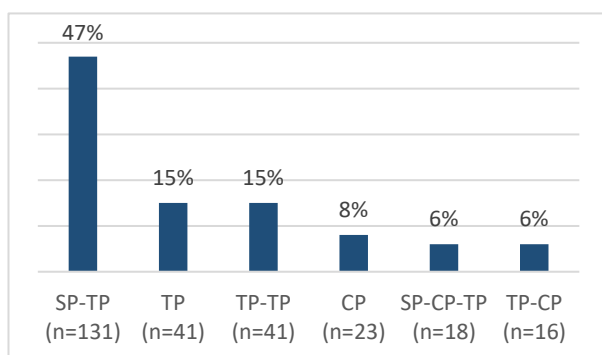
a) Instructors' responses to cognitive initiations
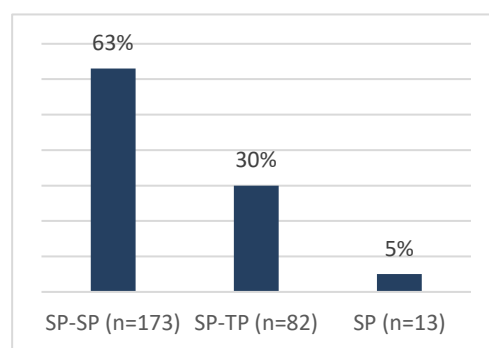
b) Instructors' responses to SP-SP initiations
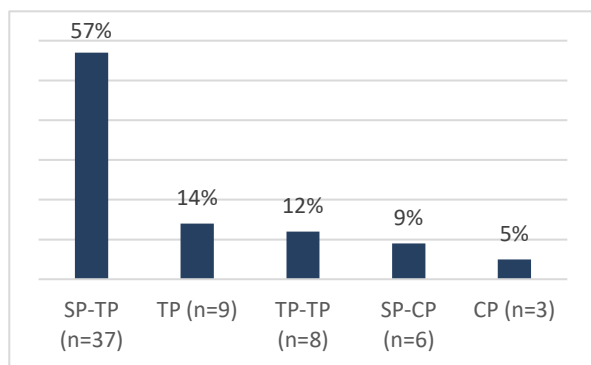
c) Instructor's responses to SP-CP initiations
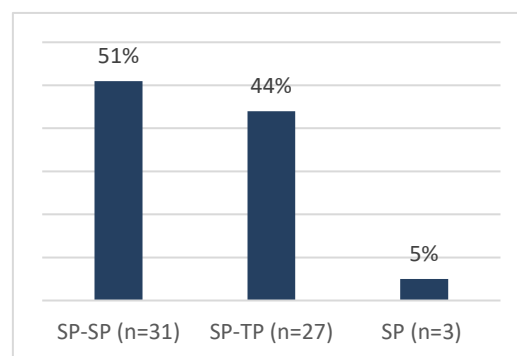
d) Instructors' responses to' social initiations

Figure 14[27]: Instructors' responses to learner initiations

On the other hand, when learners' initiating posts contain combinations of social indicators (e.g. cohesive and interactive responses), instructors rely heavily on social comments to support learners (Figure 14b).

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[27] Indicators that are lower than 5% of the overall responses are not reported.

Hi I'm [   ], I have an innovative maternity product going to the medical market and now looking to put that concept into a new retail maternity range. I'm looking forward to learning something new that could help me on my way! I am running behind but hoping to catch up this week.

♡ Like 1   ↩ Reply   🔖 Bookmark   ⚑

                    (Mentor)   Following   24 SEP

Hi Emma, welcome to the course, we hope it can help you with your work, best of luck with the product and its following range!

♡ Like 1   ↩ Reply   🔖 Bookmark   ⚑

Screenshot 25: An example of learners' SP-SP initiation and instructor social response

There are also occasions when instructors respond to learners' social comments with a post that is both social and pedagogical, as the example below illustrates:

Hello, I'm Priya. I've always been fascinated by theater but didn't have the balls to study theater because of the unemployment rates. I've taken a theater course to explore it in my spare time. I've started to write a stage play. I hope to learn more about acting so that I can write better plays.

♡ Like   ↩ Reply   🔖 Bookmark   ⚑

SP- cohesive (greeting and vocative)

Following 13 MAR

Hello Priya! And welcome. Very interesting to consider biomechanics as a stimulus for writing. It would be interesting to hear your thoughts about rhythm and its relationship to both.

♡ Like   ↩ Reply   🔖 Bookmark   ⚑

FD- Encouraging learner's contribution   FD- Setting climate for learning

Screenshot 26: An example of learners' SP-SP initiation and instructor SP-TP response

Moreover, if a learner's first post indicates instances of social and cognitive presences together, instructors' most frequent responses are a social-teaching combination (57%), teaching only (14%) and combinations of teaching presence indicators (12%). There are other instructors' responses, but they occur only rarely (Figure 14c).

It is also found that instructors use a combination of two or more social indicators when learners' initiating comments include only one indicator of social presence. They also post comments with a combination of social and teaching indicators on these occasions; however, it must be noted that these are mostly indicators of "design and organisation" within teaching presence rather than direct instruction or facilitating discourse.

The final most frequent learners' initiating comments include indicators of social and learner presences. What is interesting about these initiations is that the instructors respond to them in the same way as they respond to purely social initiations, i.e. the majority of their replies are SP-SP (53%), followed by SP-TP (32%) and SP (8%).

4.3.8 Learners' engagement with the instructors' contributions

After examining the characteristics of instructors' contributions, the level and ways of learners' engagement with their contributions is explored. In the sampled conversations (n=818), learners made 1,464 comments, which are assigned to three original CoI presences and the additional "learner presence" to capture the full dynamics of the conversations. Learner comments are coded into 2,633 instances consisting of 55% social, 36% cognitive, 5% learner and 3% teaching presences. A summary of this analysis is provided in Table 29 and a full breakdown of each category and its indicators in Appendix 7.

Table 29: Types of learners' comments in MOOC discussions

Comment type	N	%
Social Presence	**1459**	**55**
Personal Communication (Affective)	504	34
Open Communication (Interactive)	260	18
Group Cohesion (Cohesive)	695	48
Teaching Presence	**90**	**3**
Design and Organisation	4	4
Facilitating Discourse	53	6
Direct Instruction	33	37
Cognitive Presence	**940**	**36**
Triggering Event	116	12
Exploration	727	77
Integration	93	10
Resolution	4	<1
Learner presence	**144**	**5**
Forethought and planning	22	15
Performance (Monitoring)	69	48
Performance (Strategy use)	16	11
Reflection	37	26

To explore learners' engagement with the instructors' contributions, four possible engagement behaviours, from the most to least active engagement, are considered:

(1) Engagement by both liking and responding to an instructor's comment

(2) Engagement by responding to an instructor's comment

(3) Engagement by liking an instructor's comment

(4) No engagement

According to this classification, responding to the instructors' contributions represents an explicit interaction between learners and the instructors, and can signify a higher level of

engagement compared to liking, which indicates an implicit interaction where the learner reads a comment and acknowledges this by pressing the like icon.

Table 30:The overview of learners' engagement with instructors' contributions

Teaching roles	Liked and responded		Only Responded		Only Liked		No Engagement	
	N	%	N	%	N	%	N	%
Lead educators	38	34	26	32	31	25	139	32
Educators	48	42	36	44	45	38	110	25
Mentors	27	24	20	24	46	38	190	43
Total	**113**	**15**	**82**	**11**	**122**	**16**	**439**	**58**

(Goshtasbpour, Swinnerton and Morris, 2019:11)

Learners engage with 15% of instructors' postings by both liking and replying to them as Table 30 shows. These contributions are made to short (n=84, 74%), medium (n=25, 22%) and long (n=4, 3%) conversations, and it seems learners like and respond to educators' contributions more than comments made by mentors or lead educators. The analysis also revealed that learners responded to a smaller number of instructors' contributions without liking them (11%). Similarly to the previous category, these postings occur in short, medium and long conversations (n=71, 87%; n=9, 11% and n= 2, 2% respectively), and learners tend to respond to educators more than mentors and lead educators. Taken together, these two types of engagement constitute learners' explicit interactions with instructors in discussions.

Learners also indicated a less active engagement with instructors' contributions by "only liking" them (16%). Considering liking instructors' replies, learners engaged with educators' and mentors' contributions equally and at a higher level than they engaged with the lead educators' postings. When the content of these postings is considered (Table 31), the majority of them are categorised as SP-TP (34%), followed by SP-SP (31%) combination, with 11% single occurrence of teaching presence indicators.

Table 31: Learners' engagement with instructors' postings based on contributions' content (presence level)

	Liked & responded		Only responded		Only liked		No engagement	
	N	%	N	%	N	%	N	%
SP	2	2	4	5	3	3	14	3
TP	13	11	8	10	13	11	27	6
CP	7	6	1	1	5	4	13	3
SP-SP	10	9	9	11	38	31	172	39
SP-TP	53	47	44	54	41	34	171	39
SP-CP	3	3	1	1	1	1	2	<1
SP-CP-TP	6	5	2	2	6	5	10	2
TP-TP	18	16	10	12	11	9	18	4
TP-CP	1	1	2	2	3	3	10	2

In addition, the data in Table 28 show that over half of the instructors' comments (58%) are not attended by learners. All these postings occur in 2-comment conversations. Furthermore, it seems mentors' contributions are the least attractive to learners, while educators' postings indicate the lowest percentage of learners' non-engagement.

When the content of instructor contributions in terms of learner explicit and implicit engagement at category level is considered (Table 32), there is a clear qualitative difference between contributions that learners engage or do not engage with. Instructor contributions which learners did not engage with have the lowest level of facilitating discourse and direct instruction; i.e. they show a low level of teaching presence. By contrast, they contained the highest level of cohesive and affective responses and the lowest level of interactive communications. This suggests that instructor contributions focusing on social presence with little emphasis on teaching presence are not valued by learners. On the other hand, instructor contributions that learners both liked and responded to, have the highest level of direct instruction and facilitating discourse and the lowest level of affective responses. However, these findings need to be considered with caution, since contributions that learners engaged with implicitly show a nearly similar proportion of teaching presence indicators to "liked and responded to" while the social components are quite unique. That is, they possess the lowest level of cohesive responses and highest level of affective expressions.

Table 32: Learners' engagement with instructors' postings based on contributions' content (category level)

	Liked & responded		Only responded		Only liked		No engagement	
	N	%	N	%	N	%	N	%
Social								
CO	74	29	77	31	14	7	508	45
AF	28	11	34	4	50	24	276	24
I	9	3	14	6	34	16	12	1
Teaching								
FD	58	23	45	18	48	23	137	12
DI	69	27	41	17	47	23	104	9
DO	17	6	34	14	14	7	85	7

CO=Cohesive responses, AF= Affective responses, I= Interactive responses

FD=Facilitating discourse, DI= Direct instruction, DO= Design and organisation

Overall, it appears that learners engage with less than half of instructors' contributions in several ways, particularly by both liking and responding to them. They tend to engage with educators' contributions most, while they are least attentive to mentors' contributions.

4.3.9 Learners' engagement with instructors' comments during a MOOC

Learners' engagement with instructors' postings throughout the course of a MOOC was also examined, and the results indicated a different explicit and implicit engagement pattern (Figure 15). Learners' engagement by both "liking and responding to" instructors' contributions increases modestly from the beginning to the end of a course. However, engagement by "only liking" and by "only responding to" instructors' comments show a contrary pattern during a MOOC. That is, learners' implicit engagement with instructors' contributions (i.e. only liking) increases from the beginning (36%) to the middle of MOOCs (46%), however it drops noticeably during the last time period of the courses (33%). On the other hand, learners' explicit engagement by only responding to instructors decreases from the start to the middle of the MOOCs and then starts to increase until courses end.

	Beginning of a MOOC	Middle of a MOOC	End of a MOOC
Liked and responded to	34%	35%	40%
Only responded to	30%	19%	27%
Only liked	36%	46%	33%
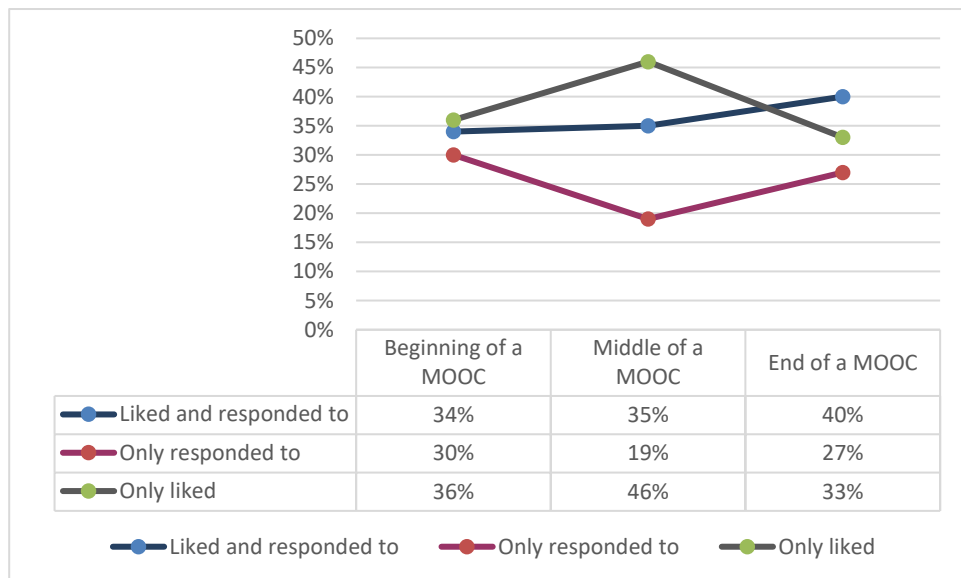
Figure 15: Learners' engagement with instructors' contributions over time

4.4 Summary

This chapter reported on the findings from the analysis of the conversations between learners and instructors to shed light on instructors' participation and activities in MOOC discussion areas. It is found that instructors largely contribute to discussions through their social contributions, which constitute 56% of their overall contributions. Teaching and pedagogical postings are their second most frequent contributions. They also post cognitive comments, but these occur only rarely (4%).

Instructors' social contributions are predominantly cohesive communications and focus on group cohesion, yet at an individual level. Comments emphasising open communication are less common and personal and affective exchanges are infrequent. Their second most frequently occurring contributions concentrate on teaching presence and specifically on facilitating the learning discourse, although instructors also provide direct instruction in discussions. Contributions related to the course design and organisation are made least. The results also revealed that instructors' cognitive comments primarily focus on the second phase of Practical Inquiry, i.e. exploration.

Furthermore, the variation of instructors' contributions over the course of MOOCs is examined and it is found that their social contributions become less noticeable as a course progresses, while their teaching contributions make a higher proportion of their overall contributions at each of the three time segments of the course (beginning, middle and end). On the other hand, their cognitive contributions become more important from the beginning to the end of a course. If the overall discussion participation of instructors is considered, the number of their contributions decreases as a course progresses.

In addition, the level of contributions based on the three instructor roles (lead educators, educators and mentors) are studied and the results indicate a relative balance of participation by the three roles, although mentors contributed to discussions (37%) more than lead educators (31%) and educators (32%).

The relationship between instructors' contributions and learners' initiating posts is also explored and it is found that if the initiating post possesses instances of cognitive presence, instructors tend to respond with contributions that are either a combination of teaching and social presences or teaching only. On the other hand, if a learner's initiating comment is social, instructors rely heavily on their social presence. Additionally, when learners start a conversation by a combination of social and cognitive or social and learner presences, instructors respond to them in a similar way and their contributions are socially based.

After unpacking instructors' contributions, this chapter reported on the degree and ways through which learners engage with instructor contributions. The analysis revealed that learners engage with 42% of instructors' contributions - both liked and responded to (15%), only responded to (11%) and only liked (16%). Just over half of instructors' contributions (58%) were not attended by learners at all. The analysis also showed learners engage the most with educators' contributions and the least with those of mentors.

Finally, this chapter outlined the new CoI indicators that emerged from the content analysis of learner-instructor conversations. The new indicators include *support for communication* (social presence) and *providing additional information* and *marketing the course or institution* (teaching presence). These new indicators must be considered in re-conceptualising the CoI framework when it is applied to MOOC contexts, particularly if the MOOCs under investigation are xMOOCs.

Chapter 5 RESULTS 2: THE ROLES OF INSTRUCTORS' CONTRIBUTIONS IN LEARNING

5.1 Introduction

This chapter focuses on the findings concerning the roles of instructors' contributions in learning. These roles are examined in terms of establishing and maintaining the CoI presences, since they provide an opportunity to expand our understanding of the instructors' contributions provided by the content analysis of their conversations with learners.

As outlined in the **Chapter 3**, the role of the instructors' contributions in supporting learners was investigated through interviewing instructors (n=12) and enquiring about their pedagogical priorities and perspectives for contributing to learner conversations, and the outcomes they intended to achieve. The first part of this chapter reports findings about the ways in which the instructors contribute to learning, while exploring their rationale for engaging with learner conversations. It principally addresses the second research question: *What roles do the instructors' contributions to discussions play in learning?,* while enriching the findings reported in the previous chapter. The second part of the chapter will report on the criteria that instructors use to engage with learner conversations.

The results of the interviews are presented in order, from the most to the least reported themes by instructors. All findings related to the teaching, social and cognitive presences are displayed in a table view, where the counts and percentage instances of each presence are indicated. This will allow consistency in reporting the findings and will demonstrate transparency with my thematic analysis.

"Proper teaching is about interaction with individual students, talking to them about their ideas and challenging them, and supporting them…the interaction is where the learning happens." (Ed5)

5.2 The roles of the instructors' contributions in discussions

According to the lead educators who designed the MOOCs, the learner-instructor interactions are designed into the learning journey and are necessary to support learners. They believe that the instructor responses and validation of learners' contributions can motivate learners and direct them in filtering what they do during a course. Therefore, in order to explore the ways that learners are supported by these interactions, the instructors' responses in interviews are analysed based on the CoI presences, as displayed in Table 33.

The analysis of interviews shows that the majority of instructors' priorities for supporting learners are associated with teaching presence (62%), followed by social presence (24%). As expected, a few cases (14%) are reported with reference to establishing cognitive presence.

Table 33: Coding results for teaching, social and cognitive presences

(No. of instructors =12)

Presence and Categories	Instances (N)	Percentage
Teaching Presence	**62**	**62%**
Facilitating Discourse	38	63%
Direct Instruction	15	25%
Design and Organisation	9	12%
Social Presence	**23**	**24%**
Cohesive	16	70%
Interactive	4	17%
Affective	3	13%
Cognitive Presence	**14**	**14%**
Triggering Events	2	14%
Exploration	10	72%
Integration	2	14%

5.2.1 Supporting learners through teaching presence

As Table 33 illustrates, concerns associated with teaching presence account for the majority of the instructors' priorities in supporting learner conversations, which suggests that they emphasise supporting learners through pedagogical contributions in discussion areas. A more granular analysis of these priorities (Table 34) reveals that the most reported aspect of pedagogical contributions concerns facilitating learner-to-learner and learner-to-content discourse (61%), compared to design and organisation of a course

(14%) or providing direct instruction (24%). This indicates the importance, in the instructors' views, of facilitating discourse and the key role it can play in supporting a learner community and in maintaining learners' interest in continuing the course.

Table 34: Coding results for teaching priorities

(No. of instructors =12)

Indicator	Instances (N)	%	Example
Facilitating Discourse	**38**	**61**	*Certainly, what I was trying to do was to sort of reward people engaging. So if they were taking the time to make a decent comment and it was valid, I would validate it. I would encourage and validate good reflective behaviour, because I know that's good for learning.* (Ed2)
Encouraging learners' contributions	15	39	
Prompting discussions	13	34	
Seeking understanding	7	18	
Setting climate for learning	3	8	
Direct Instruction	**15**	**24**	*"If I could provide some references, that's one of the things that I do, so I suggested a lot of reading, why don't you go and have a look at this, you can find some information here about that."* (LEd3)
Supplying additional & clarifying information	7	47	
Focusing & refocusing discussions	4	27	
Evaluating & confirming understanding	2	13	
Reference to outside material	2	13	
Design and Organisation	**9**	**14**	*I think, some not entirely hidden, but sub-level aims [was] to get people to exploit digital technology.* (Ed3)
Establishing netiquette	6	67	
Setting curriculum	2	22	
Utilising medium or technology	1	11	

5.2.1.1 Facilitating discourse

a) Encouraging, acknowledging or reinforcing learners' contributions

Nearly 40% of the reported instances of facilitating discourse are related to pedagogical (as opposed to social) encouragement of learners, i.e. *acknowledging, encouraging and reinforcing their contributions*. The instructors provided several reasons for emphasising this aspect. Firstly, they highlighted the affective impact of their encouragement and pointed out that receiving a response from an instructor reassures learners and indicates that their contributions are noticed and valued. This was a common view among the instructors:

> *"My main aim was to make people feel good about being brave enough to write something that anyone can see, and to sort of validate that and to create a feeling of mutual support and community."* (Ed4)

Moreover, instructors reported that showing recognition is particularly important if a learner's contribution is interesting or if it enhances the discussion and adds to it. Half of the instructors believed that this recognition would encourage learners to continue the course. In addition to recognising learners' contributions, some instructors discussed validating learners' comments. They believe if learners dedicate time to engage with the content and make a valid point, it must be validated and their reflective behaviour must be encouraged and rewarded.

> *"… if someone had gone to lot of trouble, it was particularly important to validate that."* (Ed4)

> *"If a particularly important point was made by a delegate, I made a response to reinforce the point."* (Ed1)

In summary, one of the instructors' main aims in contributing to learner conversations is to recognise and validate learners' contributions and reassure them, especially with regards to the learners who are "*first-time MOOCers as opposed to seasoned-MOOCers*" (M2).

b) Drawing in participants and prompting discussions

Another similarly important reported aspect of facilitating discourse is *prompting discussions and drawing in participants* (34%). Most instructors believe it is crucial to prioritise engaging with conversations, particularly when an individual comment or a discussion has not received any input or intervention from the instructors, or in areas where participation is minimal, slow or limited. In such situations, the instructors use a variety of strategies to prompt discussions. A small number identified the reasons for learners' hesitation to participate in the discussion, and as a co-learner provided a model to encourage them. For example, they responded to the discussion lead-in based on their own experience or completed the task themselves.

> *"At the stage at which students were encouraged to upload footage of their own completion of the physical exercises, there was initially no activity. So I started to participate myself and uploaded my own footage. This seemed to set the ball rolling. So I became a supportive 'co-learner'"* (M2)

A few instructors chose to probe learners by posing a question to engage them with the conversation again. This is also applicable to learners who are quieter: "*if there was somebody kind of present that maybe was a bit quieter but might have said one thing, then trying to get them involved as well as other students*" (M4). Two mentors also suggested using questions that address the community rather than targeting an

individual learner (e.g. *what does everybody else think?)*. Nevertheless, there are also instructors such as Ed2 and Ed5 who did not specify a strategy to prompt discussion:

> *"…. I started reading stuff and if I thought I could help the discussion and encourage other people to maybe comment, then that's what I would do."*
> (Ed2)

A minority of the instructors emphasise the responsibility to generate interest as well as to develop conversations. Mentors consider themselves most accountable for this aspect. One mentor described her role as engaging learners in discussions and having conversations with them. Another aimed to encourage learners to engage in discussions where they reflect and develop insight for themselves. She tried to facilitate this process by modelling it for them or prompting it by her own reflections.

Furthermore, the instructors explained how the dynamics of their collaboration as a team prompts discussions. They believe that because they have limited time, it is more efficient if they use their collective time more wisely, to support learners and to keep the discourse and conversations continuing. Therefore, they suggest that they would not normally participate in conversations that other instructors have already engaged with unless it is required. One of these occasions is when another instructor invites them to the conversation or when an exchange is brought to their attention. As one of the educators stated, this invitation is sometimes behind the scenes through e-mails and messages, and sometimes in public.

> *"I think because of the pragmatism, if they already had a comment by a tutor, then I wouldn't engage unless A [the lead educator] or J [an educator] invited me. You know if they said, "what do you think"? Then I would try and respond."* (ED4)

> *"….occasionally she [a mentor] would write to me, message me in some way and tell me that you might want to pick up on this, so I did."* (LEd1)

Inviting or drawing in other instructors is a variation of facilitating discourse, which is evident in MOOCs. In traditional online courses, *drawing in participants* only includes encouraging other learners to join the conversation. However, interview data suggest that in MOOCs, this call for participation is extended to the teaching team, and other instructors are asked to partake. This is one of the original findings of this study, which must be considered in re-conceptualising the CoI framework for MOOCs.

c) Seeking understanding

Another aspect of facilitating discourse mentioned by a few instructors is helping learners *seek understanding* by guiding them towards understanding the content and clarifying their thinking (18%). A small number of educators pointed out that they attempt to direct learners to think in the right way, in addition to resolving the understanding of some basic concepts. They hoped their contributions could facilitate the learning of participants who join the MOOC for that purpose (not for sharing or finding like-minded people).

> *"So just trying to get people to unpick things, and I think what I was hoping to do with the comments was not to say that's "invention" and that's "innovation"; it's to try and get people involved in discussion and to think about how does an invention, or invent differ from innovator, or innovation, and then use the content of the course to try and bring that out."* (Ed1)

As a strategy to help learners clarify their understanding, one educator and a mentor explained that they would direct learners' thinking to the course content. The educator called this strategy "casting back" and he used it for several purposes such as reinforcing the use of correct language and terminology or for redirecting the discussions. However, he stated that in most cases he is not able to adopt a challenging style (e.g. put learners in a slightly uncomfortable position to make them reflect) for casting back because in online discussions there is no access to other communication modes such as smiling to reassure learners while challenging them.

d) Setting climate for learning

A small number of instructors reported instances related to *setting climate for learning* to foster exploration of the subject matter and new information (8% of total facilitating discourse instances). Two educators described *setting the climate for learning* as a way to encourage learners to explore the course topic. When outlining their priorities for learning, they stated that they would focus on encouraging a sense of "creative curiosity", where learners are encouraged to explore course concepts and new ideas. One of the educators, for example, explained that their MOOC focused on the First World War, which is a global topic, yet she attempted "*to bring newish or less dominant discourse*" to the course and sought every opportunity to encourage learners to explore this different discourse. She said:

> *"One aim was to emphasise the comparative nature of the MOOC, because in the First World War context there's a very strong Anglophone tradition, and I think the MOOC was constructed to break this up a little bit and I wanted to reinforce this."* (Ed3)

Overall, outcomes related to facilitating the learning discourse are the instructors' main priority, since they are reported more frequently and are discussed in more depth compared to the leadership aspect of teaching presence – direct instruction - or the course design and organisation. This implies that being a facilitator and co-creator of the learning journey has priority for them, over providing direct instruction.

5.2.1.2 Direct instruction

25% of instructors' teaching contributions are focused on providing direct instruction to learners, as Table 35 illustrates. From data in the table, it is apparent that the instructors do not rely extensively on their academic leadership to support learners. As can be seen, only 15 out of 60 of the reported instances of teaching presence belong to this category, in comparison to 38 instances of facilitating discourse (Table 34).

Table 35: Coding results for direct instruction priorities

(No. of instructors =12)

Indicator	Instances (N)	%	Example
Direct Instruction	**15**	**25**	*"If I could provide some references, that's one of the things that I do, so I suggested a lot of reading, why don't you go and have a look at this, you can find some information here about that."* (LEd3)
Supplying additional & clarifying information	7	47	
Focusing & refocusing discussions	4	27	
Evaluating & conforming understanding	2	13	
Reference to outside material	2	13	

a) Supplying clarifying or additional information

Within this group of priorities, the instructors primarily intend to *supply additional and clarifying information* by their engagement with learners' contributions. The reason for this tendency is to avoid misunderstandings or to correct learners. However, as many instructors reported, the challenging task is to find such cases among the large number of contributions in the discussion areas.

> *"I was after a number of outcomes. Sometimes it was simply to clarify a debatable issue, and you know, there were a couple of opinions in the comment threads and I wanted to be clear on that."* (LEd1)

In addition, some instructors stated that if they recognised they could inject new information to a conversation, they would contribute to it. It is noticed that in addition to *supplying clarifying information*, this indicator of teaching presence in the MOOC context also covers *providing additional information*, which is not necessarily for clarification. As

explained and discussed in the previous chapter (See **4.3.4.2**), this indicator also emerged from content analysis of the learner-instructor conversations and makes 24% of their total direct instruction contributions. Therefore, it is another new and emerged indicator that must be added to the CoI framework when it is applied to MOOCs and similar contexts.

> *"For the other ones (exchanges), I think it was when I felt I had something to say."* (LEd3)

A concept closely connected to *supplying clarifying information* is that of correcting factually wrong information. As LE3 stated: *"I sometimes felt I needed to intervene if somebody was giving incorrect information, so sometimes I would step in and say that's not true."*

b) Focusing and refocusing discussions

Focusing and refocusing discussions is another indicator of direct instruction that a small number of instructors utilise to foster learning. Three reasons were provided for the need to direct and redirect learners' discussions at times. Firstly, instructors refocus discussions to develop them more productively, as they believe the existing direction will not lead to a productive discussion and therefore, learning. Additionally, there are times when the conversation becomes argumentative, or learners make the wrong assumptions about the course or the content and the instructors have to intervene to refocus the discussion. Finally, it is a mechanism for some instructors to moderate conversations when some passionate learners expand the scope of discussion by talking about different aspects of a topic. This is an aspect that Ed1 believes mentors sometimes do not act upon as required, because they are not confident in the content and the deeper understanding of it, whereas lead educators and educators would refocus discussions more often due to their knowledge of the course.

Making reference to the outside materials is another aspect of direct instruction that a minority of the instructors mentioned in interviews. One of the educators explained that when it is appropriate, she directs learners to sound online resources, as opposed to "*just looking everywhere*". Thus, she can ensure that learners access reliable and well-curated resources. In addition to referring learners to outside materials, a few instructors highlighted *referring learners to other members of the teaching team* or *other educators' work*. The CoI framework does not account for this variation of directing learners, however as discussed earlier, it can be an addition to direct instruction in MOOCs and any other online courses where a group of instructors are involved in teaching and delivering the content.

"There were comments where I thought my colleagues might have something interesting to say, then I might write a short comment saying, I wonder what "J" thinks about this, or "A" has written on this, you know, what you do you think? To highlight to them that there was a comment that I thought was in their area, and my colleagues did the same for me." (ED4)

5.2.1.3 Design and organisation

Priorities related to the design and organisation of a MOOC are reported least by the instructors. As shown in Table 36, only 14% of reported instances by nine instructors fall into this category. Surprisingly, much of instructors' attention is directed to *establishing netiquette* because of reasons mainly related to learners' engagement and motivation. Ed4 mentioned that one of her aims at the beginning of the course is to "*set the tone for interactions between other members*", as she intends to ensure nothing discourages learners from commenting or contributing. Similarly, a lead educator emphasised that he is observant of certain tones and registers (e.g. aggression) in conversations, since they could be disruptive and restrain other learners from posting a comment. Moreover, a few mentors highlighted that one of their priorities is to seek any comment that appears offensive. In such situations, they either respond to it quickly or bring it to the attention of the lead educator and course hosts. They added that by their responses they try to set the course expectations and to clear any misunderstandings.

Table 36: Coding results for design and organisation priorities
(No. of instructors =10)

Indicator	Instances (N)	%	Example
Design and Organisation	9	14	*I think, some not entirely hidden, but sub-level aims [was] to get people to exploit digital technology.* (Ed3)
Establishing netiquette	6	67	
Setting curriculum	2	22	
Utilising medium or technology	1	11	

Several instructors also referred to an aspect of the design and organisation, which occurs before the course, yet plays a crucial role in learners' engagement with discussions and direction of learning. The common consideration among instructors is the importance of tasks or lead-ins to discussions, since some of the tasks do not foster learning in their opinions. They argued that some of the lead-ins are not focused and ask general conversational questions, which would produce broad and vague responses, or conversely, are too focused and narrowed to encourage a response. One of the mentors also maintained that although straightforward and general questions are useful, they do not essentially cultivate reflective thinking. She believes more reflective and thought-provoking prompts for discussions benefit learners more.

"Sometimes the MOOC activities that led into the discussions didn't work very well, because we'd ask the wrong questions, so we asked questions that were too philosophical, or too broad, or too easy - it's difficult to pitch it." (LEd3)

Another reported aspect by instructors is related to *setting curriculum* and addresses the needs of different audiences in a MOOC and setting multi-level learning objectives for them. Since MOOCs are attended by diverse learners, different objectives need to be set to fulfil a diverse range of learning needs. One of the lead educators reported that he considers different learning outcomes for different groups of learners. For the youngest learners, for example, he aims to create some first interest and enthusiasm in the course subject matter:

"And with the real youngsters, I was just hoping to achieve some kind of first enthusiasm for theatre, and a kind of sense of awe and wonder about the ways in which theatre is taught, and how quirky its training might be" (LEd1)

He described the learning of this group of learners by making an analogy with climbing and getting on the bricks of learning one by one. He pointed out that the instructors could give learners the first brick of a field, create the initial interest, and help them build on it and develop their knowledge systematically.

At the same time, this lead educator considers a different set of aims for the practitioners who took his MOOC. He planned to further their enthusiasm and help their practice.

"…and if there were those practitioners just seeding, wanting their enthusiasm to be seeded further, I was trying to get that out in the comments." (LEd1)

Another educator highlighted a third group of learners who participate in the course but do not engage in discussions (lurkers). He emphasised that when he is in discussions, he considers learners who only read his comments and built their learning on them. He wants to ensure these learners also receive some value from his contributions, in addition to the course. Another educator added that for these learners, he would act as a *tour guide:*

"I'm not doing it to further my interest or their learning particularly, that's not what I'm thinking about, although that's valuable. I'm thinking about the wider issues of somebody else is going to read this and maybe want to stay with the MOOC a little bit longer. So, I'm a bit of a tour guide, rather than giving lots of information." (Ed2)

There was only one educator who discussed *utilising medium or technology* within design and organisation. She pointed out that as one of her sub-aims she plans to get

learners to exploit digital technology for their learning, which matches the definition of "utilising technology".

5.2.2 Supporting learner conversations through social presence

As presented in the previous section, the instructors prioritise supporting learners through their teaching presence in discussions and particularly by facilitating a critical discourse to help them clarify and deepen their understanding. The interviews also reveal that their second priority is concerned with establishing social presence (24%) with a strong focus on cohesive communications (70%) to increase learners' engagement with the course, content and peers. As can be seen in Table 37, although they also discussed open (17%) and affective (13%) communications, they put much less emphasis on them.

Table 37: Coding results for social priorities
(No. of instructors =11*)

Indicator	Instances (N)	%	Example
Cohesive Communications (Group cohesion)	16	70%	*"I usually go into the "hello" ones first, just so that I could make sure that people who had gone on and said, you know, "hello, my name is Phil, I'm from New Zealand", I could say Hi Phil, at least that got started. I occasionally did comment on the fact that I've not spoke with someone from that particular country or it was nice to have them on board." (Ed2)*
Interactive (open) communications	4	17%	*"The idea was to have a sense of a big community of classroom learners who were eager to learn, were grateful for their willingness to speak, and never to do anything that would either make them feel like the comment was stupid, or invalid, or put off someone else from making a contribution." (Ed4)*
Affective (personal) communications	3	13%	*I was a bit more biased to respond to people that said they didn't have performer training, but were interested in the material, or people that were in an older age bracket. (M1)*

*LEd1 did not report any aspects of social presence.

Nearly all instructors emphasise the cohesive aspect of social presence, particularly with reference to *phatic communications and greetings* to welcome learners. Most courses seek to welcome as many learners as possible for a number of reasons: several instructors intend to emphasise the human element of the course: "*Just to say hi, we're here; we're real people* (LEd3)*"*. A few instructors use the welcoming opportunity as a mechanism to engage learners with the MOOC, as they believe such communications could create a connection with learners and keep them on the course. One of the lead educators explained:

"So some of the comments were purely, "hi, great to see you on board," this sort of thing, just to try and make that connection, just to show there's someone at the other end, so it was a little bit of trying to make contact with as many as possible". (LEd2)

They also aim to create a feeling of mutual support and community, and as one of the educators put it, the aim is "*to make people feel good about being a part of community and contributing*" (Ed4). To achieve this goal, a mentor pointed out that:

"I tried to create a sense of community within the participants, so I would direct someone to someone else's response to get…" (M1)

Another educator reported that they welcome learners at the beginning of the course to remind them that they are on an interactive platform and they have the opportunity to interact with people who designed and are delivering the course. For this educator, it is important to promote interactions and to ensure that the large number of contributions does not affect learners' participation in the course. To create such an interactive platform, one lead educator and a mentor believe that learners must be supported in their conversations by having active discussions, which fulfils the requirements for interactive and open communications of social presence. They also added that they would try to create a sense of community through offering encouragement, which best matches open communications within social presence.

Among the priorities related to creating group cohesion, one of the educators particularly focused on *encouraging a sense of inclusivity* which can be considered as a new aspect of group cohesion when the CoI is considered for MOOCs or any other online course with a diverse learner community. This educator noticed the need for creating a sense of inclusivity because of learners' diversity in terms of their background, knowledge of topics, language proficiency and geographical and generational spread. For her, the priority is to create a sense that all learners are welcome to contribute to the discussions. Three educators and mentors described this priority in terms of their bias towards responding to learners from different age brackets, backgrounds and geographical locations, which implies their intention to aim for inclusivity, directly tied to group cohesion.

A few instructors also stressed the importance of supporting learners when they explicitly express a lack of knowledge or confidence. This is relevant to *self-disclosure* within affective communications, where learners express vulnerability or disclose details about their lives outside the course. The interviews suggest the instructors are more attentive to the former:

"Maybe there were a couple cases of learners saying things like "I'm not very confident", or "I don't know whether I'm up to this", and we were trying to be a bit encouraging, and said we're delighted to have you; please continue; hope you get something out of it. So that kind of thing, so being encouraging for people who seem a bit, needed supporting." (LEd3)

One educator emphasised that information about a learner's identity is one of the factors that prompts her to engage with the conversation. She explained that she is more inclined to respond to learners who indicate that they have no background in the topic, or learners "*that were in the older age bracket*". Overall, her interview revealed that learner identity and diversity are her priorities in responding to a posting. Another educator from a different MOOC also highlighted learner diversity, in addition to the lack of expertise in the topic and the generational differences, the geographical location of the learner is important to this educator:

"I was looking for people who were less expert, and then from geographical regions not so much part of the Anglophone First World War memory culture, and I also looked for generational spread if it was obvious. There were a number of Second World War veterans and I found their contributions very interesting." (Ed3)

In summary, the instructors seek and maintain social communications mainly for the purpose of engaging learners with the course and motivating them to share their opinions and understanding, in order to enrich their own, and others' learning.

5.2.3 Supporting learner conversations through cognitive presence

The instructors' final group of priorities for learning is associated with developing cognitive presence. While it is mentioned by eight instructors, it is not discussed in as much depth as other presences. As Table 38 shows, only 14% of what they reported is linked to cognitive presence. Unlike other priorities, these priorities are presented in order of the stages of cognitive development rather than based on the frequency of mention by the instructors, so as to follow the logical order of cognitive development. As can be seen from the table, the majority of discussed instances (79%) are related to the exploration, with triggering events (14%) and integration (7%) following it respectively.

Instances reported by the instructors seem to address different stages of cognitive presence, sometimes based on the role they play in the course. Mentors for example, only reported priorities related to the triggering events or the first stage of cognitive presence, where learners either recognise a problem as the first step of making an inquiry or show a sense of puzzlement. The following extracts exemplify this:

"My responses were primarily driven by the comments the participants made, if they asked any particular question or expressed a sense of struggle - that sort of thing." (M1)

"I got quite good at skimming over healthy activity and leaving it alone. I looked out for tentative comments, uncertain or questioning ones." (M2)

The focus that mentors give to triggering events and not to higher levels of cognitive presence can be due to their level of knowledge, expertise and confidence in dealing with the discussion content. It must be noted that most mentors are graduate students with little teaching experience or comprehensive knowledge of the topic, which might affect their confidence in responding to comments. For example, one of the mentors stated that:

"I suppose one thing was a matter of expertise. For example, there were some questions around the historical events in Russia that I felt I have no idea about any of this, there's no point in me trying to pretend I know any of that. So, I would not respond to comments I felt ask me something I don't know". (M1)

Table 38: Coding results for cognitive priorities
(No. of instructors =6)

Indicator	Instances (N)	%	Example
Triggering Events	2	14%	*"My responses were primarily driven by the comments the participants made, if they asked any particular question or expressed a sense of struggle that sort of thing." (M1)*
Exploration	11	79%	*"If it was a business concept in a new context such as Gambia, I would like to know more and be engaged more." (Ed2)*
Integration	1	7%	*"One of the things that we really wanted to do was to try and have discussions… So, I think it was partly to try and get people to think in the right way, so I think people were thinking that they'd come in and get new facts about the war. We did give them new facts about the war, but we were trying to get people to become cultural analysts, which is different"* (LEd3)

On the other hand, educators and lead educators tend to reply to a comment if it indicates learners' exploration of a topic by brainstorming and exchanging information, putting different ideas across, agreeing or disagreeing with others or making suggestions for consideration. In other words, they are more attentive to learners' comments that show some characteristics of exploration of cognitive presence. In such situations, if the comment is based on the MOOC content, it is more likely that educators and lead educators engage with it.

In addition, the educators and lead educators consider whether a comment is genuinely innovative and interesting, which can be associated with most stages of cognitive

presence. One of the educators explained that stating facts or basic information that most learners agree with is "low level" and may not contribute to the learning of others. This educator believes that in a MOOC, the diversity of learners and their locations should be used to benefit other learners, since each learner brings a different perspective to the course. Discussing innovative and interesting learners' contributions, another educator highlighted the importance of the contribution of learners who put forward a new angle or content element that he can highlight for other learners by having a comment attached to it. This is also suggested by an educator from another course who said:

> *"I looked for comparative and unusual angles to emphasise that this is all part of cultural memory and war memory cultures, so this isn't just fact finding in the past, there is the legacies idea, and then because we are cultural historians, we did pay attention to cultural production as part of this first World War discourse."* (Ed3)

Overall, if learners are exploring a perspective or a topic, most instructors tend to provide them with more detail, and support them as a co-learner to develop and evolve their ideas. A lead educator stressed that the thinking behind the MOOC is to promote and stimulate reflection through discussions. She emphasised that imparting knowledge is not the main goal; the main aim is to reflect and share different perspectives and to help learners become analysts. This lead educator not only considers the two main stages of cognitive presence, i.e. exploration and integration, but also aims to move learners through these stages and get them to resolution in the hope of making them *analysts*:

> *"One of the things that we really wanted to do was to try and have discussions… So I think it was partly to try and get people to think in the right way, so I think people were thinking that they'd come in and get new facts about the war. We did give them new facts about the war, but we were trying to get people to become cultural analysts, which is different"* (LEd3)

Focusing on moving learners through stages of cognitive presence, another lead educator pointed out that one of the fundamental challenges to the MOOC is time; learners should be given the time to deal with theoretical ideas, to explore concepts and to document their exploration and then share it.

5.2.4 Other emergent discussion priorities to support learners

Along with the instructors' CoI-related contributions to learning, a number of pedagogical contributions emerged from interviews that cannot be placed within the CoI social, teaching or cognitive presences, yet are closely connected to an aspect of participants' learning. The three most reported of these areas, which are covered in this section, are assessment and feedback, humanising the learning journey and new teaching methodologies. The points reported by the instructors in relation to these three areas are sometimes a critical reflection on what MOOC discussion areas enable or disable in terms of facilitating learning, and on other occasions, they reflect the challenging aspects of fostering learning in open and scaled settings.

5.2.4.1 Assessing learners and providing feedback

One of the areas discussed by a small number of instructors is the lack of formal assessment in MOOCs, which adds to the importance of discussion areas and highlights their crucial role. These instructors stated that because there is no formal assessment in MOOCs, discussion areas are the main places where learners can check their understanding and receive feedback from the teaching team. They pointed out that although self and peer-assessments are designed into the learning journey, they do not provide learners with the feedback that an expert can provide. In other words, they consider discussions as a means of feedback provision to learners.

5.2.4.2 Humanising the course

Some of the learning-related outcomes discussed by a few instructors are discipline specific, yet of particular importance since they are applicable to similar courses. Two of the mentors who contributed to a MOOC in Acting explained that the nature of their course subject matter is experiential and there are a number of interaction modes, such as touch, that cannot be carried forward in a MOOC. The mentors stressed that they are not, for example, able to correct learners' positions or engage with them in the exercises. As a result, they attempt to "*bring a little bit of that warmth through the language and through the comments*" in discussions. Discussion areas in their MOOC or any other MOOC that deals with the development of practical skills or creativity, are of double importance since in these courses, applying the standard pedagogy - i.e. working in small groups over a long period - is not possible and there is a clear lack of direct exchange. Consequently, discussion areas can help the instructors to create that sense of personal presence, which is central to learning in such disciplines.

A few instructors also emphasised humanising the course or adding the human touch to the learning experience through contributing to discussions. They aim at providing a more personalised learning environment. One educator explained:

> *"I think the way I understood is that the basic aim was to convey that there is actually a physical person behind this, that there is a human being that reads and responds to you... So, as a way to kind of humanise, if you want, what otherwise might seem a kind of automatic, and depersonalised learning environment."* (Ed3)

In the opinion of these instructors, their persona can be brought into evidence through interactions with learners and showing them that the course is not automated. In addition, they believe that through language and the comments, they can bring warmth to the course and reduce the distance to the learners.

5.2.4.3 New teaching methodologies

From a teaching perspective, some instructors also discussed the role of contributing to discussions in terms of exploring new ideas for teaching and interacting with learners in general. One lead educator stated:

> *"We were interested to see what will come out of this to see if we were going to learn anything; whether we were going to develop some ideas for teaching and ideas for interaction with students, not just for MOOC but in other fields."* (LEd2)

A minority of instructors use the discussion areas to test and examine some teaching methodologies in the MOOC open and massive context. One of the lead educators, for example, planned to test the universality and translatability of an embodied methodology and sought to find out whether it could be transmitted for a digital interface.

> *"I wanted, at a kind of higher level, I wanted to test out the universality of biomechanics as a methodology."* (LEd1)

Some instructors also use discussion areas as a mechanism to evaluate their course and course design as well as to receive learners' views. They emphasised that their intention is to examine how learners receive their course and whether they have "*pitched*" it appropriately. A lead educator and an educator also pointed out that through discussions they are given the opportunity to hear "*what people said about their work*". This work can be the learning asset they developed for the course or one of their projects, and in this way, they are able to have learners' feedback on a part of the course.

Before concluding this chapter with a summary of the findings about the roles of instructors' contributions in learning, findings on their criteria for engaging with learner conversations will be reported.

5.3 The instructors' criteria for contributing to discussions

Interviews suggest that the instructors consider two major criteria when contributing to learner conversations in discussion areas. One criterion is the quality of a learner's comment, which plays a key role in it being chosen for a response, and another is the knowledge and expertise of individual instructors in relation to the point raised in a learner's comment.

5.3.1 The attributes of learners' comments

The instructors reported a variety of attributes in the learners' comments that encourage them to participate in learner conversations. A lead educator emphasised that he considers the sincerity of a question and checks whether a question is "*coming from a real place*" and is genuine. Four other educators stated that if a comment addresses a specific question or if it contains a direct question regarding the content, they would reply to it, while a mentor highlighted the urgency of replying to questions. In her opinion, being selective in terms of the urgency of a question is a key factor that influences the way an instructor's presence is received by learners. This mentor specified urgency with reference to offensive comments that can disrupt a conversation and distance it from its main purpose, while a lead educator defined it in terms of concerns that learners expressed (while performing the course physical activities that could cause harm if not done correctly):

> *"Clearly I was very keen to address any concerns, questions when it came to you know "is this safe?"….. If anybody started saying this is really hurting, or this is a problem, then I'd be straight on that and say "you shouldn't do that", "you need to leave that stick alone", "you need to do just a half twist, not a full twist", whatever it might be. So I was partly aware of my duty of care."* (LEd1)

Another key attribute mentioned by some instructors is the level of reflection and critical thinking in a learner's comment. One educator believed when learners are reflective and show a critical thinking process, he must reinforce it. This is echoed by another educator stating that he engages with a contribution that shows the learner "*actually spent some time thinking about something based on the course*". This educator also uses learners' criticality and their engagement with the course material as a filter to follow this group of learners and have conversations with them:

"My inclination is to respond to people that are kind of engaging critically with the material. So right at the early session where you say "oh, welcome to the MOOC and all that", I looked at people who were engaging quite a lot and I tended to maybe follow them, and so then I would get responses saying that they've posted back. So there was a degree of dialogue…." (Ed5)

Moreover, one instructor pointed out that she considers the length of a learner's comment (e.g. a line or a paragraph). She believes that it can indicate the degree of a learner's engagement. For her, the longer a comment, the deeper the learner's engagement and understanding.

In addition to the above attributes, which can indirectly be linked to cognitive presence, a few instructors stated that they would choose a comment if it is a representative one and other learners also enquire about it.

5.3.2 The instructor's expertise and experiences

In addition to the characteristics of a learner's comment, interviews also revealed that the instructors consider their expertise, knowledge and interest when they respond to a learner. Educators and lead educators agreed unanimously that they engage with the sections of the MOOC that they developed, that they are knowledgeable about, or in which they have the ability to answer learners' questions, as well as the areas that interest them:

"If I remember rightly, my main part started in week 2, so I felt that I was much busier in week 2 and very, very keen to get involved with the comments from students about the areas that I had developed." (Ed2)

"I felt if I saw something on my area, or in response to my own lecture or input, then I would make time to respond as far as possible. Whereas if it was areas where I didn't feel it was my main responsibility, then I would either leave it, or I would do as much as I could, but it wouldn't be, I wouldn't spend as long on those." (Ed3)

It seems these educators and lead educators are more willing to choose comments from the sections or weeks they developed or are knowledgeable about, because they can contribute and add more value to them. In addition, as one lead educator pointed out, although he is leading the course, he is not able to answer all questions since he does not know all sections of the MOOC. This is also applicable to mentors, as a group of educators reported that most mentors may not be confident in dealing with different areas of the course because they do not possess in-depth knowledge.

When the instructors were asked about using filtering functionality offered by the platform (e.g. most liked, bookmarked, followings), most of them responded negatively. Many instructors are not aware of such functionalities and a small number who are aware of them, do not find them useful in delivering what they require. Ed1 for example, argued that some platform filters such as "most-liked" do not help instructors with finding unattended learners' comments or dry discussions. He believes:

> *"The most liked indicated that people engaged with it already and it was the point of not getting anything back that we needed to keep talking to, try to keep them engaged."* (Ed1)

A few instructors also reported having no filtering criteria or strategies. For them, the approach is simply logging in, seeing the contributions, and responding to them. The only approach for these instructors is to work through the list of learners' contributions and respond or like them. One of the educators commented:

> *"No filtering strategy. I don't think I spent time looking at all the questions and going, okay, those are those and that. I just didn't have time, because I had my cup of tea, had my TV, and I had my laptop, all go at the same time."* (Ed1)

5.4 Summary

This chapter has portrayed the different roles that the instructor contributions play in learning. The analysis of interviews has clearly shown that the instructors rely heavily on their teaching presence to support learning and learners, particularly through facilitating discourse. They highlight the need to facilitate learner-learner and learner-content interactions, particularly through *acknowledging and encouraging learners' contributions* to help them develop understanding and gain knowledge. Direct instruction from the instructors seems to be limited to *providing additional and clarifying information*. This indicates that they have largely withdrawn from the academic leadership role and have chosen a facilitator role instead. Design and organisation of the course is also not a priority for instructors when the MOOC is running, although they discussed course design and organisation activities (e.g. designing appropriate discussion lead-ins) that they focus on at the design stage of a MOOC.

The findings also show that the instructors focus on some aspects of social presence to create an open and trusting learning environment. They mainly highlight the importance of cohesive communications to create a feeling of community and mutual support. Interactive and affective communications are not as important as cohesive aspects of social presence in their views and are only discussed by a minority of instructors.

Similarly, the points they highlight suggest that establishing and maintaining cognitive presence is given the least consideration probably because of the challenge for learners to understand theoretical ideas, explore them practically and then share their exploration.

In addition, a number of learning priorities emerged that do not map to the CoI presences. They include *assessment and feedback in MOOCs*, *humanising the learning journey*, and *new teaching methodologies*, which sometimes lead to extra considerations for supporting learners and on other occasions pose challenges to the instructors in terms of operationalising their intended support.

The last part of this chapter outlined the criteria instructors use to filter learners' contributions when responding to and supporting their conversations. These can be summarised as the quality and attributes of a learner's comment and the instructors' expertise, interest and ability to respond to learners' comments. The comments that show learners' reflection and thinking, ask a direct question about the content, or show urgency are more likely to be chosen by the instructors. Nevertheless, the instructors always consider their knowledge, experience and expertise in responding to learners.

Chapter 6 **ANALYSIS AND DISCUSSION**

6.1 Introduction

The purpose of this chapter is threefold: it discusses the research findings and their significance in relation to the existing literature to address the research questions; it synthesises the findings of the two phases of this mixed-methods inquiry and helps to reach more comprehensive conclusions; and it considers the results and the implications for both theory and practice.

As presented in **Chapters 4** and **5**, the analysis of data from the two phases of the study produced four core findings and revealed some insights into the application of the CoI framework to MOOCs:

Finding 1: Types of instructors' contributions and their roles in learning

Finding 2: Levels of instructors' contributions

Finding 3: Changes to the types and levels of instructors' contributions over time

Finding 4: Learners' engagement with instructors' contributions

The first part of this chapter is structured into a series of discussion cycles based on these four core findings. **Findings 1, 2 and 3** address research questions 1 and 2, and **Finding 4** answers research question 3. The first part of the chapter concludes with an evaluation of the CoI framework for use in open and massive educational contexts. In the second part, the study contributions, implications of findings for practice, limitations, and directions for future research are discussed.

6.2 The characteristics of instructor conversations with learners

Before discussing the core findings, the dynamics of learner-instructor interactions are discussed to provide an overview of instructors' conversations in MOOC discussion areas.

6.2.1 Most learner-instructor conversations are short

The findings highlight that the majority of instructor conversations with learners are short and mainly include two comments, where an instructor replies to a learner and no further discourse is generated. Based on Tubman, Benachour, and Oztok's (2018) social taxonomy of FutureLearn conversations, these interactions are largely Q&As (as opposed to limited or extended social) and of a watercooler type that only involve two participants. This is also consistent with Chua *et al.*'s (2017) claim that in FutureLearn discussions most initiating posts have only one reply. Lack of conversation continuity after an instructor's contribution can be attributed to several factors. According to Wells (1996), a conversation can expand or end depending on the moves within it. That is, if an instructor's contribution is of an *acknowledge* or *give* type, it is less likely to generate further responses; however, if it is a *demand*, it will require learners to respond and, therefore, it is more likely that the conversation will continue. Another factor can be the content of the instructor contribution and the learners' engagement with it, although no causality can be assumed. Most instructors' contributions in this study were found to be social, and when learners' engagement with them was analysed, it was found that learners engaged less with social contributions and were more responsive to comments focusing on teaching presence or a combination of teaching and social presences. This may be because social contributions do not meet the content-related needs of learners (Hofmann and Mercer, 2016). In addition, as Garrison (2016) emphasises, while social contributions are socio-emotionally focused, they must be directed towards a shared academic goal. Considering the range of learners' goals in MOOCs (Kop, Fournier, and Sui Fai Mak, 2011), the shared academic goal hardly exists. Therefore, it is possible that learners did not find enough motivation for (Kehrwald, 2008) and value in (Rosé *et al.*, 2015) social conversations to return to them. During interviews, many instructors emphasised the social aspect of their communications for humanising the course and engaging learners with the MOOC. However, it seems that they are sacrificing deep and longer conversations for these social aspects. Instructors can use their social contributions more effectively by directing them towards group identity, and academic or professional goals.

Another possible explanation for short learner-instructor conversations might be that learners receive the validation or information they sought from an instructor (Clarke and

Bartholomew, 2014), and consequently do not need to continue the conversation. Another influencing factor is often the course subject (Danish, Cayzer, and Madden, 2017; Li *et al.*, 2018), as some disciplines are fact-based and do not generate lengthy conversations. Nevertheless, the short nature of learner-instructor conversations in the studied MOOCs is surprising, as all courses are from disciplines such as arts and social sciences, which tend to inspire conversations. According to a History MOOC instructor, for most topics in this course (e.g. people's perception of heroism), there is no right or wrong answer and a topic can be discussed from different perspectives. However, the findings show that the tendency is towards forming several short conversations in discussion areas rather than having several learners engaged in a medium or long conversation. As some instructors pointed out in interviews, the short nature of conversations could also be a result of discussion prompts or lead-ins that were too focused to encourage discussions. It is likely that questions were of a convergent-thinking type and limited learner involvement once the right answer was shared (Andrews, 1980) or they were not problem-centric (Hew, 2018). This study did not examine the temporal aspects of instructor contributions; however, the time gap between a learner's initiating post and an instructor's reply could be another possible reason for short learner-instructor conversations, if this gap is too long. Garrison (2016:112) states, "the relevance and timing of the contribution is of prime importance".

The high number of two-comment conversations also implies less potential for collaborative activities (Tubman, Benachour, and Oztok, 2018) when instructors are involved in conversations, because their contributions do not encourage any turn-taking or lengthy exchanges and tend to end the conversation. Thus, considering the possible effects of an instructor's contribution on an initiating post, instructors may wish to consider allowing a few exchanges before they engage with a conversation, reconsider discussion tasks and questions, and rethink the content of their social contributions.

6.2.2 Instructors rarely initiate a conversation

The analysis also reveals that instructors are not often the initiator of conversations with learners and on the few occasions where they posted an initiating comment, it was rarely continued by learners. This finding is in line with Mazzolini and Maddison's (2007) statistical analysis, which revealed a significant negative correlation in traditional online courses between instructors' initiations and both the conversation length and learners' posting rate. The lack of learner response to instructor initiations might be partly due to the purpose of an instructor's initiation, i.e. imparting information (e.g. introducing a resource) rather than having conversations with learners. Moreover, instructors may not feel the need to initiate a conversation, since most discussion lead-ins and questions

provide a starting point for conversations. It was also expected that an instructor initiation, in the same way as many learners' initiating posts is lost in the overwhelming number of contributions and becomes a lone post. However, surprisingly, most instructors' initiations were noticed as learners "liked" 77% of them. A possible explanation can be that some learners followed instructors, and they filtered comments based on who they followed and thereby found instructors' contributions. Therefore, this can confirm that FutureLearn discussion features such as *sorting* or *following* provide learners with effective ways of navigating contributions. In addition, it suggests the idea that learner engagement in MOOC discussions follows engagement behaviours in social media (e.g. Twitter) where participants follow one another, and mainly engage with the people whom they follow.

At the time the studied MOOCs were designed, FutureLearn had not introduced *pinning* as a feature of discussion areas. Considering the current platform enhancements, instructors are now able to pin their initiating posts if they wish to bring them to learners' attention or to generate discussions.

6.2.3 Instructors have two criteria to engage with conversations

The analysis also suggests that instructors consider two criteria for participating in a conversation: the quality of a learner comment, and their own knowledge and expertise. If a learner's comment contains a direct question about the content, is asked by many learners, shows high levels of reflection and critical thinking, or is offensive and discourages others from participation, instructors are more likely to engage with it. These criteria are in agreement with Arguello and Shaffer's (2015) findings; however, they do not support Chaturvedi, Goldwasser, and Daume III's (2014) analysis, which indicates that instructors often engage in conversations where learners discuss logistical issues or content issues close to the course quizzes or exams. This difference is perhaps because of FutureLearn's in-context design of discussions and the fact that in the studied MOOCs, hosts were mostly responsible for responding to learners' logistical concerns. In contrast to these findings, Chandrasekaran *et al.* (2015a) were not able to specify any criteria and found instructors' criteria quite subjective and unpredictable, as in some MOOCs they only responded to urgent comments while in others they engaged with all types of contributions to provide more guidance. Thus, this study's findings add to the previous literature that shows the existence of some criteria for instructor engagement with learner contributions, although this literature does not fully agree on the criteria.

An instructor's expertise and ability to answer learners' questions is another criterion for instructors' engagement with learner contributions. Since instructors worked in

partnership to develop MOOCs (McAuley *et al.*, 2010; Loeckx, 2016), they were more willing to participate in conversations regarding the sections or weeks they developed or were knowledgeable about. This shows how most teaching duties, such as interactions with learners, have become distributed and disaggregated in MOOCs (Amemado and Manca, 2017) and how they occur in teams and partnerships.

6.3 How are instructors' contributions to the discussions of MOOCs characterised based on the CoI framework? What roles do the instructors' contributions play in learning?

6.3.1 The type of instructors' contributions

Instructors' participation in discussion areas highlights that the clear majority of their contributions are social, followed by teaching and cognitive contributions. These findings reflect those of Watson *et al.* (2016, 2017) in a MOOC context and support the results of Gorsky and Blau (2009), Clarke and Bartholomew (2014), and Richardson *et al.* (2015) in closed online courses. The similarity between this study's findings and those of traditional online courses reinforces the notion that MOOC scale and openness has not affected the type of instructors' participation considerably. The fact that instructors spend most of their time in discussions to establish and maintain social presence is important, as it suggests that (FutureLearn) MOOC discussions are focused socially. It is reasonable to suspect that this is a likely result of three factors. First, FutureLearn design emphasises social learning. Second, most learners' contributions were also social and therefore they most likely required a social response. This is also in line with Ladyshewsky's (2013) findings that instructors' and learners' social presences affect each other. Third, learners' selective engagement with MOOCs (Kaul, Aksela, and Wu, 2018) and the possibility of entering and exiting discussions and the courses at any time (Zhang, Skryabin, and Song, 2016) meant that new learners could join the discussions anytime, and as a result, instructors felt more of a need to spend time establishing connections with new joiners. This could also be a reason for instructors' focus on cohesive communications within social presence, which will be discussed later. At the same time, the high volume of instructors' social contributions suggests that they spend much less time on pedagogical responses, i.e. teaching presence. This finding is contrary to Lowenthal's (2016) investigation of instructors' social presence in accelerated online courses and could be explained in terms of MOOC discussion settings and differing course design.

The lower proportion of teaching contributions is also indicative of a shift in instructors' attentions and possibly their roles (Richardson *et al.*, 2015) from academic and leadership responsibilities to social facilitation in MOOCs. Since learners' teaching

presence was very low (3%), it could not be assumed that teaching responsibilities were shared with learners as in traditional online courses (Anderson *et al.,* 2001). It seems teaching presence is marginalised, and this has possibly contributed to the low level of learners' cognitive presence in this study. According to Garrison (2017), when teaching presence is not adequately present in discussions, the facilitation of critical thinking and higher-order learning is reduced. It is important to note that teaching presence is key to perceived learning (Richardson and Swan, 2003; Akyol and Garrison, 2008; Akyol, Garrison, and Ozden, 2009) and achieving learning outcomes (Szeto, 2015) and a lower level of this compared to social presence in MOOCs could mean that learners do not receive sufficient academic support (Anderson *et al.*, 2001). Therefore, this aspect of instructors' contributions requires stronger emphasis.

Consistent with Clarke and Bartholomew's (2014) results, instructors' cognitive contributions are the least common type of instructor postings. This is not surprising as cognitive presence represents students' learning. Clarke and Bartholomew (2014) hypothesise that the low level of instructors' cognitive presence is due to several factors. One factor is the instructors' belief in supporting rather than challenging thinking, which is demonstrated in this study by instructors' focus on social presence to create an open and secure learning environment. It is also possible that instructors do not use explicit cognitive codes and their cognitive contributions are covered by their teaching contributions. Moreover, the discussion techniques may have led to low cognitive presence. Common discussion methods such as asking isolated questions do not support and scaffold cognitive presence adequately and techniques such as debates are required, since they provide opportunities for both exchanging information and synthesising it.

It is important to note that interviews with instructors revealed results that contradicted what the transcript analysis of their conversations showed in terms of instructors' contributions to discussions. In interviews, their priorities for contributing mainly focused on teaching contributions followed by social and cognitive ones. This difference has more than one explanation. One reason relates to instructors' perceptions of their contributions. For example, the content analysis showed that 85% of instructors' social contributions were greetings, phatic communications, and vocatives. These social aspects might not have appeared important to instructors to discuss in interviews, or else instructors use them so frequently and routinely that they have become unconscious commenting behaviours, unlikely to be noticed and reported. Neuman (2014) describes this phenomenon as unconscious non-reporting, i.e. this group of activities appear to be too insignificant in instructors' minds to be reported. The difference can also be explained by the fact that instructors' judgement of their teaching activities is not always accurate

(Wise and Cui, 2018). This is the main reason it was decided to examine instructor contributions with close attention to what happens in the discussion areas rather than relying on self-report interviews. Another explanation can be that the complexities of MOOC discussions limited instructors' ability to attend to their belief and this is the reason for the discrepancy between what they reported and what they practised in discussions. Overall, these findings highlight the weakness of self-report methods and the need for these to be supplemented with other methods to ensure reliable results.

6.3.1.1 Social contributions
Cohesive communications

The results demonstrate that most instructors' social contributions focus on group cohesion with little emphasis on open communications and affective elements of conversations, which is similar to Watson *et al.*'s (2016) findings. At first glance, this suggests that instructors prioritise establishing group identity and a sense of community over creating a safe and open learning environment or affective communications. However, the high volume of instructors' group cohesion is predominantly related to greetings and vocatives, and not group reference, something else that is consistent with Watson *et al.*'s (2017) findings. This shows that instructors use simple cohesive behaviours such as using learners' names or greetings, and yet restrict cohesive communications to individuals and do not expand them to the group. Richardson *et al.* (2015) attribute the high frequency of simple cohesive devices to the simple and low-effort use of them. It is also possible that the large number of learners, their varying goals and motivations (Littlejohn, 2013), their unstructured and optional participation in discussions (Zhang, Skryabin, and Song, 2016) and short course duration (Poquet *et al.*, 2018) inhibit instructors from creating group cohesion, and as a result, they use group references less. It must also be remembered that free entrance into and exit from discussion areas means instructors do not interact with the same group of learners all the time, and they need to establish connections with individual learners quite frequently, which may distract them from moving cohesive communications to the group level. Another explanation might be that the informal settings of MOOCs replace group references with immediacy indicators such as vocatives (Swan, 2003), as learners and instructors are comfortable using simple cohesive devices. It is important to note that the analysis of learners' comments shows a similar pattern of social comments, which suggests the idea that group reference in studied MOOCs is low in general. This finding is in line with MOOC learners' perceptions of group cohesion in Saadatmand *et al.*'s (2017) research, where group reference received the lowest score within the social presence indicators. The weak evidence of group reference in MOOCs brings to the fore

the need for new techniques for group formation compatible with MOOC settings. Considering that contributing to discussions happens in bursts and mainly at the beginning of a MOOC (Gillani, Yasseri*, et al.*, 2014), instructors may wish to develop strategies in accordance with this participation pattern to increase the likelihood of group cohesion (e.g. use strategies such as including collaborative discussion activities) to develop group cohesion from the beginning of the course when more learners are participating rather than allowing it to develop organically over time).

Considering group and community formation, Garrison (2016:48) discusses a lack of "meaningful coherent learning community" in MOOCs due to learners' self-regulation. However, as this study shows, it can also be attributed to instructors' inability to create a sense of community, most likely because of a lack of experience in creating a community in the new global rather than local environment of MOOCs (Moore, 2016) or the inadequacy of their existing strategies (Nacu *et al.*, 2014). Another possible explanation might be the cross-cultural communications in MOOC discussions, where learners' diverse nationalities and cultures led to the emergence of the new social indicator (i.e. *support for communications*) that deals with communication misunderstandings. Little awareness of different communication patterns, cultures and values can lead to misunderstanding and inhibit exploration of the diverse perspectives that can create a sense of community (Rovai, 2007). Similarly, Wanstreet and Stein (2011) draw attention to the large numbers of non-English learners in MOOCs who must overcome language and cultural barriers and require more time to integrate in discussions. Thus, the terms learning crowds or "network of learners" (Anderson, 2017) may better reflect the group dynamics in MOOCs. As Dron and Anderson (2009) state, networks are characterised by unrestricted entrance and exit, possibility of not knowing all members, and existence of both strong and weak ties among members. Veletsianos (2016) also distinguishes between networks and communities by emphasising commitments, coherence and continuity of communities. Therefore, based on these features, what is often formed in MOOC discussions is better described as a "network". Likewise, Bozkurt and Keefer (2018) describe MOOCs as learning environments where multiple networks of participants learn in a nomadic fashion: learners pause based on their needs, benefit from ongoing discussions and shared experiences and move to the next thing or end their journey. This may be the reason that some FutureLearn MOOCs adopt a discussion-bus approach[28] (Ferguson and Sharples, 2014) and use study groups (Manathunga, Hernàndez-Leo, and Sharples, 2017) to enable formation of small groups

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[28] Some FutureLearn MOOCs consider small group discussion areas where a limited number of learners (n=20) who are available online can join a structured discussion. Online learners join the discussion until the bus is full. They are expected to respond to a claim or a question and read other learners' contributions.

wherein learners can create stronger social connections with the group and build a micro community.

A closely related aspect of group cohesion that is context specific and that CoI does not account for, is "creating a sense of inclusivity". During interviews, some instructors emphasised that learners' generational spread, their different backgrounds and levels of knowledge of topics, different languages and academic skills can be barriers to their participation in discussions and community building. This diversity can be one of the extrinsic factors that Bozkurt and Keefer (2018) identify as influential in the community formation process. If learners do not feel included and do not identify themselves with the group, the social presence does not enhance their learning (Rogers and Lea, 2005).

Open communications

Open communications that support communicative interactions and encourage trust by recognising and responding to contributions of others (Garrison, 2017) are noticeably low in instructors' contributions. This suggests instructors do not try to connect to learners. It is perhaps because this category of social presence includes indicators (e.g. *asking non-task questions),* which are mainly addressed by the hosts, who are not studied here. Moreover, such focus may not have been the instructors' priority considering their limited time. Likewise, the analysis of learners' comments shows that open communications are their least frequent social contributions. Nevertheless, Watson *et al.* (2017) found nearly an equal proportion of cohesive and open communication codes in MOOC instructor contributions, which is significantly different from this study's findings or their own earlier case study (Watson *et al.*, 2016). They attribute this difference partly to the topic and purpose of the MOOC (attitudinal change) and the emphasis of instructors on both establishing a learning community and engaging learners emotionally.

Personal and affective communications

Instructors' use of personal and affective communications within social presence is also extremely low (2.5%), in contrast to Watson *et al.*'s (2017) study or Richardson *et al.*'s (2015) study of closed online courses. This suggests a lack of engagement with the interpersonal aspect of conversations and implies that instructors do not project their personal presence into discussions through using affective verbal behaviours (Swan, 2003). The learners' unsystematic participation and their large numbers may explain why instructors did not engage with affective communications. In addition, as Garrison (2017) points out, this type of communication requires time to develop, and the short course duration of the studied MOOCs (three weeks) and learners' selective engagement may

not have allowed such aspects to grow. However, Watson *et al.* (2016) relate low-level affectivity of instructors to their teaching styles and the nature of massive learner-based courses, and they conclude that the lack of balance between cohesive and affective communications in instructors' contributions is indicative of instructors' focus on building group commitment, which is not observed in this study.

Considering that social contributions are the most frequent type of learner and instructor contributions, this study reinforces Poquet *et al.*'s (2018) observation that it is possible to establish and maintain social presence when a large group of diverse learners interact for a short period of time. However, it is not clear to what extent instructors' social presence enhances learning and learner engagement, especially as it operates mostly at an individual rather than group level.

6.3.1.2 Teaching contributions

The analysis of instructors' teaching contributions revealed what instructors' teaching presence in MOOCs looks like and provided insights into their teaching strategies and roles, while highlighting the differences between their discussion activities in closed and open online courses.

Facilitating discourse

Instructors' teaching contributions primarily focus on facilitating the learning discourse with a lesser emphasis on direct instruction or design and organisation. These results are in line with findings of Watson *et al.* (2017) in MOOCs; Evans, Ward, and Reeves (2017) in an interprofessional development context; Akyol, Vaughan, and Garrison (2011) in short online courses; and De la Varre, Keane, and Irvin (2011) in blended settings. They reflect the idea that instructors do not dedicate their time consistently across the three categories of teaching presence and make the most effort to facilitate discussions. One possible reason is that instructors use more direct instruction when learners approach higher levels of cognitive presence, i.e. integration and resolution (Garrison, 2016). Since in the studied MOOCs, learners hardly moved beyond the exploration phase, instructors may not have felt the need to be directive and restricted their teaching presence to facilitation. Strong facilitating discourse could also be explained in terms of MOOC disciplines. According to Arbaugh (2014), in soft or qualitative disciplines (art, history and business innovation in the case of this study), more emphasis is placed on collaboration and facilitation than on instructing and presenting content. In addition, it is possible that instructors' training for managing discussions emphasised a facilitation style designed to guide and assist learners, rather than a traditional didactic teaching style (Evans, Ward and Reeves, 2017). Meanwhile, it

is important to note that short course duration in the studied MOOCs may have led to a higher percentage of facilitating discourse indicators; Akyol, Vaughan, and Garrison's (2011) comparative study confirms that facilitation is higher in shorter-term than in longer courses. Finally, but more importantly, instructors in interviews explained that the diversity of learners created an imbalance in terms of topic knowledge and use of appropriate language or terminology; as a result, they had to facilitate more to even out the imbalance. This has led to developing new techniques such as casting back or recycling some face-to-face methods.

The focus on facilitating discourse also highlights several aspects of teaching presence in MOOCs. First, as Clarke and Bartholomew (2014) state, it implies that MOOC instructors are biased towards guiding rather than challenging learners' thinking. According to them, if teaching presence stops at facilitation, it will not support learners' cognitive presence. They suggest that teaching presence must exhibit a balance of facilitation and direct instruction to be effective. Similarly, Garrison (2016) emphasises the balance between facilitation and providing instruction for ensuring that discussions do not converge prematurely or diverge inappropriately. Second, a higher level of facilitating discourse demonstrates instructors' strong desire to engage learners with deep discussions (Watson *et al.*, 2017). Additionally, it can be indicative of a specific teaching style in MOOCs (Richardson *et al.*, 2015), while showing a shift in instructors' roles from directive and leading to facilitative. The results from instructor interviews further support instructors' emphasis on facilitation and reveal the reasons for such focus. Instructors stated that facilitating discourse allows them to a) reassure learners and validate their contributions; b) encourage learners to continue the course; c) develop conversations; d) generate interest; e) help resolve the understanding of basic concepts; and f) encourage a sense of creative curiosity. Contrary to these findings, Watson *et al.* (2016) and Anderson *et al.* (2001) found a higher level of direct instruction in instructors' contributions. This difference could be due to instructors' pedagogical decisions to take a more directive role in managing the discussions (Garrison, 2016).

The analysis also demonstrates that within facilitating discourse, instructors mainly use two strategies: *acknowledging and encouraging learner contributions* and *drawing in participants/prompting discussions*. However, it was found that there were differences between using the latter in MOOCs and in closed online courses. It seems that in MOOCs*, drawing in participants* is not limited to learners, and instructors sometimes involve other instructors in the conversations. This is because they either do not have the expertise or knowledge to contribute to the conversation or they believe the other instructor(s) can add value to the existing discussion and help it develop. This is a variation of facilitating discourse, which is a result of collaborative and team teaching in MOOCs. It is also indicative of instructor-instructor interactions in MOOC discussion

areas, which are not common in traditional online courses. As Borup, Graham, and Drysdale (2014) state, when instructor activities are examined, such additional interactions should be considered. Their study shows that instructor-instructor interactions are an important aspect of instructor engagement in online courses. This is an area that requires further research.

Another difference between facilitating discourse in MOOCs and in traditional online courses, is the loss of collective and group meaning of some indicators, such as *reaching consensus/understanding*. The analysis shows that these indicators operate at an individual level in MOOCs. That is, instead of trying to reach an agreement within the group, instructors reach consensus with an individual learner about a concept, most likely because of the large numbers of comments and the short and water-cooler type of conversations.

Direct instruction

Contributions giving direct instructions constitute a smaller proportion of instructors' comments and mainly provide learners with content-related additional or clarifying information to reduce misunderstandings or to correct learners. One possible explanation for the small amount of direct instruction relates to the informal setting of MOOCs, as Garrison (2017) argues that informal online environments often lack direct instruction. The lower level of instructors' direct instructions also suggests that the academic leadership and systematic scaffolding of learning to help learners achieve higher-order thinking is weak (Garrison, 2017). However, it is important to note that the level of learners' direct instruction was almost equal to that of the instructors, and this suggests that direct instruction is to some extent distributed between instructors and learners[29] and is not instructor centric in MOOCs. Yet it is of note that learners' primary direct instruction strategy was *making explicit reference to outside material* and other strategies were not used frequently. Less direct instruction from instructors may also explain the low level of learners' cognitive presence and the predominance of their social postings in this study (Wanstreet and Stein, 2011). Gorsky and Blau (2009:4) point out that if strong direct instruction is not provided, learners "feel comfortable remaining in a continuous exploration mode" and do not move to more advanced levels of cognitive presence.

Some direct instruction strategies such as *summarising* or *focusing and re-focusing discussions* are hardly used or are not used at all by instructors. Regarding *summarising discussions*, the large volume of threads and the fact that, in some MOOCs (e.g. MOOCs

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[29] This is not observed for other categories of teaching presence.

19 and 25), instructors summarised discussions in an email to learners, may have caused the infrequent use of this indicator. This is an important finding, since it shows that some strategies either are not used often or are re-located to outside the discussion areas. The CoI suggests that discussion threads must be summarised and brought together at different points during a course to build and communicate a shared understanding (Garrison, 2017). Since this occurred only rarely in the studied MOOCs, learners may not have been provided with enough opportunities to construct meaning collaboratively and to confirm a shared understanding. This can also affect the Laurillard's (2002) proposed conversational cycle negatively, because learners will have fewer opportunities to compare their conceptions, recognise misconceptions and take corrective actions.

This study only examined instructors' teaching presence in discussion areas and, as Shea, Vickers, and Hayes (2010) state, this can provide a narrow view of instructors' pedagogical efforts. Future research can look at MOOC instructors' teaching presence both inside and outside the platform (e.g. group emails and social media).

Considering *focusing and re-focusing discussions*, the content analysis of learner-instructor conversations and interviews with instructors yield contradictory results. Instructors' activities in discussion areas showed no instances of this indicator; however, in interviews a third of instructors emphasised this aspect in order to develop conversations more productively, to moderate conversations when they became argumentative or learners made incorrect assumptions about the content, and to monitor the scope of discussions. One reason for this difference could be inconsistency between instructors' beliefs and their practices due to MOOC settings. The complexities of MOOC discussion areas, such as the volume of contributions or different levels of learners' knowledge, language and academic skills could limit instructors' ability to attend to their beliefs (Fang, 1996). Moreover, it is possible that instructors do not judge their activities accurately (Wise and Cui, 2018) or their focusing and refocusing activities are not visible for coding as defined by CoI.

Design and organisation

Contributions related to the design and organisation of the course are minimal and confirm the findings of Evans, Ward and Reeves (2017) and Anderson *et al.* (2001) in the context of traditional online courses. It is not possible to compare findings related to this category with other MOOC studies, as these studies (Watson *et al.*, 2016; 2017) did not apply this category. The minimal use of design and organisation indicators could be partly explained by the fact that non-teaching members were mostly responsible for dealing with them. However, as Kovanović *et al.* (2018:55) state, since "most MOOCs

follow a very structured and pre-defined course organisation with almost no changes during the course", most design and organisation activities occur before the course and through emails that lead educators send to learners. Kaul, Aksela, and Wu (2018) also believe that this type of activity is more evident in course design than in communications within MOOC discussion areas.

One of the important findings about instructors' design and organisation activities is the emergence of a new indicator within this category that reflects a unique aspect of course organisation in MOOCs. Interestingly, instructors were engaged in marketing and advertising the institution and used MOOC discussion areas as a publicity and marketing tool to increase visibility and recruitment (Howarth *et al.*, 2017). This type of activity was also reported by instructors in Zhu, Bonk, and Sari's (2019) study and reflects the idea that MOOC instructors are involved in supporting institutions to build a global brand and showcase their courses, research and innovations to a global audience (FutureLearn, 2019), and compete for future (international) students (Shaw, 2012). Instructors involved in this study were specifically advised to link learning to other institution services, where appropriate, as the below extract from staff guidance for supporting discussions shows:

Link to learning at I   Make explicit comments about how the course links to what we do at the university and UG/PGT/PGR opportunities e.g.

- 'you can find out more about this by looking at xxx which shows some of the research we are doing on this topic'

- 'it sounds like you would really enjoy studying for a Higher Education degree. There are lots of courses in this area at Leeds. For more information see step 3.18 of this course'

- 'our lifelong learning centre caters for learners already in work who are looking to gain a qualification. See: http://www_____:/ for opportunities'

- 'I have written more about this at xxxx (this would be particularly good for PhD student moderators who might have a blog, web-page, conference paper etc.)'

- 'I am currently studying this topic for my PhD. I am based in the school of xx.x. Find out more here xxx'

It is necessary to investigate whether and to what extent this indicator is present in MOOCs offered by other FutureLearn partners or MOOCs run by other platforms.

As with some direct instruction indicators, the instructors' design and organisation activities in discussion areas are not similar to what they reported in interviews. During interviews, instructors emphasised their effort for *establishing netiquette* and helping learners *use technology effectively*, mainly for reasons relating to learners' engagement and motivation. However, the content analysis of their conversations showed no cases of *establishing netiquette* and only a few examples of *using technology effectively*. The most reasonable explanations remain the same as those stated for direct instruction.

The final aspect of design and organisation to be discussed is discussion tasks. During interviews, some instructors emphasised the role of discussion tasks in creating a meaningful discussion. They criticised discussion prompts that were too focused or too general and impeded deep and meaningful conversations with learners. This is in line with Mazzolini and Maddison's (2007) statement that discussion lead-ins are effective when they elicit learners' knowledge, pre-conceptions and misconceptions and allow misconceptions to be resolved. Discussion questions act as the triggering event for cognitive development (Garrison *et al.,* 2001) and the initiating move of conversations. Thus, if they do not encourage learners to contribute, it is less likely that they generate a fruitful discussion (Schrire, 2006). These findings suggest that instructors must consider the type and content of discussion lead-ins as well as the logical progression of them to help discussions develop and aid learners to reach higher levels of critical thinking (Schrire, 2006).

Considering instructors' teaching activities in discussion areas, it can be put forward that facilitation is a defining characteristic of their teaching presence, and because of it, their teaching presence does not seem to encourage learners' cognitive presence beyond exploring ideas. Garrison (2016:94) states that facilitating cognitive presence requires "focusing discussions, challenging ideas, identifying areas of agreement and disagreement and creating a summary". These are indicators that were hardly observed in instructors' contributions in the current study. Therefore, if instructors aim to enhance learning in discussions, they will need to address these aspects more strongly as "without instructor's explicit guidance and teaching presence, students…engage primarily in serial monologues" (Pawan *et al.*, 2003:119).

Considering instructors' teaching and social activities in discussion areas, which constitute their "instructor presence", and the stronger focus on social and facilitating contributions, it can be concluded that an instructor role in MOOCs is more social, advocating and facilitative than pedagogical and managerial. However, online teaching is effective when instructors' activities are partly facilitative and partly directive and managerial (Zhao and Sullivan, 2017). Therefore, based on these findings, it is suggested that MOOC instructors consider this balance in order to contribute to learning, or as Joksimović *et al.* (2015) state, learners will not engage deeply with the course.

6.3.1.3 Cognitive contributions

The properties of analysed instructors' contributions show extremely low levels of cognitive presence. This suggests that instructors "shy away from pushing discussion(s) into more cognitive domains", most likely because they take a supporting rather than challenging approach or because they do not use explicit cognitive codes (Clarke and

Bartholomew, 2014:17). It is also possible that the low level of learners' cognitive presence affects instructors' cognitive presence. That is, there are not many cognitive contributions for instructors to engage with and consequently they decide to foster more cognitive activities by their teaching presence. Another possible explanation could be the lack of time and short course duration that inhibit attempts of both learners and instructors to process the contributions deeply. Similarly, during interviews, instructors focused less on their cognitive contributions. This could be attributed to the fact that they are not aware of this class of activities and they respond to them in discussions unconsciously or, as Neuman (2014) describes, it is unconscious non-reporting.

The low level of cognitive presence in both instructors' and learners' contributions can also be explained by discourse functions of learner-instructor conversations. Schrire (2006) proposes a sequence which considers levels of cognitive development in the light of a conversation sequence, i.e. initiate-respond-follow up (IRF). She states that initiating moves with a "demand" function are *triggering events* for cognitive presence; respond and follow-up moves which have a "give" or "acknowledge" function lead to the *exploration* phase and promote *integration* and *resolution* within cognitive presence. It is possible that learners' and instructors' contributions do not possess these functions and as a result, postings that show cognitive presence are not produced.

Within instructors' cognitive contributions, comments relating to the exploration phase of Practical Inquiry stand out, and this suggests instructors join learners to explore a concept or topic through brainstorming, exchanging information and supporting or contradicting ideas. The surprising finding about instructors' cognitive presence relates to the development of this presence over the duration of MOOCs. Unlike instructors' teaching and social presences, the relative importance of cognitive contributions increased during the courses. This implies that as courses progress, instructors are more likely to focus on cognitive contributions and play the role of a co-learner in conversations. This could be because towards the end of the course, there are fewer, but more dedicated learners; therefore, the instructors can engage in deeper and more challenging discussions, rather than in social encouragement.

6.3.1.4 Interrelation of social, teaching and cognitive presences

The type and degree of the co-occurrence of CoI indicators in instructors' postings are examined to militate against the loss of content in contributions and to understand the interaction between CoI categories and indicators in MOOCs. The analysis demonstrates that the highest interrelation in instructor contributions occurs between indicators of two presences (e.g. social and cognitive presences) and indicators of either teaching or social presence (e.g. *acknowledging learner contributions* and *supplying*

clarifying information, both within teaching presence). Occasionally, contributions include only one indicator and do not co-occur with other presences. This highlights the hybrid nature of instructors' contributions and their commenting behaviour in MOOC discussions. Within instructors' contributions, the most frequent combination includes the indicators of social and teaching presences. Within this combination, the most recurring categories are *cohesive responses* (social presence) and *facilitating discourse* (teaching presence). This suggests that a social and informal style through using cohesive devices and an encouraging tone through facilitation are becoming a fixture of instructors' contributions. In addition, the high level of cohesive responses co-occurring with teaching indicators reflects the idea that when instructors provide teaching contributions, they also make an effort to help learners perceive themselves as a part of the group. Moreover, frequent use of *acknowledging and encouraging learner contributions*, particularly with other teaching indicators similar to Evans, Ward, and Reeves' (2017) findings, implies that instructors use this indicator as an opening to provide direct instruction or to facilitate the learning discourse. These findings overall do not support Gutiérrez-Santiuste and Gallego-Arrufat's (2017) results, since they found the highest interrelation between indicators of social and cognitive presences. The main reason for this difference is likely to be the research context; i.e. investigating learner contributions.

The findings about the combination of presences in instructors' contributions are significant when they are considered in the light of learners' engagement. It was found that learners engage the most with instructors' contributions that include a combination of social and teaching presences. After this combination, contributions that are a mixture of two or more teaching indicators or only include a teaching indicator are those most responded to and liked by learners. By contrast, contributions that are purely social are not attended by learners. Although these findings require statistical correlational analysis to explore any association between the content of instructors' postings and learner engagement, they provide some insight into learners' engagement behaviours with instructors' contributions based on what instructors' comments contain.

By cross classifying the content of instructors' contributions, this study shows the layers and to some extent the richness of instructors' postings and provides a detailed understanding of the instructors' presence. This has implications for learning since deep and higher levels of learning depend on the quality and substance of contributions (Garrison and Cleveland-Innes, 2005).

6.3.1.5 The relationship between instructors' contributions and learners' initiations

A secondary aim associated with instructors' "instructor presence" (social and teaching presences collectively) was to uncover the way instructors respond to different learners' initiating posts. Drawing on discussion data, it is found that if learners' initiating posts are purely cognitive or a combination of cognitive and social presences, instructors use a combination of teaching and social indicators in the response. This finding is to be expected as learners' cognitive presence requires instructors' teaching presence to move learners forward in the learning process (Garrison, 2016). However, it is interesting that instructors do not solely use teaching indicators but combine them with social presence. This demonstrates that instructors' teaching activities have an inherent social dimension in MOOCs.

When learners' social initiating posts are considered, the instructors' predominant response is a combination of two or more social indicators. However, the second most frequent type of instructor response is a social-teaching combination and the teaching components of these contributions are mostly indicators from design and organisation. This reflects instructors' attempts to use learners' social initiating posts to help them understand the course structure and the way it operates, while shifting the focus from social conversations to preparing learners for learning. Another aspect of analysis that will enrich the findings about the relationship between learners' initiations and instructors' response is a discourse analysis of learners' initiating posts in terms of the move type, i.e. demand, give and acknowledge (Wells, 1996).

The findings also highlight that instructors respond to learners' self and co-regulated activities represented by "learner presence" in the same way as they reply to learners' social contributions. This suggests that they mostly support learners' self-regulated activities socially and do not use their facilitative or directive strategies. This is possibly because they do not wish to intervene with learners' self-regulation. Another tentative explanation is to allow learner autonomy.

6.3.2 The level of instructors' contributions

The analysis of the frequency with which instructors contributed to discussion areas reveals that most instructors' contributions are made at the beginning of the courses and this level decreases considerably as the courses progress. This is in line with learner participation patterns in discussions (Onah, Sinclair, and Boyatt, 2014) and shows that instructors follow learners' activity trend; that is, most postings occur in bursts and at the beginning of the course and their numbers fall as the course approaches its end (Brinton *et al.*, 2014; Gillani, Yasseri*, et al.*, 2014; Shirvani Boroujeni *et al.*, 2017). However,

interviews with instructors reveal other reasons than the decline in learners' participation for this decrease. They include attitudinal and affective reasons, such as instructors' fatigue or repetitive learner comments and questions that demotivated instructors, and organisation-related causes such as other work commitments or timing of the MOOC running. However, none of the reported reasons are related to pedagogy or learners' autonomy. Nandi *et al.* (2012) explain that sometimes instructors withdraw their contributions to allow more learner autonomy and control over learning in discussions; however, this was not reported by instructors in this study. It is also possible that, once the novelty effect of participating in discussion areas and meeting non-traditional learners fades, instructors are less motivated to engage with discussions. Finally, the decrease in the level of instructors' contributions can be a result of learners' comments or responses; if learners did not demand information or responses, instructors would not have been able to follow up (Wells and Arauz, 2006).

Depicting the level of instructors' contributions over time also reveals some information about instructors' engagement with discussions based on O'Brien and Toms' (2008) engagement model (i.e. point of engagement, period of sustained engagement, disengagement and re-engagement). First, the launch of course, institution requirements, and meeting learners provide a point of engagement for instructors. Second, instructors have a period of sustained engagement with learner conversations, particularly at the beginning of the courses, although they are less engaged as the MOOCs progress, and this can be a result of both positive (e.g. received what they were seeking from discussions) and negative (e.g. overwhelmed by the number of comments) internal and external factors. Thus, it could be concluded that instructors' engagement is dynamic, and it changes noticeably from one week to another and in a declining manner. Third, instead of disengaging or re-engaging, instructors maintain a low level of engagement and they do not disengage until the course ends.

When the level of contributions in terms of instructor roles is considered, findings show a relative balance of contributions by all three instructor roles, although mentors contributed slightly more than educators and lead educators. This is most likely because a) most mentors are paid to attend and contribute to discussions, and b) they have fewer work commitments compared to the other two groups and are able to spend more time in discussion areas. This finding is noteworthy in the light of learners' engagement, as mentors are instructors that learners engaged with the least despite their higher levels of contributions. This supports Dennen, Darabi, and Smith's (2007) argument that the interactions between learners and instructors do not follow a more-is-better pattern and instructors' responses must meet learner needs. Moreover, as Clarke and Bartholomew (2014) point out, in addition to the frequency, the content and purpose of instructors'

contributions are important. This can inform lead educators' or course designers' decisions about the arrangement of roles within a teaching team.

6.3.3 Changes to the instructors' contributions during a MOOC

This study also examined the evidence of changes in frequency of instructors' contributions, both overall and for each CoI presence. While discussing these findings in the light of existing research, it is important to note that (to the best of my knowledge) there have been no previous studies that investigated changes to instructors' contributions based on the CoI presences. Most studies to date (Stein *et al.*, 2007; Akyol and Garrison, 2008; Akyol, Garrison, and Ozden, 2009; Shea, Vickers, and Hayes, 2010; Akyol, Vaughan, and Garrison, 2011; Wanstreet and Stein, 2011) have explored the effect of time on learners' contributions and the development of CoI presences based on learner participation, and only in traditional online courses. Thus, caution is taken if a comparison with existing studies is made. In addition, since the frequency values have been used to report findings, the relative importance of changes to instructors' contributions rather than the statistical differences are discussed.

As discussed in the previous section, the level of instructors' contributions declines noticeably during a course. However, the findings indicate that the MOOC context still allows the development of all three contribution types despite each being evolved and developed differently. Social contributions are more evident at the beginning of the courses, while their importance decreases considerably from the beginning to the middle of MOOCs before they level out. This shows that similarly to learners' social behaviours in discussions (Akyol and Garrison, 2008), the importance of instructors' social activities declines over time, perhaps because the social connections are made, and instructors feel less need to attend to social aspects of conversations, or they prioritise teaching and facilitating activities. Moreover, as Garrison (2016) emphasises, at the beginning of the courses, social presence must be focused for learners to become comfortable in posting and sharing ideas. Contrary to social contributions, teaching contributions grow in importance from the beginning to the middle of the courses and then slightly lose their importance towards the end of MOOCs. This indicates the interaction between CoI presences or an inter-presence relation as Garrison (2017) describes and supports Akyol and Garrison's (2008) observation that whilst postings with evidence of social presence are used less over time, teaching or cognitive postings increase. This trend suggests that instructors establish social presence in early stages of the course before their teaching presence can take place. However, from the middle to the end of courses, this inter-presence interaction is more apparent between teaching and cognitive contributions as teaching contributions become slightly less prominent, whereas

cognitive contributions have gained more importance. During this period, the relative importance of social contributions remains the same.

Overall, the observed inter-presence interaction supports Garrison's (2016) claim that as the learning experience evolves in discussion areas, the focus on presences shifts. However, what occurs in MOOCs and in relation to instructors' presences is different from his proposed changes. He hypothesises that at the beginning of the course attention is given to social presence to create the condition for open and secure communications, then the focus shifts to cognitive presence in order to engage learners deeply in the content, and subsequently the teaching presence is more emphasised as challenges grow. In this study, the shift of presences is from social to teaching to cognitive rather than social to cognitive and then teaching. This can be explained by the differences between the learners' and instructors' contributions and the different nature of the processes that learners and instructors engage with. However, the linear association among presences hypothesised by Garrison is debateable even when closed online programmes are focused upon, because factors such as tasks, learning outcomes and learner characteristics (e.g. self-regulation) can affect the interaction between presences.

6.3.3.1 Changes to social contributions

The frequency and relative importance of each social presence category mirrors the continually declining pattern of instructors' social contributions over time. This is contrary to the findings of Akyol and Garrison (2008), Akyol, Garrison, and Ozden (2009) and Swan (2003) in traditional online courses where learner participation is examined. Akyol and Garrison (2008:14) and Akyol, Garrison and Ozden (2009) found that group cohesion among learners increases significantly over time while affective and open communications show a falling trend. They believe that once learners are connected to one another and feel comfortable with discussions, "the explicit personal recognition" through open communications and overtly attending to personal communications is no longer required and the focus shifts to group cohesion. Nevertheless, Swan's (2003) findings are consistent with this study's results and show a decrease in group cohesion that can be attributed to the exploratory rather than collaborative nature of discussions. The difference between what is found in this study and the results of those conducted by Akyol and Garrison (2008) and Akyol, Garrison and Ozden (2009) can have two explanations. First, the ways in which CoI presences are used and developed by learners and by instructors are different, since they hold different roles, responsibilities, and goals. Second, as explained in **6.3.1.1**, MOOC scale and openness affects the level and use of social categories, particularly group cohesion. Thus, dissimilarities between instructors'

social contributions in MOOCs and learners' social presence in closed online courses are not surprising. However, a point worth noting and speculating on is the changes to learners' social contributions in MOOCs (Appendix 8). The analysis reveals that the level of learners' contributions within each category of social presence decreases over time. When the dynamics of social presence among learners in MOOCs and in traditional online courses are compared, the organic interaction between categories does not seem to occur in MOOCs. The CoI framework hypothesises that open communication will be high level at the beginning of courses and will moderate over time as learners become experienced and agree on participation rules. Therefore, it is expected personal communications and group cohesion grow (Garrison, 2017). However, as observed here, neither learners' nor instructors' social contributions follow such patterns, perhaps because of learners' selective participation, optional engagement with discussions, large numbers, and diversity of goals.

6.3.3.2 Changes to teaching contributions

Consistent with the continuing decline in instructors' teaching contributions, the three categories of instructors' teaching presence diminish over the duration of the courses. However, contributions with the evidence of design and organisation show a slight increase in importance from the middle to the end of the course. The tentative explanation for this increase might be learners' questions about course certificates, accessing learning material after the course ends, and possibly the course re-run.

The clear drop in all categories of teaching presence can be explained by learners' needs for more support, encouragement and direction at the beginning of the course to help them express and exchange ideas. These needs might have decreased as learners became more familiar with the course topic and with the discussions (Vaughan and Garrison, 2006). Nevertheless, the major reason for the decrease in teaching contributions is likely to be the decrease in the number of learner comments.

The dynamics of facilitating discourse and direct instruction indicators in learners' contributions in this study are noteworthy. Although the frequency of contributions reflecting these two categories drops considerably from the beginning to the middle of MOOCs, it rises modestly from the middle to the end of the courses. This trend suggests that learners take more teaching responsibilities once they are settled into the course, most likely because they know the subject matter better and they feel more confident in making teaching contributions. From a practical perspective, it can be hypothetically argued that if instructors encourage such learner commenting behaviours, the overall teaching presence in discussions can be increased and consequently the balance between teaching and social contributions can be established.

6.3.3.3 Changes to cognitive contributions

Each level of cognitive presence within instructors' contributions shows a different development pattern over time. Contributions reflecting triggering events indicate a V-shaped trend during the courses, which is unlike the falling trend of triggering event instances in learners' comments (Akyol and Garrison, 2008). The emphasis on triggering events at the beginning of the course is justifiable by the instructors' desires to help learners see the possible problems or puzzles in order to initiate the process of inquiry. However, the increase in the relative importance of these contributions towards the end of the course is surprising. This apparent spike can be explained in relation to learners' cognitive presence. Since all instances of triggering events, exploration and integration in learners' postings decrease towards the end of the course, it is likely that by focusing on triggering events, instructors tried to re-engage learners with the inquiry process. Another possibility is that learner comments at the end of courses genuinely created some puzzlement for instructors and as a result, their cognitive contributions reflect this puzzlement in the form of triggering events.

Contrary to the developmental pattern of instructors' triggering events, contributions with evidence of integration show a reversed V shape. The non-existence of postings reflecting integration at the beginning of the courses is common as learners and instructors are still exploring the topic and may not have enough information to synthesise and integrate. However, it is not clear why instructors reduce their support for integrating information from the middle to the end of the courses. The only possible reason can be that instructors follow learners' exploration and integration activities, which decrease considerably in the last two time segments of the course.

Unlike triggering events and integration activities, instructors' exploration of concepts declines over the course of a MOOC; however, this decline is stabilised from the middle to the end of the course. This suggests that instructors' exploration activities are independent of learners' exploration during the last two weeks of the courses, as they do not decrease.

After considering all discussed findings about several aspects of instructors' contributions, it can be concluded that instructor and learner actions are interwoven. If we follow instructors' activities in discussion areas and move backwards, it reflects the idea that instructors make a contribution based on what learners have posted in the discussion areas; learners post a comment based on the discussion task or question and it is the instructors who decide about the discussion prompts at the design stage of the course. Thus, it appears that instructors design their contributions well in advance of the course by creating discussion lead-ins. They also have a noticeable effect on what

learners will discuss in discussion areas. Hence, focus and attention must be given to the type and function of discussion tasks if productive discussions that foster learning are the goal. This means tasks that:

a) Demand information, thinking, and activity rather than acknowledge or give information
b) Have integration and resolution as the task outcome
c) Move learners through the phases of inquiry and therefore cognitive presence

6.4 To what extent and in what ways do learners engage with instructors' contributions in discussions?

6.4.1 Learner engagement with instructors' contributions

The results demonstrate that learners do not engage explicitly (responding) or implicitly (liking) with most of the instructors' contributions (58%). However, these findings only reveal learners' behavioural engagement and do not imply that they are cognitively or emotionally disengaged, because they may read or take note of the instructors' comments and engage by viewing and observing rather than participating and interacting (Dennen, 2008). Learners' disengagement is most evident when contributions contain a low level of teaching presence and high cohesive and affective communications. This suggests that instructor contributions focusing on social presence with little emphasis on teaching presence are not reacted to by learners, and instructors may wish to direct their effort to what learners value most. No learner (behavioural) engagement with such contributions is a likely result of not addressing learner needs, since Dennen (2005) emphasises that learners' engagement is often directed by their needs. In addition, domination of social indicators, particularly affective and cohesive, in a contribution is less likely to generate further responses unless they are directed to the content or learning outcomes by a teaching indicator (Garrison, 2016). Nevertheless, it is important to note that instructors often respond to learners based on learners' initiating posts; therefore, if the initiating post focuses on social aspects, instructors are to some extent limited in the response they can provide. An example of such interactions is when a learner introduces himself and his goals and the instructor welcomes him on the course. Yet, as Garrison (2017) suggests, instructors can direct these conversations towards academic or professional goals to create the condition for learning, and provide both proactive and reactive information (Dennen, Darabi, and Smith, 2007).

The learners' (behavioural) disengagement can be attributed to several factors. The first group relates to the MOOC context. It is not uncommon in MOOC discussion areas that contributions are not noticed because of the large volumes of comments (Chaturvedi, Goldwasser, and Daume III, 2014; Wise, Cui, and Vytasek, 2016) and instructors'

contributions are not an exception. In addition, the structure of the discussion areas may not be supportive of learner engagement, particularly if they do not allow learners to sort contributions by author, topic, or keywords (Cohen *et al.*, 2019). Although FutureLearn discussions allow filtering of contributions based on whom learners follow and this enables learners to view all instructors' contributions if they follow them, this feature may not be effective if learners follow many participants. Therefore, finding instructors' contributions may not be easy for learners. Moreover, considering learners' relative participation and their selective activities in discussions (Zhang, Skryabin, and Song, 2016), it is likely that once they leave a discussion step, they do not return to it to check the instructor contributions.

The second group of factors concerns the quality, purpose, timeliness and relevance of instructors' contributions. It is possible that the purpose of an instructor's contribution is only to acknowledge, confirm or help learners' understanding rather than to have a dialogue with learners. This assumption is supported by less evidence of teaching indicators such as *drawing in participants/prompting discussions* in instructors' contributions compared to frequently occurring indicators of *acknowledging, encouraging and reinforcing learner contributions* or *suppling additional and clarifying information.* In other words, if instructors only acknowledged and verified learners' comments and did not demand further contributions, learners were less likely to react. In Bellack *et al.*'s (1973) words, instructor contributions seem to focus less on soliciting moves such as questions, commands or imperatives that elicit a response. In the same vein, Dennen (2008) emphasises that conversations require a call-and-response pattern that encourages turn-taking, and the instructors' contributions in this study do not appear to support such a pattern. The timeliness of an instructors' contribution could also have an impact on learners' engagement (Dennen, Darabi, and Smith, 2007; Garrison, 2016). If instructors respond to learners with a noticeable time gap, it is likely that learners become frustrated and leave the exchange or receive the needed information from peers. Likewise, the relevance of instructors' contributions to learner needs and goals is influential in learners' engagement (Dennen, 2005; Najafi *et al.*, 2015). Considering the diversity of MOOC learners' goals, personal experiences and perspectives, learners may not have been able to link instructor responses to their thoughts, perspective, or personal and professional contexts, and therefore did not join the instructors. In summary, these qualities of the instructors' contributions can affect learners' perceptions of how useful instructors' postings are (Jung and Lee, 2018).

The third group of factors contributing to learners' disengagement is related to learners and their characteristics. If learners do not have a new or original contribution to add after an instructor's comment, if they feel that they do not possess suitable background or knowledge to contribute, or if they prefer not to show their agreement or disagreement

with the instructors, they tend to engage with instructors' contributions less (Preece, Nonnecke, and Andrews, 2004). However, Peters and Hewitt (2010) explain that sometime disengagement or lack of activity is a mechanism for learners to manage information overload. Their research suggests that learners often resort to strategies, such as ignoring some comments or reading comments partly and selectively, to cope with information overload. Therefore, it is also possible that MOOC learners choose not to engage with instructors to manage the information overload caused by the large numbers of comments in discussion areas.

Nevertheless, learners engaged with 42% of instructors' contributions, which provides some insight into what encourages learners to engage with instructors. The highest level of engagement in the form of both liking and responding to instructors' contributions occurs when instructors' postings include the high levels of direct instruction and facilitating discourse and low instances of affective communications. It is important to note that contributions with which learners engage implicitly show a quite similar proportion of teaching indicators. However, the composition of the social categories is different, since affective communications are dominant and cohesive responses are considerably low. This suggests that when instructors focus their efforts on teaching presence, learners engage with them more. This aligns with Cohen and Holstein's (2018) analysis of learner reviews of highly ranked MOOCs based on the CoI framework. Their analysis indicates that learners value teaching (36%) and cognitive contributions (36%) more than social (23%) or technical (5%) ones, and they believe that elements representing teaching and cognitive presences contribute to the success of these MOOCs. This is perhaps because instructors' teaching contributions provide academic support that learners need in order to understand the content and to resolve their misconceptions. Such contributions may also be more closely related to learner goals (Najafi *et al.*, 2015). In addition to the focus of instructors' contributions, the *form* they take might influence learner engagement. Zhao and Sullivan's (2017) study shows that in comparison to statements, questions are more effective in inspiring learner engagement with contributions because they prompt follow-up moves by learners.

6.4.2 The influence of instructors' roles on learner engagement

When the possible effects of instructor roles on learner engagement were examined, the findings indicate that by far the most learner engagement is with educators' contributions, while mentors are the instructors that learners engage with the least. This is perhaps because of the content of educators' contributions, as they contain the highest level of cognitive and teaching indicators and the lowest number of social indicators compared to lead educators' and mentors' postings. Similarly, the lowest level of teaching and

cognitive indicators and the highest proportion of social codes in mentors' contributions can justify learners' low engagement with mentors. While no causality should be assumed, these results seem to confirm that the content of instructors' contributions plays a key role in encouraging learners' implicit and explicit engagement with instructors' contributions. This is an important finding as it has both theoretical and practical implications. Theoretically, it supports the importance of teaching presence for learner engagement in informal and open online courses. Practically, it can inform the focus and content of instructors' contributions to maximise learner engagement while helping instructors make efficient use of their time in discussion areas. It can additionally provide an informed basis for designing training courses or producing guidance documents for MOOC instructors.

Factors such as the number of followers or being more visible to learners (e.g. through course emails and announcements) do not appear to affect learners' engagement with instructors' contributions. Lead educators in the studied MOOCs had the most followers and sent the majority of emails to learners; however, these did not lead to more learner engagement with them in discussions.

To understand the type and extent of learners' engagement with instructors' contributions, evidence such as liking or replying is used in this study. Undoubtedly, such measures do not capture learners' lurking activities including viewing or reading comments, and they are limited in revealing the level and type of learner involvement (Epp, Phirangee, and Hewitt, 2017). However, considering the lack of non-behavioural data (e.g. click hits) and a reliable method to examine learners' comment reading behaviours (Dennen, 2008; Knox, 2016b), only learners' behavioural engagement was investigated. This is one of the limitations of this study that can be addressed in future research.

6.5 FutureLearn instructor roles

Before ending the first section of this chapter, the findings about instructors' contributions based on their roles are brought together to discuss FutureLearn instructor roles and present the profile that appears most engaging to learners.

The findings show that among the three instructor roles (lead educator, educator and mentor), educators have a very different discussion participation pattern, particularly in terms of contribution types and the length of conversations with learners. Considering the conversation length, they have the lowest number of short and the highest number of medium-length conversations, which suggests that they are more successful than mentors and lead educators in encouraging turn-taking and increasing the potential for

collaborative knowledge construction. The most plausible explanation for their longer conversations is their prompting strategy, since they invite other learners to conversations considerably more than lead educators and mentors do (see **4.3.4.1**) and focus their efforts less on encouraging learners already engaged in a conversation to continue it. Educators' extended conversations with learners also indicate that their contributions disrupt the continuity of learner interactions less. This could be a likely result of their instructor presence as well as their position within the hierarchy of instructor roles. They are not at the top of the role hierarchy like lead educators, who could be intimidating for learners, and they are not as subordinate as mentors, with their less extensive experience or knowledge. Therefore, while learners can trust educators' expertise and knowledge, they are not intimidated by their position in the course. The content of educators' contributions also reflects a distinctive combination of CoI presences, which resulted in the most learner engagement. Their contributions include the most teaching and cognitive indicators and the lowest number of social codes. The noticeable feature of their teaching presence is the higher level of direct instruction and lower-level facilitating discourse, compared to other instructors. This reflects the idea that they adopt a directive style in discussion areas and provide the academic leadership that learners require. This may be the reason learners engaged with them more than the other instructors. Similarly, educators' cognitive contributions contain most instances of triggering events and integration and the least cases of exploration. This is indicative of educators' focus on initiating the inquiry process and then helping learners synthesise the information they explored, which runs contrary to lead educators and mentors, who primarily help learners explore a concept or topic. Educators' social contributions mirror those of lead educators in that they have the most personal and open communications and contribute least to group cohesion. Taken together, educators' stronger teaching presence and directive facilitation style as well as their prompting strategy seem to encourage the most learner engagement in discussion areas.

Compared to educators, mentors' participation profiles are at the other end of the spectrum with regard to the contribution types and learner engagement. They are the most socially active instructors with the lowest teaching and cognitive presences. Since most mentors were doctoral students, it is reasonable to suspect that their lesser expertise and knowledge of the course topics led to their lower-level teaching and cognitive presences. Additionally, as lead educators and educators stated in interviews, a lack of confidence and experience in dealing with content questions may lead mentors to focus their activities on social aspects. What stands out about mentors' contributions is the highest level of facilitating discourse and group cohesion among the three instructor roles, which emphasises their supportive and facilitative role. The contrasting participation pattern of mentors and educators is important as it suggests that their

activities are complimentary. That is, while mentors mainly meet learners' social needs, educators address their content-related and academic needs. This also shows that CoI presences or contribution types could be distributed among instructor roles rather than all roles focusing on all three presences.

Learners showed the lowest explicit engagement and highest disengagement with mentors. However, learners' implicit engagement with mentors' contributions is similar to their implicit engagement with those of educators. This implies that learners prefer to acknowledge mentors' contributions by liking them rather than responding to them and engaging with them in a conversation.

Lead educators' participation profiles are a mixture of mentors' and educators' participation patterns. They resemble educators in their social presence and mentors in teaching presence. However, their teaching presence is different from both of the other instructor groups because of the highest instances of design and organisation indicators. This is most likely because of their leading role in designing the course and their knowledge of course arrangements. Moreover, lead educators' cognitive presence is distinct from other instructors since they do not contribute to triggering events. Yet they show the highest level of exploration among the three instructor roles, which indicates their emphasis on exploring the course content with learners. What stands out about lead educators' contributions is that they divide their time and focus nearly equally across all presences (SP=34%, TP=34%, CP=32%) and provide a balanced instructor presence. Therefore, according to Garrison (2016, 2017) and Clarke and Bartholomew (2014), they are more likely to contribute to learning and learners' cognitive development.

Considering the discussed instructor profiles and learner engagement with them, a MOOC teaching team can use their collective time more productively in discussion areas by considering a) what learners value and engage with most, b) what each instructor role can provide to facilitate learning, and c) how instructors can distribute their contributions to provide a balanced instructor presence as a team.

6.6 Application of the CoI framework in the MOOC context

Applying the CoI framework for coding learner-instructor conversations in this study confirms Anderson's (2017) claim that the framework is robust enough to reveal and explain educational transactions in open and scaled contexts such as MOOCs. It also validates Garrison's (2018) observation that the generic nature of the framework enables examining and understanding learning in a variety of online educational settings including MOOCs. In this study, applying CoI to both the discussion dataset and instructor interviews allowed a comprehensive understanding of the learning discourse

in MOOC discussions, particularly from an instructor perspective. It also revealed the focus of discussions and the extent to which they foster learning. Additionally, it showed how instructors and learners direct their time and effort in discussion areas, and it shed light on the components and indicators that are stronger or, conversely, absent in MOOCs. Furthermore, it uncovered the required conceptual and operational adjustments to the CoI indicators to make the framework fit for MOOCs, whilst it revealed emerging indicators. What is more, it brought to the fore the reasons why creating a community in MOOCs is difficult.

Considering that the underpinning theories of the CoI framework and FutureLearn MOOC design are quite similar (constructivism and social constructivism), all the CoI presences and categories crossed easily to the MOOC learning environment. However, due to emphasis on self-regulation in MOOCs (McAuley *et al.*, 2010; Clarke, 2013), Shea *et al.*'s (2012; 2013) proposed learner presence was required as the original framework does not capture learners' planning, monitoring or reflection (on the learning process) activities. This suggests if CoI is used for studying learner discussion behaviours in MOOCs or informal educational settings, four presences must be considered. However, this addition requires some modifications of the learner presence indicators (as outlined in **3.4.5.6**) to resolve the overlap between this presence and the original CoI presences. For example, within Strategy Use, *offering* must be eliminated from *offering and seeking clarification/additional information* since it overlaps with *supplying clarifying information* within teaching presence.

Furthermore, considering MOOC course design (e.g. no formal assessment, flexible scheduling of the course), the re-operationalisation and re-conceptualisation of some indicator definitions are necessary. This includes changing the operational definitions of *asking questions* and *expressing agreement/disagreement* within social presence, and *setting curriculum and communicating assessment methods, design methods* and *presenting content/questions* within teaching presence. It is essential to specify that *asking questions* within social presence only includes non-content and non-task questions to avoid overlaps with asking questions for triggering events (cognitive presence) and for drawing in participants (teaching presence). Similarly, *expressing agreement/disagreement* must be limited to non-tasks with a social function to differentiate agreements and disagreement for exploration and integration of cognitive presence. The operational definition of *setting the curriculum* must be extended to cover information about how the course operates and how learners can navigate the course material in addition to the original activities of communicating important course information and outcomes. Moreover, formal assessment information in this indicator must be replaced by information about self and peer-assessment to fit MOOC

assessment patterns. The definition of *design methods,* similarly to *setting the curriculum,* is extended to include MOOC-specific information such as instructions for late joiners or information about course reiterations. *Presenting content/question* is another teaching presence indicator whose definition needs a change and separation of components. This indicator is originally defined as presenting content and directing questions to learners (Anderson *et al.*, 2001). However, in MOOCs, content presentation mainly occurs through videos, and questions are directed to learners through discussion tasks. Therefore, it is more practical to separate *presenting content* from *presenting questions* and to relabel the former as *supplying additional information/content* still within the same category, i.e. direct instruction. Furthermore, one major and one minor re-conceptualisation should be considered. First, *establishing time parameters* is not applicable in the sense it is used in traditional online courses to deal with course deadlines; instead, it informs learners of timeframes for activities and course events such as online Q&As. Considering the newly acquired meaning of this indicator in MOOCs, *advising course timeframe* is a more suitable label for this indicator. Second, following Shea *et al.* (2010), the minor re-conceptualisation of adding disagreement to *expressing agreement* is needed, since in discussions there are instances of disagreements with a social function that must be distinguished from disagreements within cognitive presences.

In addition to the discussed modifications, the results revealed three new indicators that reflect unique aspects of learning and discussion activities in MOOCs. They include *support for communications* (social presence), *marketing the course/institution* and *supplying additional information* (teaching presence). The rise of *support for communications* is a direct result of MOOC learner diversity. It appears that learners' diverse backgrounds, cultures, values, and language levels cause communication misunderstandings that must be resolved; otherwise, the necessary open and secure environment for learner communications cannot be created. This is an aspect that may require new strategies as instructors' existing teaching strategies are often not effective for dealing with the global and multicultural context of MOOCs. Likewise, *marketing the course or institution* is an activity that instructors usually do not engage with in discussion areas, particularly in traditional online courses; however, since one of the drives for delivering MOOCs is marketing the institution and courses to potential students (Czerniewicz *et al.*, 2017) and to a massive audience (Haavind and Sisteck-Chandler, 2015), instructors' discussion activities seem to expand to cover this aspect. This shows that instructor roles are diversified in MOOCs. The third emerged indicator, *supplying additional information*, most likely developed because instructors provided additional content-related information to compensate for learners' different levels of topic knowledge. The emergence of these new indicators reflects new instructor discussion

activities in MOOCs and indicates the influence of context on the CoI framework. As Kaul, Aksela, and Wu (2018) state, it suggests that the existing CoI indicators are not sufficient to capture all the dimensions of learning and teaching in a MOOC environment. Therefore, to ensure that the framework addresses the nuances of learning in MOOCs or other scaled-up learning contexts effectively, the use of a revised version developed and applied in this study is suggested.

In addition to revealing new indicators, the findings illustrate that some indicators are disappearing in MOOCs when instructors' activities are considered. Strategies such as *establishing netiquette, focusing and refocusing discussions,* and *assessing the efficacy of the process* are not used by instructors at all and indicators such as *expressing emotions, using humour, expressing (dis)agreement on non-tasks, identifying areas of agreement and disagreement,* and *summarising discussions* are hardly used (<1%). This shows how the emergence of new indicators and the disappearance of some existing ones is changing the dynamic and nature of CoI presences in MOOCs. However, the absence of some indicators (e.g. *summarising discussions*) does not necessarily mean that they do not exist in MOOCs; instead, it shows some teaching activities are relocated to outside the discussion areas (e.g. emails) because of the lack of scalability. Therefore, for a detailed understanding of instructors' activities, looking beyond discussion areas is essential.

It is also important to note that besides the emergence and fading of some indicators, MOOC scale and openness has led to variations in the use of some indicators. For example, collaborative teaching in MOOCs has resulted in the expansion of *drawing in participants,* since instructors invite both learners and other instructors to a conversation. Such variations give rise to instructor-instructor communications in discussion areas, which are not common in traditional online courses and reflect a different teaching dynamic in MOOCs. Another example is the loss of collective and group meaning of some indicators such as *reaching consensus or understanding,* most likely due to the structure and nature of discussions in MOOCs (i.e. the large numbers of threads).

Although the CoI framework requires some adjustments in the context of MOOCs, it provides a crucial and powerful lens to explore MOOC instructor activities. It also enables the understanding of the different nature of the three presences and the ways scale and openness can affect them. Nevertheless, the challenge of creating a community and discussion areas that "support focused synergy of minds through communication and commitment to a common interest and purpose" (Garrison 2016:8) remains, as the interests and purposes of MOOC learners are diverse (de Freitas, Morgan, and Gibson, 2015). Therefore, Dron and Anderson's (2014) suggestion of learning in 'sets', where learners with an interest in a topic but no interest in developing a closer group or

community study together, can better represent inquiry-based learning in MOOCs. If creating a community is the goal, then the design of the MOOC should incorporate the principles of CoI (Toven-Lindsey, Rhoads, and Lozano, 2015).

6.7 Contributions of the study

This study enhances the understanding of instructors' activities and contributions to MOOC discussion areas and helps move forward the under-investigated area of MOOC instructors. Before this study, research into MOOC instructors mainly focused on instructors' roles and demographics (Ferguson and Whitelock, 2014; Nacu *et al.*, 2014), their motivations (Hew and Cheung, 2014; Lowenthal, Snelson, and Perkins, 2018; Zhu, Bonk, and Sari, 2019), experiences and challenges of creating and delivering MOOCs (Zheng *et al.*, 2016; Stöhr *et al.*, 2017; Lin and Cantoni, 2018), or the way they learn to teach on MOOCs (Papathoma, 2019). However, instructors' activities in discussion areas and learners' reactions to them have remained a research gap that required addressing. By identifying the level of instructors' participation in discussions, the type and nature of their contributions and learners' engagements with them, this study has been one of the first attempts to address the aforementioned gap, and it has contributed to the existing knowledge of MOOC instructors, particularly when FutureLearn MOOCs are considered. It has also provided valuable insights into the dynamics of learner-instructor interactions in MOOCs and shed light on some characteristics of instructor-instructor interactions. Moreover, the study has revealed the types of instructor contributions and instructor roles that learners engage with most, while providing some indicators for more effective use of instructors' time and effort in discussion areas.

The contributions of this study can be divided into theoretical, practical, and methodological contributions. **Theoretically**, this study has advanced the understanding of the Community of Inquiry framework and has expanded its application to massive and open online educational settings. It has also improved the exploratory power of the framework by revisiting it in the MOOC context, revealing its potential and constraints and providing a revised model that considers activities not represented by the original framework. This revised model can inform future research into learning and teaching in MOOCs and other massive or open educational contexts. Additionally, the conclusions drawn from this study add to the body of CoI research. This includes establishing the following:

- the development of CoI presences even if the course is short and involves large numbers of demographically diverse learners

- the need for including learner presence when examining MOOC learning discourse
- the similarities and differences between the nature of the three presences in MOOCs and closed online courses
- the different developmental pattern of the presences over the duration of a MOOC compared to traditional online courses
- the end of some CoI indicators' lifespans and the emergence of new indicators
- the challenges of creating a sense of community in MOOCs

By demonstrating how the CoI framework can reveal different instructors' and learners' activities in MOOC discussions, and by pointing towards the necessary operational and conceptual adjustments to the original framework, this study has contributed to the theoretical understanding of CoI in MOOCs, particularly in FutureLearn MOOCs.

On a **practical level**, the findings provide useful insights into patterns of instructors' contributions to discussions and enable MOOC instructors to make research-informed decisions about their activities in discussion areas. They serve as a reference point for current and future MOOC instructors to evaluate the balance of presences in their contributions, while recognising the type of presence(s) that learners engage with most. The greater understanding of learners' engagement with instructor contributions highlights how some instructor activities are more engaging while others could be reconsidered to facilitate a more fruitful learning discourse. Taken together, these findings help MOOC instructors use their time and effort more effectively and in a way that fosters learning and greater engagement in discussion areas. In addition, findings about the type and level of learners' engagement with instructors provide a means by which course designers can reflect on where and when to devise discussion areas in a MOOC, what type of discussion tasks to consider and which instructor roles to allocate to maximise learner engagement and conversations in discussion areas.

By understanding instructor role profiles and contributions, the divisions of labour among instructors on a MOOC can be approached more effectively and in such a way that the roles complement one another rather than all roles focusing on one contribution type or activity. Additionally, findings about the facilitation style of each instructor role and their contributions towards moving learners through the inquiry process can inform MOOC teaching teams' decisions. These can lead to more effective collaborative teaching. Overall, research of this type can be significant to the instructors and course designers who create and deliver MOOCs or other informal and open courses.

Methodologically, quantifying and measuring participation in discussion areas by the frequency of posting comments has been criticised for not reflecting the content or quality

of the participation (Morgan, 2011; Epp, Phirangee, and Hewitt, 2017). Combining simple counts with content analysis of comments in this study provided a means to measure both the quality and quantity of instructors' contributions. This combined method has offered a more comprehensive picture of instructors' participation in MOOC discussions. Another methodological contribution of this study is the development of a CoI coding scheme for content analysis of contributions and conversations in a MOOC context.

6.8 Recommendations for practice

There are a number of important implications from the findings for MOOC instructors or online instructors who teach in a scaled, open or informal context. Drawing on evidence from the learner-instructor conversations, the following recommendations are offered for more effective instructor activities in MOOC discussion areas:

1. One of the major findings of this study is the higher level of instructors' social presence compared to their teaching presence. This indicates that instructors' contributions are not balanced, and learners do not receive sufficient academic support to move through the inquiry process. Thus, instructors are encouraged to ensure that they provide a balanced instructor presence which meets both the academic and social needs of learners.

2. Based on this study, instructors' teaching presence focuses mainly on facilitation, which indicates learners' thinking is mostly supported, but not challenged, and as a result, learners do not move beyond exploration of ideas and do not reach higher levels of cognitive presence. A key priority for MOOC instructors must be to consider the balance of facilitation and direct instruction in their contributions.

3. Main teaching strategies for facilitating cognitive presence, i.e. *focusing discussions, challenging ideas, identifying areas of agreement and disagreement and creating a summary*, appear very weak in MOOCs. Therefore, if instructors aim to enhance learning in discussions, they must address these aspects more effectively.

4. Another important finding of this research highlights instructors' emphasis on cohesive communications at an individual rather than group level. This weakens the potential for community formation. It is therefore recommended that instructors use *group references* more often to create a stronger group cohesion and to encourage a sense of community.

5. Learners appear to engage least with instructors' social contributions, most likely because they are socio-emotionally focused and do not meet learners' academic or content-related needs. Therefore, instructors must direct their social

contributions towards a learner's academic or professional goal(s) to make them more relevant to the learning process.

6. Learners engaged most with contributions that contained both social and teaching presences. Therefore, if increasing learner engagement is the aim, instructors must provide a balance of teaching and social presences in their contributions.

7. This study showed that in the majority of cases, an instructor contribution ends the conversation and reduces the likelihood of turn-taking and collaborative activities in discussions. Therefore, instructors may reconsider the timing of their contributions and allow a few exchanges before adding their contributions.

8. Inappropriate discussion tasks and lead-ins are identified as one of the causes for short learner-instructor conversations. Therefore, it is important that instructors design tasks that encourage conversation, challenge and test ideas, provide appropriate model contribution, and are targeted towards the higher levels of thinking. Instructors are discouraged from using questions that are too broad or too focused, are not problem-centric or are not divergent-thinking type.

9. The emergence of a new indicator for *supporting communications*, shows that the likelihood of communication misunderstandings in MOOC discussion areas is higher than in traditional online courses. As a result, instructors are required to consider strategies for dealing with learners' diversity (language, background, culture, values, knowledge) and to ensure discussion areas are secure environments for open communications.

10. It is suggested that instructors familiarise themselves with the CoI framework and use the revised model proposed here as an analytical tool to evaluate the balance of their contributions as well as being inspired by the teaching and social strategies offered by this framework.

11. Findings about FutureLearn instructor roles and learner engagement with them can inform the formation of teaching teams in FutureLearn MOOCs and the most suitable combination of the available roles.

6.9 Limitations

Although the research presented here provides a greater understanding of instructors' contributions to MOOC discussions and offers the discussed contributions to theory and practice (**6.7**), a number of limitations must be addressed in future research.

First, despite the study sample size being appropriate and representative of learner-instructor conversations in FutureLearn MOOCs, the single research setting, i.e. MOOCs

from one institution and one platform limits the generalisability of the findings to MOOCs offered by other platforms and institutions. The reasons for this decision have been a) gaining a deeper and more robust understanding of learner-instructor conversations based on one pedagogy (social constructivism) rather than mixed pedagogies, and b) limitations of access to other MOOCs within the restricted timeframe of this research. Studies including MOOCs offered by several institutions and platforms (e.g. EdX, Coursera) would produce more generalisable results. In addition, most studied MOOCs were from Arts and Humanities, given the availability of courses at the time of this study. Examining conversations from both hard (quantitative) and soft (qualitative) disciplines, which place different emphasis on interactions (Garrison, 2016), could build confidence in the generalisability of this study's findings while providing a good opportunity for comparative studies investigating the role of discipline. Secondly, due to time limitations, only data within the platform, i.e. discussion postings, were considered in the exploration of learner-instructor conversations. Future research would benefit from other data sources such as learner-instructor conversations outside the platform (e.g. Twitter or other social media).

Another limitation as rightly pointed out by some instructors in interviews has been following the common practice of measuring instructors' levels of contribution by the frequency with which they posted comments in discussion areas (Hara, Bonk, and Angeli, 2000; Mazzolini and Maddison, 2003, 2007; Akyol and Garrison, 2008; Arguello and Shaffer, 2015; Lowenthal, 2016; Zhao and Sullivan, 2017). Although this limitation has been addressed by going beyond the quantity of instructors' contributions and analysing the content of their postings to include the contribution quality too, it is necessary to investigate and find a more appropriate measure. A higher number of comments does not necessarily mean a higher level of contribution or instructor engagement with learners. Therefore, a systematic measure that incorporates both the quality and quantity of an instructor contribution to represent the "level of contribution" is needed. This new measure could benefit from considering the three domains of engagement (cognitive, behavioural and affective) to provide a more accurate picture of contribution or participation level.

Finally, it must be noted that this study did not attempt to statistically quantify the findings, as the content analysis of conversations was used to explore and not predict learners' and instructors' engagement behaviours with discussions. Quantitative statistical analysis in future research could confirm the statistical significance of the findings while allowing systematic and rigorous comparison of contributions by instructor roles and at different time segments of MOOCs.

6.10 Directions for future research

There are several areas for future research building on this study. Now that a comprehensive picture of learner-instructor conversations and instructors' activities in MOOC discussion areas is obtained, a natural next step would be to examine the effect of instructor contributions on learning through investigating such impact on learners' cognitive presence and course completion. It would be interesting to explore whether or not an instructor's contribution in medium and long conversations helps learners move to higher levels of Practical Inquiry, i.e. integration and resolution. In addition, since this study did not statistically examine the relationship between the content of an instructor's contributions and learner engagement with conversations, future co-relational studies would help to build a better understanding of such effects. Consistent with this line of inquiry would be examining learning and course completion in two types of MOOCs: those with and without instructors' involvement in discussions. As explained in **3.2**, MOOCs that were designed without instructors' involvement in discussion forums were excluded from the sample. Therefore, it would be interesting to compare whether instructors' participation in discussions has an effect on learning, learner engagement and course completion rates.

Another possible direction is to investigate the temporal aspects of learner-instructor conversations and the timeliness of instructor contributions, since this study focused only on the quantitative and qualitative dimensions. As discussed in **6.2**, one of the possible reasons for the lack of conversation continuity after an instructor's contribution is the long time-gap between a learner's comment and an instructor's response. Examining this and other time-based features of instructors' contributions, such as duration, sequence and salience could help uncover more aspects of instructors' activities in discussion areas.

Moreover, research into MOOC instructors would benefit from future studies that assess learners' perspectives about instructors' contributions and examine whether and to what extent such contributions facilitate learning. Such studies could be carried out through interviewing MOOC learners and using the CoI survey instrument.

Furthermore, as shown by this study and prior research, instructors do not seem to have a systematic approach for their interventions and identifying learner conversations that require urgent attention. Research looking at providing instructors with visualisation tools and learning analytics and examining the ways these tools impact instructor contributions could be another possible area of future research. A further area of investigation that has emerged from collaborative teaching in MOOCs and has created a variation of some teaching presence indicators is exploring the dynamics of instructor-instructor interactions and understanding the relationship among instructor activities in discussion areas.

The rich sample of learner-instructor conversations created for this study can be revisited with new research foci and analysis approaches to uncover more aspects of learner-instructor communications in MOOCs; some examples include: using Social Network Analysis to explore the interaction patterns and relationships in discussions, applying Tubman *et al.*'s (2018) social taxonomy to instructors' conversations, studying cross-cultural aspects of communications, applying Sollar's (2001) interaction model to explore learner-instructors interaction patterns, examining linguistic accessibility and inclusivity of instructor contributions, applying conversation or discourse analysis methods to examine communication aspects such as turn taking, sequence, lexical choices and repair strategies.

Considering the application of the CoI framework to MOOCs, future work should assess the revised version proposed and used in this study. It is recommended that the validity and reliability of revised and newly introduced indicators in additional datasets from different MOOCs and platforms be confirmed. This is important for moving forward the use of CoI for researching learning and teaching in the MOOC context. This study also analysed learner comments based on the CoI framework, and despite the emphasis in MOOCs on self-regulation and independent learning, learners' "learner presence", which represents their self and co-regulated activities was very low; further studies are required to better understand the underlying reasons for the low level of learner presence.

Chapter 7 **CONCLUSIONS**

MOOCs as a new form of online education have attracted the attention of researchers; however, little is known about MOOC instructors and in particular about their practices in delivering courses. This has been identified as a research gap since 2014 (Ross *et al.,* 2014; Stephens-Martinez *et al.,* 2014) and more recent studies (Zhu *et al.,* 2018; Lowenthal *et al.,* 2018) still highlight it as an area that richly deserves researchers' attention. Therefore, this study set out to explore what instructors do in MOOC discussion areas and how learners react to them. By addressing this central question, the research described in this thesis offers new insights into the type and level of instructors' contributions to MOOC discussion areas and enhances the understanding of the dynamics of learner-instructor interactions in open and large-scale educational settings. It also reveals features of instructors' contributions (e.g. balance of different contribution types) that can encourage or discourage learner engagement or hinder instructors' contributions from fostering higher-order learning or community formation. In addition, by taking a longitudinal perspective, this study enriches the knowledge of instructors' discussion activities during a MOOC. More importantly, by applying the CoI framework, the study not only enhances the theoretical understanding of the framework but also expands its scope and exploratory power to include MOOCs. It proposes a revised model that can inform future research into learning and teaching in MOOCs or other open, informal, and massive educational contexts.

Based on an extended methodology and a large sample, this study has shown that the majority of instructors' contributions to discussion areas are social (56%) and teaching (40%), with cognitive (4%) postings constituting a smaller proportion of instructors' contributions. This suggests that instructors do not focus equally on the social and teaching contributions and that there is an imbalance between the social and academic or content-related support that the learners receive. The lower level of teaching contributions means that the academic support to move learners through the inquiry process is not strong, especially as the level of learners' teaching comments is noticeably low. This removes the possibility of assuming that teaching responsibilities are shared between learners and instructors as hypothesised by the CoI or that learners receive the required academic support from peers. Thus, it can be argued that "teaching presence" as suggested by the CoI framework is not shared in MOOCs. The lower level of instructors' teaching presence also possibly forms one of the reasons that learners' cognitive presence in the studied MOOCs is low. In addition, instructors' teaching contributions are not balanced in their focus on facilitating the learning discourse and providing direct instruction. This suggests that while learners are supported in their thinking, the academic leadership and systematic scaffolding to move them through the

phases of inquiry and help them achieve higher levels of cognitive presence are weak. This has significant implications for raising instructors' awareness and informing their future decisions and priorities in discussion areas to facilitate learning.

The predominance of instructors' social contributions, on the other hand, indicates that their discussion activities are socially driven and are consistent with the FutureLearn design based on social learning. However, the high level of social presence is due to frequent use of simple group cohesion strategies such as greetings and vocatives. Whilst this reflects instructors' efforts to make learners feel comfortable sharing ideas and exchanging information and to create conditions for open communication, they are aimed at individual learners and do not contribute to community-building. The use of group references by instructors is minimal and this can explain the reason for network rather than community formation in MOOCs. Considering the diversity of learners' goals, commitment levels, knowledge, languages, and cultural values, which led to the emergence of a new social indicator (support for communication), as well as learners' selective participation in discussions, creating a sense of community in MOOCs is challenging for instructors. Therefore, what occurs in MOOCs is "learning in networks" where entrance and exit are not restricted and instead of "communities of inquiry", "networks of inquiry" are shaped. It is also observed that instructors' personal (2.5%) and open (9%) communications are noticeably infrequent and indicative of instructors' lack of desire to engage with these social aspects or the unfeasibility of doing so due to large numbers of learners.

Not surprisingly, cognitive contributions from instructors constitute the least frequent postings in discussions, demonstrating instructors' focus on supporting learners through social and teaching contributions. Since learners' cognitive presence is relatively low in studied MOOCs, it is possible that MOOC characteristics – particularly the course's short length – inhibit both instructors and learners from engaging with cognitive activities more. Nevertheless, the appearance of all three presences in instructors' and learners' contributions shows that CoI presences develop in MOOCs to varying degrees, despite the short course duration, and large numbers of demographically diverse learners. This also means that constructs which lead to learning based on the CoI framework are meaningful in the MOOC context.

Another important finding about instructors' contributions is their hybrid nature, whereby two or more presences or indicators co-occur in an instructor's comment. The most frequent combination includes teaching and social categories. Cohesive communications within social presence and facilitating discourse within teaching presence are the most recurring categories in instructors' postings and suggest that a

social and informal tone (cohesive responses) and an encouraging and supportive style (facilitating discourse) are becoming a fixture of instructors' contributions in MOOCs.

Another major finding of this study is the extent and the ways in which learners engage with instructors' contributions. It is found that learners do not engage with the majority of instructors' contributions (58%), most likely because they do not meet learners' needs, do not encourage a learner response, or may simply become lost in the large volume of comments. It is also possible that learners do not feel that they possess enough knowledge or background to engage with instructors. The most disengagement occurs when an instructor's contribution has a high level of social presence. By contrast, most learner engagement is evident when the contributions are focused on teaching presence.

When learner engagement in relation to FutureLearn instructor roles is considered, learners showed the highest level of engagement with educators and the lowest with mentors. This is an interesting finding, since the educators' discussion activities are very different from lead educators and mentors. The content of their contributions reflects a distinctive composition with the highest level of teaching and cognitive presences and the lowest proportion of social categories. In addition, their teaching presence mainly focuses on direct instruction, which means they adopt a more directive teaching style and provide more academic support, compared to other instructors. In the meantime, their facilitating strategies place more emphasis on inviting other learners to conversations, whereas lead educators tend to encourage the existing learners in a conversation to continue it. Moreover, educators' higher cognitive presence with an emphasis on triggering events and integration means that they are more supportive of learners' cognitive presence. Educators were also involved in the highest proportion of medium length conversations, and their short conversations with learners were fewer than lead educators and mentors. This shows educators encourage turn-taking and communication and their contributions are less likely to disrupt the flow of a conversation. Their middle position in the hierarchy of FutureLearn roles may similarly be influential in learners' engagement with them as learners may be intimidated by the lead educators' position or may not fully trust mentors' knowledge because of their status. These findings offer the most desirable instructor profile if learner engagement with instructors is needed. Mentors' discussion activities are contrary to educators –with the highest social and lowest teaching and cognitive contributions. This contrary participation pattern is complementary and shows CoI presences can be shared among instructors and lead to a more balanced contribution level in discussion areas.

The examination of instructors' participation in discussion areas also reveals that instructors contribute to discussions throughout the course of MOOCs. Most instructors' contributions are made within short conversations and since most of these conversations

are two-comment exchanges, it can be concluded that instructors' contributions do not encourage turn-taking, and that consequently, the potential for communication and collaboration decreases.

Following learners' participation, the volume of instructors' contributions declines as the courses progress. This decrease implies that the support learners receive from instructors decreases over time. Despite the drop in the number of all three contribution types, instructors' cognitive contributions do not decline considerably and as a result their relative importance increases modestly from the beginning to the end of MOOCs. Changes to the relative importance of instructors' teaching and social presences indicate an interaction (inter-presence relation) between these two presences: the higher proportion of social contributions gives way to teaching contributions as the courses progress. This is particularly evident from the beginning to the middle of the course. Then, towards the end of the course this interaction is more observable between instructors' teaching and cognitive presences, while social contributions remain at the same level. Thus, similarly to closed online courses, the interrelation among the CoI presence exists; however, the interaction between them is different.

From a theoretical perspective, this study showed that the CoI framework can describe educational interactions in MOOCs, and that all its presences and categories are meaningful in MOOC design, which is based on social-constructivist pedagogy. However, some indicators have acquired a new meaning and some others have required reconceptualisation and reoperationalisation of definitions. Moreover, three new indicators were needed to address activities that are context specific and that the original CoI does not consider. It also becomes apparent that for examining learner activities in MOOCs, in addition to the three original CoI presences, learner presence must be considered in order to uncover learners' self-regulated activities. Although the CoI framework required these adjustments, it provided a crucial and effective lens to explore the MOOC instructor contributions in discussions. It also enabled the understanding of the different nature of social, teaching and cognitive presences and the way scale and openness can affect them.

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Appendix 1: List of FutureLearn MOOCs for this study

MOOC	Course length (weeks)	Course Type	Course Category
MOOC 1	2	School/ Mini MOOC	Medicine and Health
MOOC 2	2	Credit bearing MOOC	Nature and Environment
MOOC 3	2	School/ Mini MOOC	Medicine and Health
MOOC 4	2	School/ Mini MOOC	Business and Management
MOOC 5	2	School/ Mini MOOC	Business and Management
MOOC 6	2	School/ Mini MOOC	Business and Management
MOOC 7	2	School/ Mini MOOC	Creative arts and Media
MOOC 8	2	School/ Mini MOOC	Business and Management
MOOC 9	2	School/ Mini MOOC	Business and Management
MOOC 10	2	School/ Mini MOOC	Business and Management
MOOC 11	2	School/ Mini MOOC	Business and Management
MOOC 12	2	School/ Mini MOOC	Business and Management
MOOC 13	2	School/ Mini MOOC	Business and Management
MOOC 14	2	School/ Mini MOOC	History
MOOC 15	2	School/ Mini MOOC	Nature and Environment
MOOC 16	2	School/ Mini MOOC	Nature and Environment
MOOC 17	2	School/ Mini MOOC	Nature and Environment
MOOC 18	3	MOOC/ CPD MOOC	Medicine and Health
MOOC 19	3	MOOC/ CPD MOOC	Creative arts and Media
MOOC 20	3	MOOC	Business and Management
MOOC 21	4	MOOC/ CPD MOOC	Medicine and Health
MOOC 22	4	MOOC	Business and Management
MOOC 23	2	Mini MOOC	Business and Management
MOOC 24	2	Mini /CPD MOOC	Nature and Environment
MOOC 25	3	MOOC	History
MOOC 26	3	MOOC	Nature and Environment
MOOC 27	6	MOOC	Education

Mini-MOOCs:
What: discovering knowledge, exploring subjects, online learning community
Who: New/returning to learning; life-long learners; prospective students
MOOCs:
What: Immersive HE level learning experience; online learning community
Who: New/returning to learning; life-long learners; professionals; students
CPD MOOCs:
What: Continuing professional development; professional body/employer requirement
Who: Professionals; postgraduates

	Indicator	Code	Definition	Example
Forethought t and Planning (FP)	Goal setting	FP1	Learners deciding upon specific actions and outcomes	*This week I'm going to continue going through these steps and try to accustom myself to the 3-fold rhythm and sequences of the etude.*
	Planning	FP2	Learners deciding on methods or strategies appropriate for doing the tasks and activities (answer to how they will do sth)	*In future I will read these posts in chronological order (so I need to start and the bottom and read up!)*
	Assigning tasks to self /others	FP3	Learners distributing, sequencing tasks and sub-tasks to self/others for future completion (answer to what will they do)	*I will have a look at Warrior Nation.*
Performance Monitoring (M)	Checking for understanding	M1	Learners seeking verification of understanding of tasks, learning activities, events or processes (not the content)	*Are we supposed to fill out "Realise your vision" before or after the 1st week's topic videos and case studies? Or should I do this part first?*
	Identifying problems or issues	M2	Learners identifying difficulties or problems (related to materials, technologies) that interfere with completion of tasks, performance, products or other outcomes.	*Could someone from the team possibly look at the answer to the final question of the test? What I'm certain is the correct option kept coming up as incorrect (at least on my laptop)*
	Noting completion of tasks	M3	Comments between learners that indicate that certain tasks or activities have been finished to support attaining a goal	*I have now found the link in 1.11, signed up with Academia.edu, and got that particular article. Have also forwarded my remark above to the Feedback.*
	Evaluating quality	M4	Evaluating the quality of a learner's product, its content or its constituent parts as learners work toward completion	*I answered off top of my head and did better than I thought I would but like you said being on this course I should have got 10/10!!!*
	Observing or monitoring during performance and taking corrective action	M5	Statements that monitor individual or group performance that result in corrective action based on feedback or reflection	*I have looked at different sources for my exhibition and have various links, but hadn't thought of using Padlet, so will give it a go!*
	Appraising **personal** interest, engagement or reaction	M6	Comments between learners about self or others' engagement, interest, commitment or participation; Personal reactions to tasks, materials and activities (NB: Statements must be related to the completion of the task, not the content of the discussion)	*I did not contribute much online and was unable to partake in the chat room sessions. I found the course moved at quite a pace and I felt I would need more time to reflect on the questions before giving written answers for all to see! I think this may reflect my age and the way I had studied in the past.*
	Recognising learning behaviours of self or group (i.e., metacognitive knowledge)	M7	Statements about individual or group's preferences, strengths/weaknesses NB: Statements must be related to the completion of the task or process. Avoid coding content of the discussion.	*Although I am a 'words person', I find writing useful for recording thoughts about movement (including frustrations) but not at all useful for learning/recording movement.*

Appendix 2: Learner presence coding scheme

	Noting use of strategies	M8	Statements that illustrate that learners are mindful and aware of the strategies that they are using	*Taking notes in particular (or a learning log in this case) seems to be something I don't do immediately but starts when something I want to follow up on catches my imagination.*
Performance 2) Strategy use (SU)	Seeking, offering or providing help	SU1	Requesting, offering, or providing assistance related to learning materials, tasks, processes or products	*I think I`ve missed the part where JP had explained the volitional reflex. can you tell me where it was?*
	Recognising a gap in knowledge	SU2	Statements indicating that learners are aware of a gap in knowledge and its connection to the current task, process or product.	*I must say I didn't know of any heroines initially. I eventually located information about Dr, Elsie Inglis who was one of only 500 qualified female doctors in Britain in 1914.*
	Noting outcome expectations	SU3	Statements in which learners acknowledge the relevance of current tasks or processes to a future outcome	
	Seeking clarification/additional information	SU4	Seeking clarification or additional information (task-related only)	*I should like to know a bit more about how Germany is remembering (or not) this period of time. Is it too late to ask for direction here?*
	Reviewing	SU5	Comments noting the need to review, or the completion of reviewing content related to the course.	*I would need to refer to this chapter in order to review the principles of this philosophy.*
Reflection (R)	Change in thinking	R1	Statements that indicate a change in thinking as a result of process, product or outcome	*As a historian/literary sort of person, it is only recently (actually I've learnt this through one of my PaR PhD students) that I've realised that there are some things we can really only learn through practice, simply reading about it is not enough. I've had to somewhat swallow my archive-obsessed pride here.*
	Causal attribution of results to personal or group performance	R2	Statements in which learners credit their results to their performance (i.e., use of forethought/planning, monitoring, strategies)	*9/10. What is interesting and ironic, because of our study of the War and media/images, is that most of my knowledge comes from reading historical fiction, and watching films, and not so much non-fiction.*
	Reflection on learning outcome or learning process	R3	Statement in which learners reflect on the learning process or the learning outcome (knowledge and skill acquisition)	*This has been a beneficial week. Apart from the 3 levels of innovations, I learned of the business model and organisation innovation other than the other 3 types: product, service & process.*

	A	B	C	D	E	F	G	H	I	J	P	U	Z	AA	AB	AC	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BG	BH	BI	BL	BM	BN	BO	BP
1		Course	Instructor	1st,2nd,3rd of a course	Conversation Length	Nvivo classifer	identifier	Total No. of comments	Ed's comment	No. of likes	5	4	3	3	3	3	2	2	2	2	2	1	1	1	1	1	1	ED	ED	ED	ED	ED	ED	ED	ED	ED	ED	1	1	1	1	2	2	2	3	3	3	3	3
2	✓	BS	LE	1st	L	1	1	13	6	7	EX3	EX3	CO1	CO2	IN1	FD5	CO1	CO2	DI1	FD2	EX3	TE2	FD5					CO1	FD3	DI6								EX3							AF1	EX1	CO3	I2	CO2 EX1
3	✓	BS	LE	1st	L	1	1	13	13	1																		EX1	CO2																			
4	✓	BS	LE	1st	M	2	1	8	3	1							EX3					EX3	AF2					CO1	CO2	FD3								CO1	CO2	CO1					EX2	EX3	TE2	EX3	
5	✓	BS	LE	1st	S	3	1	2	2	0												CO1	AF3					CO1	CO2																				
6	✓	BS	LE	1st	S	3	2	2	2	0												CO1	AF3					CO1	CO2																				
7	✓	BS	LE	1st	S	3	3	2	2	0												CO1	AF3	CO1				CO1	CO2																				
8	✓	BS	LE	1st	S	3	4	2	2	0												R3						CO1	I4																				
9	✓	BS	LE	1st	S	3	5	3	2	1												EX3						FD3	EX1									EX3											
10	✓	BS	LE	1st	S	3	6	2	2	0												AF3	AF1	M1	I1	I4	CO1	CO1	CO2	DO2	CO1																			
11	✓	BS	LE	1st	S	3	7	4	3	0							CO2	EX1	TE2	FD5		IN2						DI6	DO1	CO3	FD5							EX1	I4		CO2								
12	✓	BS	LE	1st	S	3	8	4	2	0												EX3						FD3	DI1									EX3				EX3							
13	✓	BS	LE	1st	S	3	9	5	2	5												IN2						FD3	CO2	DO1	FD3	I1						TE2				FD3	CO2	IN1	CO2	EX3			
14	✓	BS	LE	1st	S	3	10	2	2	0												EX3						FD3	EX1	CO2																			
15	✓	BS	LE	1st	S	3	11	2	2	0												IN2	AF2	CO2				FD3	CO2	DO1																			
16	✓	BS	LE	1st	S	3	12	3	2	1												EX3						FD3	DI6B									CO1	CO2	EX2								
17	✓	BS	LE	1st	S	3	13	2	2	0												I4	EX3					CO1	CO2	CO1																			
18	✓	BS	LE	1st	S	3	14	2	2	0												EX3						FD3	EX1																				
19	✓	BS	LE	1st	S	3	15	4	2	3												EX3						FD3	AF2									AF2				AF2							
20	✓	BS	LE	1st	S	3	16	3	3	1							EX1	FD3				TE2						EX1																					
21	✓	BS	LE	1st	S	3	17	5	3	3							EX3					EX3						FD3	EX1									CO2	AF3	EX3		EX3							
22	✓	BS	LE	1st	S	3	18	3	2	0												TE2	EX3	M1	AF1			CO1	CO2	DI6								I4		CO2	EX1								
23	✓	BS	LE	1st	S	3	19	2	2	0												AF3						CO1	CO2																				
24	✓	BS	LE	1st	S	3	20	3	2	0												AF3						CO1	CO2									CO1	AF1										
25	✓	BS	LE	1st	S	3	21	2	2	0												AF3						CO1	CO2	I3																			
26	✓	BS	LE	1st	S	3	22	5	2	1												EX3						CO1	CO2	FD3	DI4	DO1	FD3					IN2				CO2	DI6B	EX3					
27	✓	BS	LE	1st	S	3	22	5	5	0																		FD3	CO2	EX1	DO1	DI1	I4	AF2	CO3	I3	I1												
28	✓	BS	LE	1st	S	3	23	3	2	3												I4	TE2					CO1	CO2	FD3	DI6							EX3											
29	✓	BS	LE	1st	S	3	24	4	2	4												TE2	FD5					DI6	DO1									TE2	EX3			EX3	DI7						

Appendix 3: Recording coded data in conversation format

Appendix 4: Invitation email to instructors

From: Fereshteh Goshtasbpour
Sent: 12 February 2017 22:31
To: Ed1 <Ed1@XXX.ac.uk>
Subject: Request for an interview in April

Dear Ed1,

I am a PhD student in the School of Education and I'm looking at MOOCs offered by the University of XX.

Your course*, [NAME] (first run, 2014),* is one of the courses that I'm working on and I was wondering if I could interview you as one of the educators involved with this course. I attached my project information sheet for your information.

I understand how busy you might be at this time of the year; but I was wondering if you could consider the possibility of sparing between 45 minutes to an hour in **April** for an interview.

Many thanks and I look forward to hearing from you.

Best wishes,
Fereshte

Fereshte Goshtasbpour
PGR students
School of Education
University of Leeds

Appendix 5: Interview protocol

Interview with MOOC Instructors

1. Introduction
- Thank the instructor for their time
- State the purpose of the interview and inform them of the discussion dataset
- Obtain consent
- Ask for their permission to record the interview

2. The instructor's demographic information
- Years of teaching experience
- Highest qualification (only for mentors)
- Online teaching experience before teaching on MOOCs
- Experience of online learning as a student
- Number of MOOCs you have been involved with
- Trainings received for delivering MOOCs? If not, would you have valued training? What should it have covered?

3. Questions
Warm-up question: So you were lead educator/educator/ mentor on XX. What did it entail in terms of delivery stage of a MOOC?

Can you describe to me how you approached discussions in your MOOCs so that I can get a picture in my head.

[Engagement with discussions]

1. How often did you go to the discussions during the course of your MOOC? How long was it typically?
2. To what extent was your activity in the discussions planned? Did you follow a set procedure? If so, can you please talk me through it?
3. What were your priorities for the discussions?
4. How did you locate opportunities to support learners in discussions?
5. What types of learners' comments did you respond to mostly? Why? Did you use any of the FutureLearn discussion tools to filter comments?
6. Are there any particular types of learners' comments that you didn't respond to? Why is that?
7. What kind of comments did you mostly make? What did they address? Why do you feel learners need more of this type of comments? (If they find it difficult to answer: Would you say roughly that most of your comments are focused on teaching pedagogy or other issues? Why?)
8. What criteria did you use, if any, to decide about the level and type of your engagement with learners' comments?
9. What type of your comments do you feel learners engage with most?
10. When a few learners were engaged in a conversation, did you join in? If so when? Why is that?

[Division of work]

1. Your MOOC included X number of other educators and mentors. Can you describe how you decide about "who" engages with "what" and "when" in discussions?
2. Was each instructor tasked with specific discussion activities? If so, what were they? Did you contribute to conversations where other instructors had already engaged with learners? (follow up as appropriate)
3. What differences do you see between these three roles (lead educator, educator and mentor) in terms of engaging with learners and discussions?
4. Why do you think some of the instructors on your MOOC contributed so little or sometimes not at all to the discussions?

[Reasons for contributing to discussions]

1. What outcomes did you intend to achieve by contributing to discussions?
2. In what ways do you think your comments helped learners and contributed to their learning? (Or What did you expect learners to achieve from interactions with you or from your comments?)
3. Did you have any problem to engage with learners? If so, can you name a few of them/ the most important one?

[Feelings and attitude towards contributing to discussions]

1. To what extent did you enjoy engaging with MOOC discussions?
2. What was the best thing about contributing to the discussions? And what was the worst?

[Changes over time]

1. Did you have consistent engagement with the discussion throughout the duration of your MOOC? Why? Why not?
2. Did you change at all in the way you engaged with the discussions during the course?

[Concluding question]

In your ideal engagement with discussions what would you do? How would you do things differently ……?

4. Closing:

Would you like to add anything……..
Thank the instructor.

Demographic info	Ed1	Ed2	LEd2	M4	M3	LEd3	Ed4	Ed3	LEd1	M1	Ed5	M2
Teaching experience (Years)	3	7	10	10	5	18	30	22	22	3	19	3
Education level	EngD	Msc	BA	PGCE	PGCE	PhD	PhD	PhD	PhD	PhD	PhD	MA
Online teaching/learning experience	N/Y	N/N	Y/N	N/N	N/N	N/N	N/N	N/N	N/Y	N/N	N/Y	N/Y
No of MOOCs	1	1	1	2	1	1	1	1	1	1	1	1
Training received	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Workload allocated	No	No	No	No	NA	Partly	No	No	No	No	No	NA
Warm-up question												
How they perceived their role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Engagement with discussions												
Engagement: How often	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	✓
Engagement: planned activity	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓
Discussion priorities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Locating learning opportunities	✓	x	✓	✓	✓	✓	x	✓	✓	✓	✓	✓
Prompts to respond	✓	✓	✓	✓	✓	✓	x	✓	✓	✓	✓	✓
FL discussion tools	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓
Not responding to comments	✓	✓	x	✓	✓	✓	x	✓	✓	✓	✓	✓
Type of comments they make	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓
Comments Ls engage with most	✓	DNT	✓	✓	✓	DNT	DNT	✓	DNT	✓	DNT	✓
Criteria for engagement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Join in conversations? Why/why not?	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓
Division of work and Roles (LED, ED,M)												
Specific tasks for each role	DNT	✓	✓	DNT	✓	✓	✓	DNT	✓	✓	✓	✓
Engage while other Ed engaged	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
The difference between roles	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Why little contribution	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	DNT	✓
Why of engagement, feeling and attitudes												
Why and what outcome	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
How their comments help Leaners	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Any problems to engage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Enjoying discussions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Best thing about discussions	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓
Worst thing about discussions	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓
Changes over time												
Changes in teaching strategies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Consistent engagement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
How they would do things differently	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Appendix 6: Interview checklist

Appendix 7: The breakdown of learners' contributions in discussions

Comment type	N	%
Social Presence	**1459**	**55**
Personal Communication (Affective)	**504**	**34**
Expression of Emotions	128	25
Use of Humour	21	4
Self-disclosure	356	70
Open Communication (Interactive)	**260**	**18**
Asking questions (non-task)	24	9
Quoting from others' messages- referencing explicitly to others' messages	11	7
Expressing agreement/disagreement	19	7
Complimenting and expressing appreciation	190	73
Support for communication	16	6
Group Cohesion (Cohesive)	**695**	**48**
Phatic and Greetings	344	50
Vocative	248	36
Group reference	43	6
Course reflection	60	9
Teaching Presence	**90**	**3**
Design and Organisation	**4**	**4**
Setting curriculum and communicating assessment methods	2	50
Design methods	0	0
Establishing time parameters	0	0
Utilising medium and technology effectively	1	25
Establishing netiquette	1	25
Making macro-level comments about course content	0	0
Facilitating Discourse	**53**	**6**
Identifying areas of agreement-disagreement	0	0
Seeking to reach consensus-understanding	4	8
Encouraging, acknowledging or reinforcing student contributions	32	60
Setting climate for learning	2	4
Drawing in participants, prompting discussion, presenting follow up topic for discussion	15	28
Assessing the efficacy of the process	0	0
Direct Instruction	**33**	**37**
Presenting content-question	0	0
Focusing (re-focusing) discussion on specific issues	0	0
Summarising the discussion	1	3
Confirming understanding through assessment and explanatory feedback	1	3
Diagnosing misconceptions	0	0
Supplying clarifying information	3	9
Supplying additional information	3	9
Making explicit reference to outside material	25	76
Cognitive Presence	**940**	**36**

Triggering Event	**116**	**12**
Recognising Problem	31	27
Sense of puzzlement	85	73
Exploration	**727**	**77**
Exploration within the online community	124	17
Exploration within a single message	12	2
Brainstorming and information exchange	570	78
Suggestions for consideration	19	2
Leap to conclusions	2	<1
Integration	**93**	**10**
Integration among group members	35	38
Integration within a single message	43	46
Connecting ideas (synthesis)	14	15
Creating solutions	1	1
Resolution	**4**	**<1**
Various application to real world testing solutions	4	0
Defending solution	0	0
Learner presence	**144**	**5**
Forethought and planning	**22**	**15**
Coordinating and assigning tasks to self and others	2	9
Goal setting	16	73
Planning	4	18
Performance (monitoring)	**69**	**48**
Checking for understanding	7	10
Identifying problems or issues	17	25
Noting completion of tasks	1	1
Evaluating the quality of an end product/its components	6	9
Observing or monitoring during performance and taking corrective actions	13	19
Appraising personal interest, engagement or reaction	13	19
Recognising learning behaviours of self or group	8	12
Noting use of strategy	4	6
Performance (Strategy use)	**16**	**11**
Seeking, offering or providing help	7	44
Recognising a gap in knowledge	2	12
Noting outcome expectations	0	0
seeking clarification	7	44
Reviewing	0	0
Reflection	**37**	**26**
Change in thinking	3	8
Casual attribution of results to personal or group performance	2	5
Reflection on learning process or learning outcome	32	86

Appendix 8: Changes to learners' contributions over time

Comment type	Beginning		Middle		End	
	N	%	N	%	N	%
Social Presence	**915**	**63**	**282**	**19**	**262**	**18**
Personal Communication (Affective)	351	24	98	7	55	4
Open Communication (Interactive)	128	9	56	4	76	5
Group Cohesion (Cohesive)	436	30	128	9	131	9
Teaching Presence	**59**	**65.5**	**14**	**15.5**	**17**	**19**
Design and Organisation	2	2	2	2	0	0
Facilitating Discourse	35	39	7	8	11	12
Direct Instruction	22	24	5	5	6	7
Cognitive Presence	**475**	**50**	**316**	**34**	**149**	**16**
Triggering Event	69	7	34	4	13	1
Exploration	366	39	247	26	115	12
Integration	39	4	33	3	20	2
Resolution	1	<1	2	<1	**1**	<1
Learner presence	**58**	**40**	**44**	**30**	**42**	**29**
Forethought and planning	9	6	6	4	7	5
Performance	37	26	26	18	22	15
Reflection	12	8	12	8	13	9
TOTAL	**1507**	**57**	**656**	**25**	**470**	**18**

Appendix 9: Learners' initiation and instructors' responses

Learner's initiation	Instructor's response	N	%	Total	
CP	SP-TP	131	47	277	36%
	TP	41	15		
	TP-TP	41	15		
	CP	23	8		
	SP-CP-TP	18	6		
	TP-CP	16	6		
	SP-CP	6	2		
	SP-SP	1	>1		
SP-SP	SP-SP	173	63	272	35%
	SP-TP	82	30		
	SP	13	5		
	TP	4	1		
SP-CP	SP-TP	37	57	65	8%
	TP	9	14		
	TP-TP	8	12		
	SP-CP	6	9		
	CP	3	5		
	SP-SP	1	1.5		
	TP-CP	1	1.5		
SP	SP-SP	31	51	61	8%
	SP-TP	27	44		
	SP	3	5		
SP-LP	SP-SP	20	53	38	5%
	SP-TP	12	32		
	SP	3	8		
	TP	1	3		
	SP-CP	1	3		
	TP-CP	1	3		
CP-CP	SP-TP	11	61	18	2%
	CP-CP	4	22		
	CP	3	17		
LP	SP-SP	4	33	12	1.5%
	SP-TP	4	33		
	SP	2	17		
	TP	2	17		
CP-LP	SP-TP	7	58	12	1.5%
	SP-TP	2	17		
	CP	1	8		
	SP-SP	1	8		
	SP-CP	1	8		
CP-TP	TP-SP	6	60	10	1%
	TP	2	20		
	TP-TP	2	20		

SP-CP-LP	SP-TP	8	80	10	1%
	TP	1	10		
	SP-TP-CP	1	10		
SP-TP	SP-TP	4	80	5	1%
	SP-SP	1	20		
TP	TP	1	33	3	>1%
	SP-SP	1	33		
	SP-TP	1	33		
LP-LP	SP-TP	1	100	1	>1%

Appendix 10: Consent form for interviews

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Consent Form
Interactions in Massive Open Online Courses (MOOCs)
The Case of Educators' Contributions to Discussions

	Add your initials next to the statement if you agree
I confirm that I have read and understand the information sheet dated 14/10/2016 explaining the above research project and I have had the opportunity to ask questions about the project.	
I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline. I will inform Fereshteh Goshtasbpour (edfg@leeds.ac.uk; 07884475229) of my withdrawal. I know by using FutureLearn platform I have already consented my course data to be used for research purposes. Therefore, after my withdrawal, only my interview data will be removed and destroyed.	
I give permission for members of the research team (two supervisors) to have access to my anonymised responses. I understand that my name will not be linked with the research materials, but I might be identifiable in the report or reports that result from the research if direct quotations from my discussions are used because the content of my discussions are licensed by Creative Commons which requires attribution to the author. I understand that my responses during the interview will be kept strictly confidential.	
I agree for the data collected from me to be stored and used in relevant future research in an anonymised form.	
I understand that other genuine researchers may use my words in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	
I understand that relevant sections of the data collected during the study, may be looked at by individuals from the University of Leeds or from regulatory authorities where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	
I agree to take part in the above research project and will inform the lead researcher should my contact details change.	

Name of participant	
Participant's signature	
Date	
Name of lead researcher	Fereshte Goshtasbpour
Signature	
Date*	

*To be signed and dated in the presence of the participant.
Once this has been signed by all parties the participant should receive a copy of the signed and dated participant consent form, the letter/ pre-written script/ information sheet and any other written information provided to the participants. A copy of the signed and dated consent form will be kept with the project's main documents kept in a secure location.

Project Title	Document type	Version #	Date
Interactions in Massive Open Online Courses (MOOCs)	Educator consent form	2	14/10/16

Appendix 11: Project information sheet

Fereshte Goshtasbpour
edfg@leeds.ac.uk
07884475229

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Participant Information Sheet

**Interactions in Massive Open Online Courses (MOOCs)
The Case of Educators' Contributions to Discussions**

You are being invited to participate in a doctoral research project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and ask me if anything is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the project?

The overall aim of this research is to build a comprehensive picture of teaching practices in Massive Open Online Courses particularly in their discussions where (lead) educators and mentors interact with learners. This will be achieved by examining the lead educators', educators' and mentors' engagement with exchanges in these discussions.

Why have I been chosen?

Since you are a (lead) educator or a mentor on one of the Massive Open Online Courses offered by the University of Leeds, you are invited to take part in the study. It is your interactions with learners and your contributions to the discussions that I am interested in.

What do I have to do?

The project will last for two years, however you will be involved only for one 45-minute to an hour interview session and no more than a few follow up e-mails (if necessary).

1) For the first stage of this study, you are not required to do anything since the transcripts of the discussions of your already completed course will be studied. Before analysing these transcripts, they will be fully anonymised so that the data is unlinked from you and your course as much as possible. This will be done by using course general areas (e.g. Science) instead of course names, giving pseudonyms to you, removing any reference to your contact details or social media accounts and in general removing any direct or indirect identifier of you.
Yet, for this stage, I require your permission to use extracts from your discussions for direct quotations in the final report or conference presentations. These extracts cannot be anonymised because your contributions to discussions are licensed by Creative Commons which requires attribution to the author.

2) For the second stage, which will start after the completion of the first stage, you will be invited to an interview to talk about your contributions to the discussions as well as factors that influence your contributions. The interview will be audio recorded and fully

transcribed. Data from the interviews will be analysed to find common themes. Any direct citations from these interviews will be fully anonymised.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and will be asked to sign a consent form. You are free to withdraw at any time, without giving a reason. If you withdraw, your interview data will be removed from the data set and its audio file will be destroyed.

What are the possible benefits and risks of taking part?

While there may be no immediate benefits for you by participating in this project, it will give you an opportunity to reflect on your practice in massive open online courses. You can also discuss the challenges that managing and structuring of such massive courses bring to your teaching, which in turn can be brought to the attention of course designers, MOOC providers and the Digital team for future courses.

This research will pose no physical, psychological or social risk to you. Any concerns about your professional identity (when discussing data with my supervisors) will be removed by fully anonymising your data and keeping your personal information confidential.

What will happen to the results of the research project?

The findings of the study will be reported in the final doctoral thesis and might be published. The data (discussion transcripts and interview files) will be stored in a secure place complying with the Data Protection Act (1998) and the University's Code of Practice on Data Protection for two years after the completion of the study. Interview audio files will be destroyed once they are fully transcribed. However, their anonymised transcripts together with discussion transcripts are planned to be kept securely for up to ten years for additional or subsequent research.

Who is organizing the research?

I am a PhD student at the University of Leeds and my research is funded by the School of Education at this university.

This study has been reviewed and given a favourable opinion by Research Ethics Committee on 22/11/2016, ethics reference AREA 15-119.

Appendix 12: Project ethical approval

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Fereshteh Goshtasbpour
School of Education
University of Leeds
Leeds, LS2 9JT

ESSL, Environment and LUBS (AREA) Faculty Research Ethics Committee

University of Leeds

16 February 2020

Dear Fereshteh

Title of study:	**Teaching Practices in Massive Open Online Courses (MOOCs): The Case of Educators' Interventions in Discussion Forums**
Ethics reference:	**AREA 15-119 amendment Oct 16**

I am pleased to inform you that your amendment to the research application listed above has been reviewed by a representative of the ESSL, Environment and LUBS (AREA) Faculty Research Ethics Committee and, I can confirm a favourable ethical opinion as of the date of this letter. The following documentation was considered:

Document	Version	Date
AREA 15-119 amendment Oct 16 fg_Amendment_form_nm.doc	1	26/10/16
AREA 15-119 amendment Oct 16 Letter to FutureLearn academic lead-V2.docx	1	26/10/16
AREA 15-119 amendment Oct 16 FG_Participant Information Sheet_V2_October 2016.docx	1	26/10/16
AREA 15-119 amendment Oct 16 FG_Educator Consent Form_V02_October 2016.doc	1	26/10/16
AREA 15-119 FG_ Educator_Participant Information Sheet_V1.docx	1	27/04/16
AREA 15-119 FG_ Training staff_Participant Information Sheet_V1.docx	1	27/04/16
AREA 15-119 FG_Educator Consent Form_V01_April 2016.doc	1	27/04/16

AREA 15-119 FG_Ethical_Review_Form_V2_nm.doc	1	27/04/16
AREA 15-119 FG_Trainer Consent Form_V01_April 2016.doc	1	27/04/16
AREA 15-119 Letter to FutureLearn academic lead-V1.docx	1	27/04/16

Please notify the committee if you intend to make any further amendments to the original research as submitted at date of this approval as all changes must receive ethical approval prior to implementation. The amendment form is available at http://ris.leeds.ac.uk/EthicsAmendment.

Please note: You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, and other documents relating to the study. This should be kept in your study file, which should be readily available for audit purposes. You will be given a two week notice period if your project is to be audited. There is a checklist listing examples of documents to be kept which is available at http://ris.leeds.ac.uk/EthicsAudits.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to ResearchEthics@leeds.ac.uk.

Yours sincerely

Jennifer Blaikie

Senior Research Ethics Administrator, Research & Innovation Service

On behalf of Dr Kahryn Hughes, Chair, AREA Faculty Research Ethics Committee

CC: Student's supervisor(s)