

The Use of Asynchronous Discussion to Support Collaborative Learning in an Online Programme

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Abstract

This study argues that student to student conversations in groups have a significant impact on learning. Previous studies have focused on the potential impact of individual contributions in these learning conversations. This study challenges this view and suggests that measuring these individual contributions cannot, on their own, improve the student experience and impact on student performance.

A case study design was used to explore what was happening in an online collaborative group task. This was achieved by examining the dialogic interactions in asynchronous online discussions being used in the group collaborative process. The dataset for this investigation was a large corpus of online posts by eight postgraduate student groups working on a group task. The data was analysed using framework analysis. Developed by Richie and Spencer (1994), framework analysis is a matrix based method which allows the researcher to demonstrate how the data was managed and allows the researcher to move back and forth between different levels of abstraction whilst still keeping sight of the "raw" data. The central component of framework analysis is the development of a thematic framework. This thesis also examined quantitative data related to the number, length and frequency of discussion posts within and across each of the groups. Overall a typology of three dialogic types were identified and ten key characteristics of these groups were also identified. This thesis found that the predictive value of monitoring the use of time was very low if this is the only indicator used.

The dialogic types identified in the findings were found to be significant. Their presence or absence in the group communications had the potential to help educators predict whether the group would go on to meet the criteria for the task in the time allocated. The group characteristics also contributed to this prediction and there appeared to be a cumulative effect the more characteristics that were present. This suggests that the group conversations had a significant impact on individual and group achievement.

The findings of this thesis have significant implications for how we understand student to student interactions and their impact on learning. This study has used online student group conversations. However, the findings do not only have impact for student conversations in online learning but relate to all forms of learning. Revealing the impact of these interactions to educational designers and teachers can help support students in group learning. In addition, if students understand the impact group conversations have on their learning and achievement and that of their peers, sharing this information has the potential to significantly improve their performance and learning experience.

This study recommends further research be carried out into student to student dialogue to explore further how learning is impacted by group conversations. It is recommended that this exploration should focus on theory generating research to help address the theoretical gaps that exist in understanding how students learn in collaboration with each other. This should be utilised to enhance student experience, performance and achievement.

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Chapter 1: Introduction to this thesis

Chapter 1 introduces the topic area of this thesis which is asynchronous online discussion in educational practice. The chapter will identify the research aim, objective and research questions and discuss how these questions came to be formulated. The structure of this thesis will be set out with a description of its component parts to facilitate the navigation of the document.

1.1 Asynchronous online discussion

Asynchronous online discussion (AOD) is a term used to describe a time delayed, text based communication using an online platform that enables multiple users to engage in discussion with each other (Johnson 2006). This is similar to an email discussion but in discussion forums all of the messages from each contributor are collected in an area that displays the messages in a time ordered way.

Asynchronous online discussion is used in distance, blended and online learning as a mechanism for students to communicate with educators and their peers. AOD enables communication at times that are convenient and practical to the user and users can review these communications after they are over (Yang 2014). This affords all learners the opportunity to participate in discussion wherever they are geographically and at any time they are able to.

When used in conjunction with a face to face or other form of synchronous class, these discussions can be used to enable students to engage in reflective discussion in preparation for, or as a follow-up to, the synchronous class (Mongan-Rallis & Shannon 2006).

Discussion can be used by students to share examples of their work with each other, to engage in group work outside of the live classroom and to ask questions of each other or the educator about topics being studied (Thornburg et al. 2020).

In online learning, asynchronous online discussion has been adopted as a key pedagogic practice that promotes the use of dialogue where learners can interact with peers and instructors to exchange ideas, discuss issues and collaborate to solve problems. Students and instructors are able to voice opinions, analyse peers' comments and reflect on their learning (DeNoyelles et al. 2014). Wellman (2001) argues that computer networks are social networks. Social networks can be defined as those individuals with whom a person is in regular and sustained contact. Asynchronous online discussion can be said to hold a group of learners together for the purpose of achieving specific learning goals.

1.2 Facilitating asynchronous online discussion

Joksimovic et al. (2015) in their report of findings from a systematic review of research into online learning, reported that the studies they reviewed revealed that the most common approach to fostering interactions within the online learning environment is through structured online discussions. The studies tended to indicate that the asynchronous, purposefully structured discussions, with clear guidelines and timely, individualised feedback from instructors or from peer students to support learning in an online environment, are considered to be the best instructional strategies to support learning in an online environment (Borokhovski et al. 2012; Darabi et al 2013; Thomas 2013). Joksimovic et al. (2015) reviewed studies focused on instructional practices and found general agreement on several aspects including that online courses should provide good support for student-to-student and student-to-content interactions; the instructor's moderating role in guiding discussions is of great importance and instructors should be able to provide timely, formative feedback on learning progress for every student.

Facilitating online discussion as an educator is a different experience from facilitating discussion in a live classroom. Baran et al. (2011) suggest that the educator moves from being the centre of the interaction or the source of information in the live classroom to the "guide on the side" in online group work (p.429). This means that instructors design and monitor learning activities but the students assume responsibility for learning by coordinating and regulating their educational experiences. This facilitation experience can be challenging for educators as they need to stay on the periphery of these groups of learners but also be aware of the group's progress and make decisions throughout about whether the group requires an intervention to be able to move on with the task (Baker 2011). If they intervene too much they risk disabling students from taking control of their own experience in working together. Where programmes take large numbers of students, the facilitation of multiple groups can mean that this job becomes increasingly difficult (Hew & Cheung 2014). This can lead to inconsistency in the way that these groups are facilitated and can impact on the students' progress in the group and affect their experience of this learning. It can also lead to groups who are struggling not consistently getting a timely intervention from their facilitators (Smits & Voogt 2017).

1.3 Research aim and objectives

The aim of this study is to explore the role of asynchronous discussion in supporting collaborative group work in online environments. There is a large amount of research that has focused on the individual contributions to asynchronous discussion. Despite this, it is currently not possible to apply this research in a practical way to assist online educators in

interpreting contribution of the interactions in the discussion communications to progressing the group task. This study will focus on student to student asynchronous dialogue in collaborative group activities in order to investigate whether this can be used to indicate how groups are progressing and the need for instructor intervention where a lack of progress is detected.

The first objective of this study is to gain insight into the nature, impact and contribution of asynchronous online discussion to collaborative group activities. A second objective is to explore the possibility of developing an analytical tool for use by online educators to assess the progress of groups in their task and aid decision-making about which groups would benefit from an intervention by the educator.

1.3.1 Primary research question

- In what ways does the use of asynchronous discussion impact on a wiki assignment in an online programme?

1.3.2 Supplementary research questions

1. What characteristics are evident in asynchronous discussion interactions that support the collaborative online assessment?
2. What is the impact of these characteristics on the group's ability to engage with the assessment?

The link between the research questions and what is currently known about asynchronous online discussion in collaborative group activities is explored through a review of the contemporary literature in Chapter 3.

1.4 The shape of this thesis

The overall shape of the thesis is outlined here chapter by chapter to show the coherence in its structure and the progressive development of the ideas presented within it. There are seven chapters in total. The first four chapters lay the foundation of the thesis by setting out the research rationale and the research questions, key terms and concepts. These chapters go on to establish the research context and identify the approach taken to fulfil the research aim. In chapters five to seven the findings are presented and discussed, conclusions are drawn by going back to the research questions, and consideration is given to the contribution of the thesis to educational practice and recommendations are made for future research.

The following provides an overview of the contents of each chapter:

Chapter 1 introduces the research subject in order to set the scene for this thesis, outlines the research aim and objectives and explains how the thesis can be navigated.

Chapter 2 offers a literature-informed rationale for exploring asynchronous online discussion and identifies the gap in current knowledge that is driving this exploration. Chapter 2 also considers the role of reflexivity in this thesis and how the researcher is positioned within this research process.

Chapter 3 explores the history of distance, online and blended learning in recent decades and the technological and pedagogical developments that have driven the myriad of ways in which learning with technology is perceived and enacted in contemporary educational practice in higher education. This chapter also introduces key concepts and terms that are of relevance to the study and identifies how they contribute to what is currently known about technology mediated learning.

Chapter 4 presents the research methodology, the study design and the research methods and provides a rationale for each of these stages in the research process. It establishes the alignment between the research questions, the methodology, the study design and the research methods and an analytical approach to the findings. It also presents a reflexive review of the way that the methodology and the approach to data analysis and synthesis has been surfaced and considered by the researcher in this thesis.

Chapter 5 presents the findings of the discussion posts of the eight collaborative writing groups. Using a framework analysis approach, the findings are subjected to a thematic analysis and a typology of dialogues is presented.

Chapter 6 presents a discussion of the impact of key characteristics that have been identified within the dialogues and general rules identified about use of time in the prediction of whether the groups will complete meet the task criteria on time. This chapter goes on to discuss where the findings from this thesis fit with existing theories of collaborative learning in the online environment.

Chapter 7 returns to the research questions for a summary and final consideration of the findings. It also acknowledges the strengths and weaknesses of the study and makes explicit the contribution to knowledge that this thesis brings. The thesis is concluded with recommendations for educational practice and future educational research.

1.4.1 Citation style, abbreviations and glossary of terms

The citation style used throughout the thesis is based on the American Psychological Association 6th Edition (APA 6th Edition), the main features of which are described in Appendix A. A list of abbreviations and a glossary of terms appears as Appendix B. The inclusion of this information alongside the chapter summaries is intended to enhance the navigability and readability of the document.

1.5 Chapter Summary

This introductory chapter has provided an initial overview of the research subject area, established the purpose of the study and provided some information to guide the reader through the remaining chapters of the thesis. The educational context and literature informed rationale for the focus on this subject area, the research drivers and the position of the researcher in relation to this thesis will be considered in Chapter 2.

Chapter 2: The educational context, research drivers and reflexivity

This chapter sets out to examine the place of asynchronous online discussion (AOD) in the context of educational practice in higher education and the reasons why AOD is the focus of this thesis. It also discusses how reflexivity has been utilised to surface the influence of the researcher throughout the research process. Section 1 of the chapter identifies the heterogeneous use of technology-enhanced learning (TEL) within higher education and the pedagogical affordances of TEL. Section 2 will examine the drivers for the research focus of this thesis. This will start with an exploration of the importance of design in online learning and the types of communication technologies that are available to curriculum designers. It will then go on to explore the theoretical underpinnings of collaborative learning and the contribution of collaborative writing activities and AOD in the design of blended and online learning. The gap in knowledge that is identified relates to understanding student to student discourse in AOD and in particular how conversations in AOD can predict what is happening in collaborative group tasks. The research driver is identified as the wish to provide the online instructor with a way of understanding what is happening in collaborative groups by identifying patterns and characteristics in AOD. The intention of this is to enable instructors to provide bespoke assistance to learners in the conduction of the task and to enhance the learner's experience.

2.1 The educational context: Technology-enhanced learning in higher education

This section shines light on the rapid adoption of TEL in higher education and how it pervades all aspects of educational practice in a variety of ways. The drivers for this technological insurgence in education are discussed and also the diverse ways that it is understood and implemented in educational practice. The growing body of research identifying the pedagogical potential of practices in blended and online learning to enhance learning for all is also highlighted. The advantages of TEL in providing access for those who are currently "lost" to education are discussed and the work that is being done to extend this reach further.

2.1.1 A problem with definition

The term technology-enhanced learning (TEL) has become a widely accepted term in the United Kingdom (UK) and Europe for describing the interface between digital technology and higher education teaching (Guri-Rosenbilt & Gros 2011; Kirkwood & Price 2014; Bayne 2015). TEL can be considered as any form of digital learning, be that face to face technology enhanced classrooms or learning in virtual learning environments (HEA 2019). It is not evident that a shared understanding has been developed in higher education of what TEL

means (Kirkwood and Price 2014). The researching of TEL has also been hindered by a lack of recognition of the heterogeneity of TEL applications (Dunn & Kennedy 2019).

2.1.2 The use of TEL in higher education

The use of TEL has increased rapidly in universities in the UK and this increase has been mirrored globally (Alexander et al 2019). This increase in the use of technology in higher education has been matched by the development of digital capability with, for example, social media, mobile learning and learning at large scale all now possible (Castro 2019). The drivers for this increase in use and capability are said to have been a combination of government incentives promoting its use and to meet student's expectations (Alexander et al 2019). The UK government's Department for Education (DfE 2019) has set out a vision for education technology and promised to provide support for the education sector in England to develop and embed educational technology in educational practice. This policy outlines the perceived need to reduce the burden of "non-teaching" tasks, make assessment more efficient and effective, support access, inclusion and improved educational outcomes for all, support teachers, lecturers and educational leaders so that they can develop more flexibly and support decisions about work or further study and help those who are not in the formal education system gain new skills. Galanek et al (2018) in a survey of 64,000 undergraduate students in the United States (US) have found that the majority of undergraduate students continue to express preferences for learning environments that fall somewhere on the "blended" continuum from mostly face to face to mostly online. While 38% of students said they prefer fully face to face classroom environments, students who have taken some fully online courses are significantly more likely to prefer blended environments and less likely to prefer fully face to face courses (Ganek et al 2018).

There are very many specialist areas of technology use in higher education, for example the use of artificial intelligence in education; multi-sensory learning; learning from animations and simulated learning environments (Kukulska-Hulme et al 2020). Alongside the specialist use of TEL in higher education, the use of technology pervades almost every instance of mainstream teaching and learning under the label of blended learning (Smith & Hill 2019). Dunn & Kennedy (2019) argue that there is some misconception of TEL in mainstream educational practice in higher education, whereby it is often considered to be a vessel for "additional learning" (p.105). These authors go on to explain that in this respect TEL is placed alongside traditional lectures and seminars and functions as an adjunct or compliment to "core" learning that students can choose to engage in if they wish. The majority of higher education institutions deliver TEL via a virtual learning environment (VLE) used by all students even those taught in physical classroom delivered programmes (UCISA

2016). Therefore most higher education institutions use forms of TEL such as online lecture slides and recordings, additional content posted online, course specific discussion forums and social media groups created by students. This means that a broad range of TEL pedagogical practices, from using the virtual learning environment as a repository for documents to the most new and innovative pedagogies, are delivered by a homogenous delivery framework. Assessing the individual contribution of TEL in these different learning approaches is challenging and this has been a persistent criticism of those who want evidence of the potential pedagogical opportunity that TEL may offer (Becker et al 2017).

Despite this challenge, there is an emerging body of research focused on the pedagogical value of TEL and arguing the pedagogical benefits of TEL (Storme et al. 2016; Cleary et al. 2017; Hazari et al. 2019). Researchers have argued that TEL can allow students to explore educational content both at their own pace and in pursuit of their own areas of interest (Howard & Scott 2017; Chan et al. 2016). It has been argued that the use of TEL can allow the students to be in charge of their own learning, i.e. student led rather than teacher led learning (Broadbent & Poon 2015). It has also been argued that the use of TEL could be a way of closing the attainment gap in education (Becker et al. 2017; Alexander et al. 2019) by allowing flexible, lower cost access to higher education. This cost is not just related to the course fees but the cost of travel to where face to face education is delivered. There is also the cost of the requirement to be present to study, i.e. the opportunity cost. These hours may be needed for work or to support dependants (Rossi 2015). Others however argue that there is still much to be done to overcome barriers to accessing the internet for learning for a large percentage of the global population (Safford & Stinton 2016). Solutions to this are being thought of, for example, using offline networked learning, an approach based on low cost, low power network hubs that enable people to connect with each other and share resources via their mobile devices (Kukulka-Hulme et al. 2020).

2.1.3 Summary

This section has identified the heterogeneous nature of the use of TEL in higher education as problematic in the development of a shared understanding of what it means and its potential for contributing to the enhancement of educational practice. The drivers for its rapid increased use are discussed and how students' preferences have changed to some form of blended or online learning rather than purely face to face teaching. The drivers for blended and online learning are discussed in relation to the provision of education for people experiencing barriers in access and finally the growing body of research that is attempting to understand the pedagogical contribution of blended and online learning practices to the advancement of educational practice for all learners.

2.2 Research drivers

This section highlights the challenge of designing for online learning where learners need to be motivated, engaged and self-directed without the physical reinforcements that face to face learning provides. It discusses the affordances of communication technologies and the prominence of collaborative learning activities in many online programmes. The characteristics of collaborative writing activities and AOD in providing a mechanism for the collaborative process in these activities are discussed. AOD facilitation is discussed with particular attention paid to student to student interaction in collaborative groups that have low moderation or that are un-moderated. The gap in knowledge is identified as being a lack of understanding of how students learn from each other in collaborative groups and the driver for this research is identified as providing instructors with a mechanism by which they can identify, from student to student conversations in AOD, when to intervene to help collaborative groups in achieving the task.

2.2.1 Designing online learning

Although learning online shares important educational aims with traditional face to face learning, the way that the aims are achieved may take very different forms and each type of learning has its distinct affordances and limitations. Educational practices in higher education often assess the effectiveness of online learning by comparing it with traditional instruction methods and the designing of online learning environments is often done from a starting point of how it is delivered in the classroom (Delen & Liew 2016). While online learning affords learners autonomy and choice in their education it also requires learners to be self-regulated and self-directed in their learning. Learners need to remain motivated, engaged and persistent without the physical presence and reinforcements of instructors or peers (Pittaway 2012). Course design and instructional effectiveness are said to be some of the most significant challenges for instructors in online courses (Thorpe 2002; Cercone 2008; Salmon 2013)

2.2.2 Communication Technologies

Siemens et al. (2015) identify three broad categories of technology for learning. These are: i) information technologies that support the delivery of and access to information; ii) communication and interactive technologies that mediate user interaction; and iii) social software technologies that support group-based activities such as decision-making, planning and critical thinking. These technologies were computer-based originally but are now predominantly located on the web or the cloud and are more socially focused. These communication technologies allowing synchronous or asynchronous communication are now embedded into software platforms for learning such as a virtual learning environment.

Web 2.0 tools have enabled two-way communication such as via video conference, synchronous or asynchronous discussion and virtual classrooms without needing to be physically together. Anderson (2008) says that they have also enabled sharing, extracting and organising knowledge along with building social relationships. This allows group-based learning activities that were previously only available in face to face teaching.

2.2.3 Communities in Online Learning

Rogoff (1994) suggests the notion of a community of learning is based on the premise that learning occurs as people participate in shared endeavours with others. The idea of communities of learning are consistent with a constructivist approach to learning that recognises the key importance of interactions with others, and the role of social interactions in the construction of values and identity (Jonassen 1995). This is different to approaches to learning that are premised on notions that learning occurs through transmission of knowledge from experts and that knowledge is acquired by a passive learner. With the growth in online learning and the interactivity afforded by Web 2.0 technologies, there has been a huge amount of research focused on the potential of developing communities of learning in the online environment (Pallof & Pratt 2007, Liu et al 2007, Luo et al 2017)). The researcher's interest in how communities of learning can be developed in online environments is referred to in this work as a motivating proposition (see section 2.4.4). In this regard it has been referred to as per the definition by Rogoff (1994).

There are two other ways in which the term "community" is used in this thesis. The term "community of practice" is used to refer to a group of people who share a common interest and a desire to learn from and contribute to the community with their variety of experiences as defined by Lave and Wenger (1991). This term is used to explain the purpose of the assignment on which this research is focused. In particular the need for students to meet a learning outcome in relation to public health practice to be successful on their programme of study. The term "community of inquiry" is also used in this thesis and this refers to the framework developed by Garrison, Anderson and Archer (2000). The Community of Inquiry theoretical framework represents a process of creating an online learning experience through the development of three interdependent elements, social, cognitive and teaching presence. This framework is explored extensively in the literature review and again in the discussion chapters of this thesis in relation to the findings of this research.

2.2.4 Collaborative learning as a social constructivist pedagogy in online environments

Collaborative learning is a form of social constructivist learning underpinned by ideas originating with Vygotsky (1930) (translated by Cole et al 1978) and developed by others

(Doolittle & Camp 1999; Ozer 2004) emphasising the importance of attaining knowledge through social interaction. This type of learning emphasises the role of social discourse in the learning process and encourages communication among peers to both aid and strengthen the learning experience (Schell & Janicki 2013). It is believed that increased levels of interaction boost creativity, critical thinking and knowledge construction. Collaboration is also thought to trigger participation, improved communication and listening skills (Leidner & Jarenpaa 1995).

Collaborative learning has become an established instructional approach for online learning (Lee et al. 2006) as it offers opportunities to connect learners with their instructors and other learners. Learning activities, designed to encourage participation, vary from taking part in asynchronous discussion to small group activities (Koh & Hill 2009). One of these online collaborative activities is the collaborative writing activity.

2.2.5 Collaborative writing activities

Collaborative writing has been used in a wide range of educational settings (Du Sam et al. 2016). There are many studies reporting beneficial effects from collaboration during the writing process such as helping learners to emulate and learn from each other's writing (Corcelles and Castello 2015), encouraging critical reflection and the pooling of resources (MacArther et al). Van Steendam (2016) depicts the requirements of a collaborative writing activity in several elements. The instructional setting, the group composition and the task design are grouped together by Van Steendam and relate to the structure of the task. Van Steendam advocates for more studies exploring the effect of group composition and of group dynamics. Van Steendam also groups together elements of the collaborative process including the process regulation of dialogue and the text construction process. The final element is the collaborative product or text that is constructed as a result of the collaborative writing task. Also given significance by Van Steendam is the role of the individual characteristics and their impact on the characteristics of the group throughout this process.

Web 2.0 technologies (Schrum & Levin 2009) have enabled the development of online collaborative writing tools, such as wikis and blogs that have been integrated into educational settings (Brodahl et al 2011). Most online collaborative writing activities have methods of communication embedded within them in order to provide the means by which the collaborative process can be conducted.

2.2.6 Asynchronous online discussion

Several studies show that asynchronous online discussions (AOD) are the most prominent approach for supporting collaboration in learning (Rovai 2007; Macfadyen & Dawson 2010;

Darabi et al. 2013; Thomas 2013). There is a body of research that supports the value of AOD in meeting the meeting key pedagogical aims (Campbell et al. 2008; Lyons & Evans 2013; Hudson 2014). Borokhovski et al. (2012) and Darabi et al. (2013) argue that asynchronous, purposefully structured discussions with clear guidance and timely summative individualised feedback from instructors or peers, are the best instructional strategies in an online environment. This literature promotes AOD as a highly popular and effective means of engaging students remotely to share learning experiences and develop collaborative problem-solving skills (Murphy 2013; McGarry et al. 2015; Hampton et al. 2017).

2.2.7 The design of asynchronous online discussion

According to Darabi et al. (2011) for learners to achieve an active interaction and engagement in critical thinking, discussion activities should demand cognitive collaboration. Oh et al. (2018) report online courses being criticised for designing discussion strategies that promote surface learning and cognition and critical thinking in their learners. Using a set of questions to prompt student thoughts can trigger student interest and participation but they may not generate the kind of substantiated challenge from student's posting that prompt meaningful discourse (Garrison et al 2000; Garrison & Arbaugh 2007; Oh et al 2018). The design of tasks has therefore be important in promoting an increased level of cognitive engagement and critical thinking. Richardson and Ice (2010) discovered that discussion strategies that demand more cognitive effort, for example case studies and debate, elicit more critical thinking, although students prefer simpler discussion tasks such as open-ended discussions. Using a wiki group task based on a case study and using a problem-solving approach fits this requirement for prompting cognitive engagement and critical thinking. The use of asynchronous discussion in a collaborative writing activity is to facilitate interaction when multiple students comment on another's work, respond to feedback and reflect on their writing process and outcomes (Stahl et al. 2006; Thomas 2013). A chain of learner interactions (or discussion thread) can influence the creation and revision of the joint composition, which requires critical thinking, communication and organisational skills. The collaborative writing activity that is the focus of the research undertaken in this thesis has an asynchronous discussion board embedded within it to allow for this collaborative process.

2.2.8 Discourse facilitation

The facilitation of AOD is considered an important responsibility for online instructors by their students (Clarke and Bartholomew 2014; Phirangee et al. 2016). Students perceive that active instructor facilitation is a key element in triggering deeper thinking (Hosler & Arend

2012). Hew (2015) found that the highest ranked reason given by students for preferring instructor facilitation was perceived subject matter expertise. Research on the role of instructors, the amount of instructor facilitation and types of facilitation that promote student's participation and critical thinking is still inconclusive (Clarke and Bartholomew 2014; Oh et al. 2018). There are some concerns about instructor-led or facilitated discussion. These concerns are around the inconsistency between instructors in terms of effort and time given to the promotion of quality online discussions (Seo 2007; Correia & Baran 2010). Instructor facilitation shows a wide variation in the frequency of postings and the style of facilitation and what constitutes effective facilitation is still under development (An et al. 2009; Clarke & Bartholomew 2014; Oh et al. 2018). There is also concern that instructor facilitation can result in instructor-centred discussions with the instructor perceived as a dominating presence (Rourke & Anderson 2002). Thormann et al (2013) compared non-moderated groups with instructor facilitated groups and found that non-moderated group members participated more activity in a discussion group than moderated groups. Several other researchers found students to be more expressive, reported feeling more at ease in expressing ideas and demonstrated more active participation in non-moderated groups (Hew & Cheung 2008; Correia & Baran 2010; Xie & Ke 2011; Ghadirian & Ayub 2017). What is not yet clear from the research is whether non-moderated groups can impact critical thinking (Hew & Cheung 2008; Correia & Baran 2010).

2.2.9 Student to student conversations in asynchronous online discussion groups:

The gap in knowledge

AOD has emerged as a key pedagogical approach in online learning in recent years and is used across a range of online programmes in higher education (Siemens et al. 2015). AOD is a key pedagogy for learning at scale in some MOOCs (Toven-Lindsey et al. 2015). As such, there has been a large amount of research attempting to assess student performance and experience in AOD (Chiu & Hew 2018). This research is explored extensively in the literature review chapter of this thesis. Some approaches to this research have been quantitative, for example, measuring the number of times that students post or identifying key words or phrases within the text of discussion postings. This quantitative research has focused on data gathering of individual students to assess levels of engagement with tasks and in some cases using this data as a pedagogical approach to feedback to students, however it has not been focused enough on impacting on student experience (Ferguson & Clow 2019). Qualitative approaches have also been used to survey students to assess levels of satisfaction, however this information is perception based and on its own, cannot be applied directly to improve the student experience. Instructors who are managing several groups with low-moderation or no moderation over a period of time such as the length of a

module, e.g. those undertaking collaborative writing tasks, have no way of reliably identifying from the discussion posts when these groups are working well and when these groups are in need of instructional intervention. The studies assessing the effectiveness of AOD are not helpful in this respect because they are not sensitive enough to identify patterns in the collective group dialogue that may be helpful in indicating difficulties with the group dynamics. It is believed that identifying these patterns and characteristics from the discussion postings of several groups undertaking a collaborative writing activity will help to build a picture of how the group is functioning. It is believed that this will also help to indicate whether they are in need of intervention in order to help them complete the task. These patterns and characteristics may also be of help to other online instructors in higher education in the same way.

2.3 Summary

This section has identified the design of online learning as challenging as it is attempting to meet the needs of learners who are not supported by immediate physical resources. It explores collaborative learning as an established approach to learning in online environments and the role of AOD as an online pedagogy in its own right and the use of AOD to provide a means for communicating in the collaborative process.

This section has identified the drivers for this thesis which are to provide a mechanism or framework to enable instructors to identify patterns and characteristics in the conversations of students are having in AOD. This will assist instructors to be able to support groups in progressing their work on the task. The gap in knowledge is in understanding how the conversations in AOD can indicate how students are learning from each other in collaborative groups and this gap can impact on students' progress and their experience as a learner in higher education.

2.4 The reflexive process in this thesis

The aim of this section is to shed light on the reflexive process that has been utilised in this thesis to ensure the integrity of the research process. This starts with a consideration of the researcher and her impact on the human participants in this study. The stages of the research process are also systematically examined throughout this thesis at the stages in which they apply. An explanation is given of how the reflexive process has been used in scrutiny at each stage to surface and, where appropriate, to mitigate for the subjectivity that is inherent in any research process. Further reflexive comment is made in the chapters on methodology and data collection and analysis. In order to assess trustworthiness, rigour and

validity, Lincoln and Guba's (1985) categories of trustworthiness have been applied to explore reflexivity in the case study approach. Richie and Spencer's (1994) phases in framework analysis, as adapted by Smith and Firth (2011), have been used to examine rigour in the analysis of the data in this thesis within the literature review chapter. Finally, Maxwell's validity types for qualitative research have been applied to examine reflexivity in the data synthesis stage of the research process in the discussion chapter of this thesis.

2.4.1 The researcher

This section will consider the links between reflection and reflexivity and their use in educational practice and in the research process and in on-going researcher development. It will then consider the dual role of the researcher in this thesis both as both a teacher and researcher.

2.4.2 Reflection, reflexivity and researcher development

Reflection, as developed from the ideas of Argyris and Schön (1974), is the process in which we are able to consider the ways our own assumptions and actions influence a situation, and thus change our practice as a direct result of this process. Reflective practice and ensuing actions are not new concepts within teacher education and professional development (Dewey 1933; Schon 1987) and are now an integral part of professional education. According to Hibbert et al. (2010) reflection suggests a mirror image which affords the opportunity to engage in an observation or examination of our ways of doing, or observing our own practice, whereas reflexivity is more complex, involving thinking about our experiences and questioning our ways of doing. Alvesson and Skoldberg (2000) say that reflexivity, when applied to the research process, affords an awareness that the researcher and the object of study affect each other mutually and continually and involves both reflection and interpretation.

Researcher reflexivity has been said by Haynes (2012) to involve thinking about how our thinking came to be, how our pre-existing understanding is constantly revised in the light of new understandings and how this in turn affects our research. Since the researcher is the primary "instrument" of data collection and analysis, reflexivity is deemed essential in qualitative research (Glesne 1999; Merriam 1998; Russell & Kelly 200; Stake 1995). It is also argued by some to provide a necessary insight into the complex dynamics that exist in the conduction of quantitative research, although this is seen by others a challenge to the validity of quantitative research (Ryan & Golden 2007; Finlay 2012).

Berger (2015) talks about the influence of personal characteristics, such as gender, age, ideological stances on an individual's reflexivity and the importance of exploring the

interactive effects of the researcher's position and socio-cultural context on reflexivity. Linked to this, Attia and Edge (2017) talk about a developmental approach to research methodology. Rather than seeing researcher development as a welcome side effect of reflexive research, they focus on the development of the researcher as central, with reflexivity in an instrumental relationship with this on-going process. This idea is welcome within this thesis and the development of this researcher has been considered and considerable throughout this doctoral process. Attia and Edge (2017) propose this developmental approach to be amongst others, an internal growth model and a capacity-building approach that supports creativity and innovation by encouraging researchers to be more aware of research opportunities in their environments and to be purposeful in their decision making. They say it also promotes continuous engagement with fellow researchers and communities of interest that can support researcher development by the sharing and analysing of research practice. This is something that this researcher will be seeking to achieve as a post-doctoral researcher.

2.4.3 Teachers as researchers

The researcher in this thesis is a full-time university lecturer and before undertaking doctoral studies had a limited experience of undertaking primary research in the educational setting. This is reflective of the well-documented divide between those who teach in higher education and those who research (Tight 2016). This is a reality that can be argued to be to the detriment of both research and practice as both are meant to influence each other positively. It has been argued however that, where this divide exists, a practising teacher and researcher can enable other researchers to perceive and convey field experiences more powerfully than if they had never been a practitioner (Anderson 2002; Schwant 1994). Kennedy-Lewis (2012) says that renegotiating one's role as a researcher from that of a teacher requires a rebalancing of values and priorities that can make the act of researching difficult. Engagement in reflexivity can clarify decision-making processes and help to locate the researcher in the picture and see how her presence and the act of research influences the situation she is researching (Fook 1999). This unique position of researching my own practice has allowed me to explore intersections between research and practice that otherwise might remain inaccessible to researchers who are not engaged in practice. I have navigated this divide between research and practice by reflecting on my influence on students on the programme and my impact on them as a researcher and mindfully adjusting the research process where necessary to mitigate for this influence when this potential has been anticipated and exploring the impact of this researcher/practitioner intersection in retrospect where it has not been anticipated. This account gives the impression that this has been a smooth process. However, alongside the anticipated impacts being mindfully

navigated and retrospective reflections being made on impact, my experience has sometimes been of unanticipated moments of rapid realisation and self-correction that may be typical of a novice researcher.

2.4.4 Propositions:

There are four key propositions that I want to explore that are of relevance to my practice and the practice of teachers using online classroom environments:

1. Expansion of time in online learning environments: Understanding how time is utilised in online learning and whether patterns of time use can predict when support is needed.

I want to investigate whether the online environment offers opportunities for the use of time to be controlled by the individual or group in a way that is more difficult in the physical classroom. This proposition is based on the premise that the online environment may offer more flexible opportunities to expand the time available to students beyond the limits of the traditional face to face classroom. The online environment may allow for students who may take more time to fully comprehend key concepts to read and re-read the materials, to listen again to recordings of live online classrooms and to then engage in discussion that can assist them in exploring concepts and ideas independently and with others.

2. Accommodation of pace of learning in online environments: Understanding how the pace of learning can be accommodated to meet individual student's needs in online learning environments.

The pace of physical classroom sessions is often be set by the facilitator's judgment of how much time students should be taking in the learning process. It can often be influenced by the most confident and vocal students in the room. This may leave students who learn at faster or slower rates or who are less able to direct and contribute to discussion to miss opportunities to ask critical questions or make contributions to learning. Online learning environments may be a place where learning can be facilitated so that students who learn more quickly than others do not become frustrated by the pace of learning that is set to accommodate all students and those who are slower learners who may be accommodated but also may be struggling to keep up and could be missed. Therefore understanding the patterns that could indicate that individuals or groups need help and support would be very useful to educators.

3. Development of a community of learning in unfacilitated online learning environments: Understanding how group dynamics in an online environment without tutor intervention can contribute to the development of a community of learning and identify when a group may be struggling to develop this indicating an intervention may be necessary.

I want to look at the ways in which students communicate during group work that leads to summative assessment. Group dynamics can limit promote or prevent the interplay of ideas and full discussion by the use, timing and intonation of language and by the power differentials of physical presence and body language. The ways in which the group functions in the online environment without physically meeting is of great interest to me. In particular how students negotiate who will do what, in what timescale and how the quality of the work is monitored and task deadlines are met.

4. The considered response: Understanding the contribution of the considered response in discussions contributing to the co-construction of knowledge in online environments

The learning environment has many opportunities for learning and arguably the most powerful of these is the opportunity to engage in dialogue with others in the pursuit of learning. Our responses in a live or synchronous situation are sometimes influenced by the speed at which the response is expected and this can mitigate against a fully considered response. Our responses are also influenced by the expectations of others based on their perceptions of how we should behave in a social situation. This can mean that some of our responses are limited or modified to fit what the student perceives as the group's expectations of them. I would like to investigate how students engage in the co-construction of knowledge without physically interacting, in asynchronous linear discussions in an online learning environment where there is potentially more time to consider the response. This is because a time lag is expected in a way that in face to face discussions they are not.

2.4.5 Summary

This section has located the researcher within this study and outlines how the reflexive process has been used throughout this thesis in order to surface the influence of the researcher. It explores the relationship between reflection and reflexivity and their influence on the actions of researchers and researcher development. It also examines the teacher as researcher and the impact of this on the research process and the research community. Finally this section identifies some propositions that the researcher has put forward as drivers for this research that are based on her experience and perceived to be of relevance to both her own practice and for other teachers using an online environment.

2.5 Chapter Summary

This chapter has explored the context of the growth in use of TEL in educational practice in higher education and the drivers for this growth. It also explores the heterogeneous nature of the understanding of and the use of TEL in higher education and the potential of TEL to impact on extending access to education for more learners. It also highlights the potential for

pedagogies of online learning to contribute to the development of educational practice in all settings. The chapter goes on to discuss how collaborative learning strategies have been utilised in online learning in particular the collaborative writing activity. It identifies a gap in knowledge in a lack of understanding of how conversations in AOD can indicate how students are learning through collaboration and how they use this to progress the task. It also identifies the driver for this research which is to look for patterns and characteristics in group AOD that will help instructors with this understanding and enable them to provide interventions to help them complete their work. The last section in this chapter discusses how reflexivity has been located in this thesis, how it is used to explore the reality of a teacher researching their own practice and how it will influence this teacher and researcher in practice going forward.

Chapter 3: Literature Review

3.1 Introduction

This chapter reviews the literature relating to how students learn using asynchronous discussion as part of a wiki collaborative writing group activity. In order to put this type of learning activity in the context of learning generally and in the context of technology-mediated learning specifically, this review starts with the history and development of distance, blended and online learning in higher education. The impact of the diversity of definitions of technology-mediated learning is also considered. The literature related to technological and pedagogical developments in technology-mediated learning and how this has impacted on approaches to learning is considered and in particular its role in the emerging practice of asynchronous online discussion. The review will then identify theories and frameworks explaining learning in online environments and how the relationships between the student, the teacher and the activity are theorised. The literature related to the use of a wiki as a collaborative writing activity with asynchronous discussion as a pedagogical approach is considered. Finally literature researching the use of asynchronous discussion to analyse and predict student behaviour is reviewed.

The following key findings are extrapolated from this literature:

1. There have been major technological and pedagogical developments in the last three decades that have changed the way that teachers and students interact in technology-mediated environments. There is a huge and varied range of ways in which technology is used in educational practice making learning with technology not homogenous and often misconceived by people outside of this field.
2. Definitional ambiguity in educational research and practice has hampered its adoption and development in mainstream higher education practice.
3. Theories of online learning show a dichotomy between learning theorised in the collective and individualised, independent learning and this is mirrored in the diversity of online educational practice.
4. Whilst these theories of online learning explain learning in different ways, they are most often teacher-centric in that they theorise the teacher's interactions with the student as the trigger for this learning. Whilst most acknowledge that students learn from each other, and in some cases consider this as the central learning process, they do not offer adequate explanation of how this happens in online environments.
5. There is a huge amount of research attempting to find out what is happening in the asynchronous online discussions. However, there are problems with the quality of

this evidence. The impact of this evidence on the educational experience of students is also under-researched leaving a gap in knowledge for educators about how students learn in online groups.

3.1.1 A review of the history of distance, blended and online learning

The intention of this review of the history of distance, blended and online learning is to paint the landscape of what is currently known about the concept of distance learning from correspondence course to computer-mediated learning. The review makes the point that as compelling as it is to focus on technology, it is the consideration of the underpinning pedagogy that will allow an understanding of how asynchronous online learning has emerged, how it is practised and how it is being developed, which is a central focus of this thesis.

3.1.2 Distance learning- from correspondence course to computers

Distance learning has been taking place for almost two centuries (Spector et al. 2008). In this time there have been many developments in the way that distance learning has been achieved. Moore and Kearsley (2011) state that despite the ever changing scope and definition of distance education, the major premise remains the same. This premise is that students and teachers are separated by space and time or both for the majority or the complete duration of teaching and learning (Siemens et al. 2015). The way that distance learning has been defined particularly in the last two decades has been inconsistent in the literature indicating that there is some confusion. This confusion has been ascribed to changes in the use and capability of educational technology affecting the way it is understood (Moore et al. 2011). Traxler (2018) adds to this by suggesting that, rather than an easy comparison between distance and campus-based learning, the distinctions between distance, online and blended learning are less clear.

The way that distance learning has developed in recent history is also thought about with different emphases. One differentiation is by mode of delivery. Anderson (2008) identifies five generations of distance learning determined by the technology available. The first of these generations is correspondence study where distance learning was individual and episodic using the postal system, the second generation has been defined as supported by mass media using television and radio, the third using video and audio conferencing, the fourth using computer conferencing and the fifth generation Anderson refers to as electronic database assisted learning or the educational Semantic Web. The Semantic Web was first proposed by Berners-Lee in (2001) as a mechanism for electronic educational information storage and retrieval, now known as search engines. This educational information is

distributed and available to all via the world-wide-web or internet and is now the conduit for distance, online and blended learning (Simonson, Zvacek & Smaldino 2019).

A second differentiation uses pedagogical approaches. Anderson & Dron (2011) identify three generations of distance education pedagogy; cognitive-behaviourist, social constructivist and connectivist. Behaviourist and cognitivist pedagogies with the teacher as instructor and knowledge purveyor at the forefront had dominated perceptions of distance learning before recent technological developments (Anderson & Dron 2011).

3.1.3 Online learning

Siemens et al. (2015) suggest that online learning has now become commonplace in post-secondary education. Allen and Seaman have produced fourteen Babson Survey Research Group reports over the last two decades and have published the latest in (2017) documenting online education in the United States which tell us that around 1 in 3 (29.7%) of students are taking some of their higher education course at a distance. In their 2016 report the figure was nearer to 1 in 4. In the UK traditional three-year, full-time, on campus path to a first degree in higher education is still the main model accounting for 58% of all students at UK universities. In 2016-17 online learning made up 8% of all provision at UK higher education institutions with the Open University accounting for 65% of all online learning and other institutions 35% (Universities UK 2018). Whilst this provision is mainly in postgraduate and continuing professional development, there are growing numbers of undergraduate courses providing online flexible study pathways using blended learning with minimal attendance requirements. Currently there are 581 UK based online bachelor degrees advertised on StudyPortals (2020). Despite this increasing student demand and growing provision and the economic case for more flexible learning for learners unable to access face to face education (Universities UK) there has been some concern expressed about online learning as a credible alternative to face to face learning. This concern has often centred on poorer completion rates (Johnson et al 2015; Shea & Bidjerano 2017; Hart et al. 2018). Contesting these findings, Wavle and Ozogul (2019) in their study of student graduation data from 12,840 undergraduate students at a multi-campus university in the US showed a significant positive impact on student completion rates at all campus types with the biggest effect on students in urban and regional campuses, where graduation rates overall are typically lower than at the traditional flagship campus. There have also been concerns about quality as a barrier to faculty acceptance with Allen and Seaman (2015) reporting that only 28% of academic leaders in the US feel their faculties fully accept the value and legitimacy of online education. Their subsequent report in 2017 reported no change in this lack of faculty acceptance and legitimacy of online education.

Online learning is often considered as a sub-set of distance learning and, similar to distance learning, is very difficult to define (Joksimovic et al. 2015). It is widely accepted that online learning represents a special form of distance education (Harasim 2000; Taylor 2001; Siemens et al. 2015). The most frequent terms used to describe online learning are web-based learning, e-learning, internet-based learning, computer-mediated learning and computer-assisted learning (Ally 2004; Means et al. 2009; Rudestam & Schoenholtz-Read 2010; Tallent-Runnels et al. 2006). The first fully online course was offered in 1981 (Harasim 2000) and early versions of online programmes mimicked existing distance education practice in an instructivist teaching approach, for example it was text heavy and mirrored postal packages of handbooks and reading lists (Garrison 2011; Harasim 2000).

Joksimovic et al. (2015) acknowledge that it is very difficult to identify what is considered to be purely online learning. In their systematic review exploring the history and state of online learning, the studies they examined defined online learning as a sub-set of distance learning, that is courses delivered completely online, excluding “print-based correspondence education, broadcast or radio, video-conferencing, video-cassettes and stand-alone educational software programmes”. Joksimovic et al. question how this definition fits in relation to learning that uses forms of video-conferencing e.g. Skype or Google Hangouts that are often incorporated into both distance learning and online learning.

Online learning has also been aligned to the fifth generation using Anderson’s (2008) categorisation, that of electronic database assisted learning using the internet. Massive Open Online Courses (MOOCs) have expanded the definition of online learning and access to education even further (Evans-Greenwood; O’Leary & Williams 2015). MOOCs are web-based online learning courses that are designed for the participation of unlimited numbers of geographically dispersed students. The term MOOC was first used to refer to a course that was run by George Siemens and Stephen Downes in 2008. Early MOOCs were built on connectivist learning pedagogies and were developed with an intention to expand access to learning for everyone and an open educational resources (OER) philosophy with work on MOOCs by Fini 2009; Mak; Williams & Mackness (2010). Several MOOC platforms were launched in 2012 by private companies such as FutureLearn, Coursera, Edx and Udacity and these MOOC companies have subsequently formed partnerships with universities offering the first MOOC for credit and MOOC-based master’s degree in 2013. In recent years research has focused on pedagogies for MOOCs with some MOOCs (cMOOCs) keeping connectivist and social-constructivist pedagogical approaches whilst others (xMOOCs) have been built on an instructivist learning approach with limited interactions with other learners (Ferguson & Clow 2015). There are also hybrid MOOCs (hMOOCs) that combine learning approaches (Perez-Sanagustin et al. 2017). There has been a focus in the

research more recently on the ability to “up-scale” connectivist and social-constructivist pedagogical approaches traditionally used in smaller online learning to the large number of students undertaking MOOCs (Ferguson & Sharples 2014; Butler et al 2017; Brown 2018). Whilst there may still be a perception of online learning as instructional and as a lonely experience (Wicking et al. 2016) it is clear that there has been a shift in thinking from the “putting it all online” philosophy that may have existed in some people’s perceptions to pedagogies that engage learners with the content and each other (Marr 2018).

3.1.4 Blended learning

Blended learning has been defined as learning that encompasses both face-to-face classroom teaching and distance delivery (Spector et al. 2007; Graham 2013). There is a very broad range of teaching practices that can be considered blended, based on the proportion of face to face and online delivery with some courses only considering learning to be blended where face to face teaching is at least half of the delivery (Bernard et al. 2014). Others include classroom instruction where the course uses a Learning Management System (LMS) for communication. Therefore any instructor who employs technology in their teaching practice could refer to their teaching as blended (Siemens et al. 2015).

Siemens et al. (2015) point out that many studies are analysing learning and teaching in online and blended settings together without a clear distinction between the two approaches and this can mean that it is very difficult to synthesise the findings of research. Joksimovic et al. (2015) also note this and, in addition, that terms such as computer-based instruction, web-based instruction or problem-based learning have become synonymous with distance, online and blended learning. Therefore synthesising the findings of research involves the “morphing or aggregation” of these terms with all three of these types of learning. This means that it is difficult to isolate and understand the impact of these distinct types of learning. This definitional ambiguity inhibits the ability to track the accurate extent of the growth of blended learning (Oliver & Trigwell 2005) when combined with higher education institutions’ inability to track innovative practice that happens organically (Dziuban et al. 2018).

The use of asynchronous (recorded lectures, discussion forums, prescribed reading) alongside synchronous approaches (face to face seminars, video conference tutorial, webinar) in learning design, i.e. blended approaches, to learning design have been described as the “new normal” (Norberg et al. 2011 p. 207; Dziuban et al. 2018). This is both for teaching taking place in face to face settings and in online learning. Norberg et al. suggest a time based blended learning model that encompasses all settings. Norberg et al. quotes Meyer (2005) who comments that by modifying learning with the term “blended” we

are implying that it is something fundamentally different from “regular learning”. Meyer proposes that dropping the blended learning label may create a new educational reality where education occurs through a multiplicity of sources.

Garrison and Kanuka (2004) say that blended learning can support deep and meaningful learning however Graham et al. (2013) say that many higher education institutions (HEIs) are still in the early stages of implementation. Whilst blended learning is increasingly promoted in higher education and there are many pockets of expertise in universities, Marshall (2011) says that the critical self-reflection needed to prompt organisational change has not yet happened and that HEIs are not yet able to foster the enabling environment necessary for wider technology uptake and incorporation into every day, everywhere teaching practice. Mirriah et al. (2015) say that higher education is challenged amongst other things by a lack of institutional definition of blended learning and (Porter & Graham 2016) say that there is a paucity of research informed models to support institutional adoption. Dzuiban et al. (2018) suggests that blended learning might be considered as what Johnson describes as a slow hunch (2010) evolving over a long period of time and challenged by the problem of interacting with almost every aspect of higher education, making the learning part in blended learning less easy to surface and explore.

Graham et al. (2013) have used a case study approach to develop a Blended Learning Adoption Framework for use by HEIs. This framework considers *strategy* including purpose, advocacy, implementation, definition and policy, *structure* including governance, models, scheduling and evaluation and *support* including technical, pedagogical and incentives. This framework was based on interviews with senior administrators and did not include the view of teachers or student representatives which is seen as a limitation (Adekola et al. 2017). This suggests that there is work to do in embedding blended learning in everyday teaching practice in universities and making it the “new normal” rather than an exception to the rule. (Smith & Hill 2019) have reviewed the literature in order to define the nature of blended learning through its depiction in current research and suggest that rather than the dissemination of individually-focussed research studies, more institution and cross-institutional studies should be shared in both the technical and the general research literature to enable more research-informed institutional blended learning development.

3.1.5 Technological developments and the development of online learning environments

Technology is being used in a variety of different ways to support distance, online and blended learning and the ways in which we use technologies in learning is dependent on a number of factors, one of which is the capabilities of those technologies (Siemens et al.

2015). Communication technology has developed from printing, radio and telephone (Daft & Lengel 1986) to video conferencing in the 1990s and the development of the world-wide-web also in the 1990s (Baset & Schulzrinne 2004; Bondi & Desclaux 2006). The technologies continue to move on with the more recent development of mobile technologies such as mobile phones and tablets (Choudhary et al. 2013; Crompton and Burke 2018).

This development of technological capability has led to a variety of ways in which an online learning systems can be organised and defined (Paulsen 2002). At a macro level, online learning systems have been developed with different functions and the functions of each can be very different (Graham 2006). A Learning Management System is a broad term that is used for a wide range of systems that organise and provide access to online learning services for students, teachers and administrators, a Course Management System refers to a set of tools that enables the teacher to create course content to be accessed by students (Watson & Watson 2007) and a Knowledge Management System (KMS) is the software-supported handling i.e. storing, administering, updating and retrieving of “objects” of information (Wilén-Daugenti 2009). Maier & Schmidt (2007) points out that knowledge management could be thought of as a misnomer in that, strictly speaking, knowledge management systems neither contain knowledge nor do they manage it. A Virtual Learning Environment is characterised by an interface that allows students to register and take courses, staying within that environment for the duration of the course (Paulsen 2002) Newer to this are Personal Learning Environments (PLE), described as integrating formal and informal learning e.g. using social media communications, producing personal timetables, to tailor learning to the needs of the individual (Dabbagh & Kitsantas 2011). Learning Environments have also be defined by what digital resources are used to assist with learning for example a blog, a wiki, a live online classroom or it can be defined by the design methodology for example self-paced, self-directed, collaborative learning groups or teacher-led activities (Moore, Dickson-Deane & Galyen 2010).

The term Web 2.0 was first used in 2004 and referred to the second generation of the Internet (Schrum & Levin 2009). Web 2.0 refers to websites that emphasize user-generated content and a participatory culture. Examples of Web 2.0 features include social networking sites or social media sites e.g., Facebook, blogs, wikis, video sharing sites e.g. YouTube and Web applications (Paroutis & Saleh 2009). The characteristics of Web 2.0 technologies are that they allow users to add and change content easily, collaborate and communicate instantaneously so that participants are able to share develop and distribute information (Grant & Mims 2009). Web 2.0 technologies range from those that allow personal expression to those that support community building (Palloff & Pratt 2009). Some of the common forms

of Web 2.0 technologies which have been integrated into online courses include Skype, Twitter, Google Documents, blogs and wikis (Paroutis & Saleh 2009).

This rapid adoption of educational technology has triggered debate on the relative importance of pedagogy versus educational technology as a driver for shifting ideas about what represents quality in online learning (Siemens et al. 2015). Clark (1983) argues that the disruptive effect that technology brings is not enough to spark change by using the analogy of grocery delivery where technology is the truck that delivers the groceries (or pedagogy) but it is the pedagogy that has the impact on student achievement. Anderson and Dron (2010) use a different analogy “the technology sets the beat and creates the music, whilst the pedagogy defines the moves” (p.81). Whether is technology in the driving seat or pedagogy or it is the synergy of both, there has been a seismic shift in pedagogies for online learning and their theoretical underpinnings as communication technologies have advanced (Harasim 2017).

3.1.6 Summary

The way that learning that is not face to face has developed over the last three decades has been fast growing and diverse encompassing what can be referred to as distance, online and blended learning. There is definitional ambiguity in the way that distance, online and blended learning are viewed and this causes confusion to educational practitioners and educational institutions and has been an inhibiting factor in the understanding, adoption and development of technology-mediated learning in mainstream higher education practice. There has been fast moving technological capability and pedagogical practices have developed alongside this which have changed the way that learning is designed and practiced in these environments.

It is this change in the underpinning pedagogy of learning practice that will enable the researcher and teacher to understand how asynchronous online communication has emerged as a learning approach, how it is being practised and its potential development as a one of the key pedagogies in technology-mediated learning.

3.2 Theories of online learning

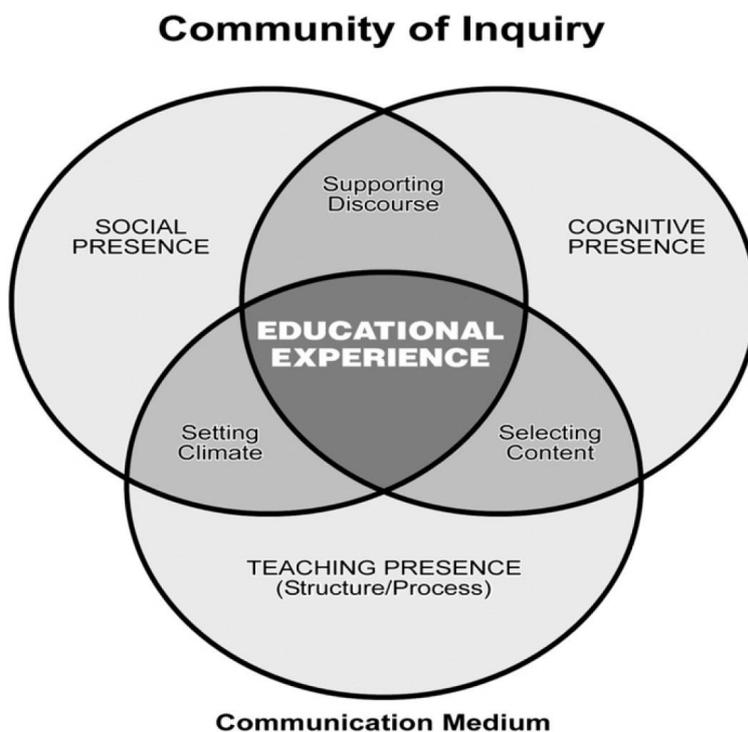
In order to understand the foundations of these pedagogical approaches, an exploration of the theories that have been developed to explain the process of online learning will follow. This review of theory seeks to explore how student learning in online environments has been explained and critiqued and how these theories influence pedagogical approaches in technology-mediated learning.

A number of theories have been applied to specifically to online learning. No single learning theory has emerged for learning generally and the same is true for online education. Some of the most well-known theories of online learning are openly acknowledged to have been derived from well-established and embedded general learning theories (Garrison, Anderson & Archer 2000; Harasim 2012; Laurillard 1997).

3.2.1 The Community of Inquiry (CoI) theory

Garrison Anderson & Archer (2000) developed the Community of Inquiry (CoI) theory which attempts to explain the effectiveness of online teaching and learning. This theory asserts that successful online learning occurs when three forms of presence are cultivated: social presence, teaching presence and cognitive presence. Social presence refers to behaviours that enhance rapport, trust and collegiality. Garrison et al (2000) define social presence as “the ability of participants in the community of inquiry to project their personal characteristics into the community, thereby presenting themselves to other participants as real people” (p. 4). Teaching presence refers to the design and facilitation of learning tasks and their assessment and cognitive presence refers to shared negotiation of meaning through knowledge construction (Haynes et al. 2015).

Figure 1: The Community of Inquiry Framework Source: Garrison, Anderson and Archer 2010 p. 6



To develop a successful online course many consider building and sustaining an online learning community as essential (Palloff & Pratt 2007; Hayes et al. 2015; Astall & Cowan 2016).

The term “community” has been regarded in the literature as a sense that members have a belonging, members of the group matter to one another and to the group and a shared faith exists that members needs will be met through their commitment to be together (McMillan & Chavis 1986). Studies such as Richardson and Swan (2003), Overbaugh and Lin (2006) and Rovai (2001) identify students’ experiences in learning communities as linked to positive learning outcomes, enhanced achievement and have found a relationship between the flow of information and effective learning. A collaborative learning activity fits with this idea of the development of a community of learning. Similarly asynchronous discussion where relationships are developed could be considered to stimulate the development of a community of learning.

The growing focus on communities of learners reflects a shared understanding from some educationalists that we as a species live in communities and understand the world through mental states developed in joint activity with others. Mascolo (2009) and others promoting social learning pedagogies believe that the transition from teaching to learning as a primary goal of education assumes that students construct and hold greater responsibility for their own learning and that the traditional lecture based model fails to effectively consider and support the pedagogical processes involved in knowledge building. Applying this to the online environment, at their best online learning community models allow participants to actively engage one another in ideas and perspectives they hold to be educationally worthwhile. Shea (2006) believes that it is through the design of the learning environment, with the emphasis on shared educational goals and collaboration that these processes can be most effectively and functionally activated.

Astall & Cowan (2016) consider the process of building individual representations of knowledge in a participatory learning community as being at the heart of constructivism. Astall & Cowan advocate for a shift from e-learning to “we-learning” with social constructivist learning theory underpinning this shift. Online instructors therefore need to consider the philosophical, pedagogical and technical aspects of supporting socially constructivist learning, in particular creating online environments that are designed to support this kind of learning.

Several researchers suggest that successful online teaching strategies involve community learning, shared interactions and meaningful learning experiences (Liu et al. 2007; Ouzts 2006; Rovai 2002). When constructivism is applied to online content creation, it is often

considered a “social constructivist experience” (Gulati 2008 p.184) with online learning viewed as social constructivism with a focus on collaborative discourse and individual development of meaning through construction and sharing of texts and other social artefacts (Bonk & Cunningham 1998; Jonassen et al. 1999).

Rourke & Kanuka (2009) critiqued the Col framework arguing that deep and meaningful learning did not occur as described in the framework, rather students seemed to report instances of surface learning and to associate these with instructional material rather than sustained interaction with the instructor or other learners. Akyol et al (2009) responding to Rourke & Kanuka argued that measuring deep and meaningful learning as an outcome does little to inform the teaching and learning process. Much of the research critiquing the Col framework has focused on the role of social presence and the lack of demonstration of how the sustained, continuous two way communication leads to deep and meaningful learning (Richardson & Swan 2003; Shea & Bidjerano 2009; Ke 2010) and that asynchronous group-based communications per se are insufficient to develop an effective community of inquiry (Annand 2011).

Garrison, Anderson & Archer in their (2010) paper reviewing the first ten years of the Col Framework say that the Col instrument provides a means to study the dynamics of online communities of inquiry. They noted that the conceptualization of social presence has changed over time in order to show the connection of this activity more clearly to the formal educational experience. A progressive schema was proposed to illustrate social presence as identification with the community, then purposeful communication within a trusting environment, and finally the development of social relationships. Even so, Garrison, Anderson & Archer (2010) noted that more study of the relationship between social presence and cognitive and teaching presences was needed. They also said that they look forward to seeing the framework used as a predictor of learning processes and learning outcomes but they recognise that this challenge may take the next decade to explore and understand.

Building on the Col framework Shea et al. (2012) examined the Col framework by surveying 2010 college students in 38 institutions in a common online learning network using Col as the basis for the analysis. They identified behaviours that they felt could not reliably be coded as the three Col indicators of social presence, cognitive presence and teaching presence. They called these behaviours “learning presence” defined as efforts focused on individual and the group to understand and regulate their learning. This framework has dominated the literature in the last two decades being frequently cited and used as the theoretical basis for a large amount of research into online learning.

Shea et al (2014) did further work exploring five student led discussions in a doctoral course to produce a re-conceptualisation of the Col Framework as Social Learning Presence (SLP) including attitudes, abilities and behaviours students bring to self-regulate and co-regulate their behaviours, Social Teaching Presence (STP) reflecting the roles specific to online instructors each with a shared emphasis on the social dimensions of teaching and learning and Socio-Cognitive Presence (SCP) the socio-cognitive construction of knowledge.

This theory is still being challenged with Maddrell, Morrison & Watson (2016) saying that although thousands of articles have been published using it, those critical to it point to the lack of empirical evidence to support the central claim of deep and meaningful learning. Cherney et al. (2018) say that the lack of a comprehensive conceptualization of social presence hinders scholars' ability to fully operationalize and measure this concept in terms of online class groups and this leads to a lack of understanding of the ways social presence can influence and be influenced by group work online as well as specific student learning outcomes.

3.2.2 Theory of Connectivism

Siemens (2004) who was an early pioneer of MOOCs, is credited with developing this learning theory, but acknowledges the work of Barabasi (2002) and Stephenson (1998) in influencing its development. The principles of connectivism as defined by Siemens (2004) are:

- i) Learning is defined as actionable knowledge and knowledge resting in diversity of opinions.
- ii) Learning may reside in non-human appliances.
- iii) Learning is a process of connecting specialised nodes or information sources.
- iv) The ability to see connections between fields, ideas and concepts is a core skill.
- v) Currency i.e. accurate, up-to-date knowledge is the intention of all connectivist learning activities.
- vi) Decision-making is seen as a learning process in that choosing what to learn and the meaning of information is seen through the lens of a shifting reality.

Siemens (2004) describes connectivism as a learning theory whose basis lies in the major shifts in the way that information flows and changes because of data communication networks. This theory is driven by the dynamic of information flow which students need to understand and be provided with experiences of navigating and recognising constantly shifting and evolving information (Piccianno 2017). AIDahdouh et al. (2015) have considered connectivism as a theory of knowledge that refutes the idea that learning is an internal

construction and identifies it as what can be reached in the external network that should be considered as learning.

Connectivism is also about the development of the learning network and therefore there are links to social learning in the promotion of teacher to student and student to student interaction. Pedagogical approaches associated with connectivism are the use of blogs, learning communities e.g. collaborative writing activities, online discussion and conversation and sharing via social media platforms. Downes (2007) who is attributed to running the first MOOC with Siemens in 2008, described connectivism as “the thesis that knowledge is distributed across a network of connections and therefore that learning consists of the ability to construct and traverse those networks” (p.1). MOOCs using connectivist driven learning strategies are commonly known as cMOOCs. Although MOOCs have a very close association with connectivism, not all MOOCs use connectivism as their underpinning learning theory (Ng & Widom 2014). MOOCs using instructional methods such as recorded lectures with limited teacher student or student-student interaction are called xMOOCs (Kennedy 2014).

Critics refer to connectivism as an instructional theory and not a learning theory in that it recommends the design of learning materials to help students maximise their learning potential rather than explaining how individuals learn (Kerr 2006, Bell 2010, Anderson & Dron 2011, Clarà & Barberà 2013). Researchers have also questioned whether all students are able to manage to be self-directed and self-motivated learners (Kop 2011), others have found that students have reported feeling disconnected and demotivated from their online experience (Mackness & Bell 2015, Pando 2018).

Clarà & Barberà (2013) ask whether students employing connectivist methodology can independently create or construct conceptual knowledge. They cite the learning paradox. This paradox is how do you recognize a pattern if you do not already know that a specific configuration of connections is a pattern. They also suggest that connectivism under-conceptualizes interaction and dialogue, by understanding it as a learner’s connection to a human node in the network. Additionally, they argue that connectivism is unable to explain concept development. These criticisms have persisted in recent years with AlDahdouh (2018) arguing that connectivism cannot show how learners form connections to the variety of resources and that a process over and above connectivist pedagogy seems to be required. Gonçalves & Osório (2018) argue that as there are no activities in MOOC that can be implemented collectively there is a tendency for the lack of involvement and participation of teachers.

Downes (2020) has acknowledged that the greatest challenges to connectivism are being posed at a conceptual level. However, he argues that none of these criticisms indicate that connectivism is incoherent or is not offering something valuable and the value shows in its application. Connectivism according to Downes is being used to design and develop learning opportunities and promotes the value of social networks, the development of deep learning and has traced them back to interaction, autonomy and network effects.

3.2.3 Theory of Online Collaborative Learning (OCL)

Online Collaborative Learning is proposed by Harasim (2012) as a theory focusing on the facilities of the internet providing learning environments that foster collaboration and knowledge building. In the same way as Siemens does in connectivist theory, Harasim promotes the benefits of moving teaching and learning to the internet and large-scale networked education.

The concept of collaborative learning predates online learning as an approach to education. It has been identified as being a learning situation with two or more people, as learning from interactions which take place between individuals and as a learning mechanism i.e. a method of learning (Dillenbourg 1999). Gokhale (1995) states that the term "collaborative learning" refers to an instruction method in which students at various performance levels work together in small groups toward a common goal. The students are responsible for one another's learning as well as their own. Thus, the success of one student helps other students with their learning. In OCL however Harasim places the role of the teacher in centre stage (Picciano 2017)

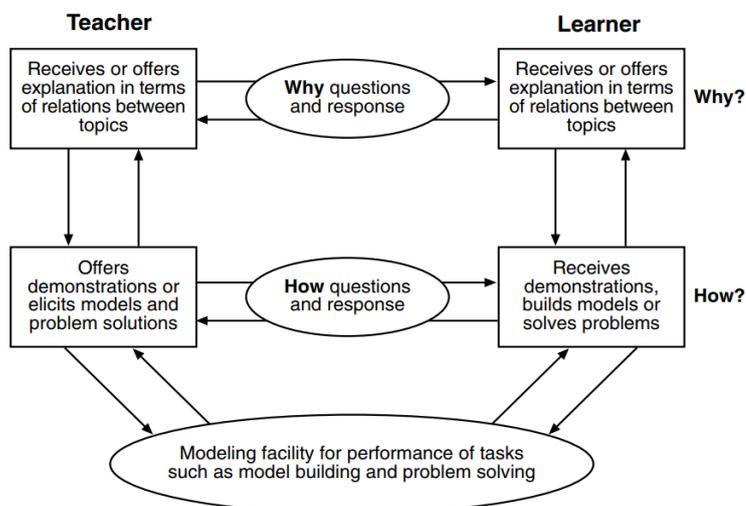
Harasim's model proposes three phases of knowledge construction through group discourse. These phases are *idea generating* which is the brainstorming phase where divergent thoughts are gathered, *idea organising* which is the phase where ideas are compared, analysed and categorised through discussion and argument and *intellectual convergence* where intellectual synthesis and consensus occurs, including agreeing to disagree, usually through an assignment, essay or other joint piece of work (Harasim 2012 p. 82). OCL derives from social constructivism as students are encouraged to collaboratively solve problems through discourse and where the teacher facilitates as well as being a learning community member. Picciano (2017) suggests that because of the importance of the teacher as an active facilitator of knowledge building, this model is teacher dependent and therefore OCL is not easy to scale up, unlike connectivism, and is best suited to smaller learning environments. OCL has been criticised for not having a framework for judging when discourse is collaborative (Oncu & Cakir 2011) therefore not identifying how learning is achieved through collaboration. Ingram and Hathorn (2004) say that collaboration is a

complicated concept, and it can be difficult to know when it is occurring, how effective it is, how to encourage it, or what is preventing it. Oncu and Cakir say that developing reliable and valid student assessment techniques for online learning environments is crucial to measure student achievement and student engagement

3.2.4 Laurillard’s Conversational Theory

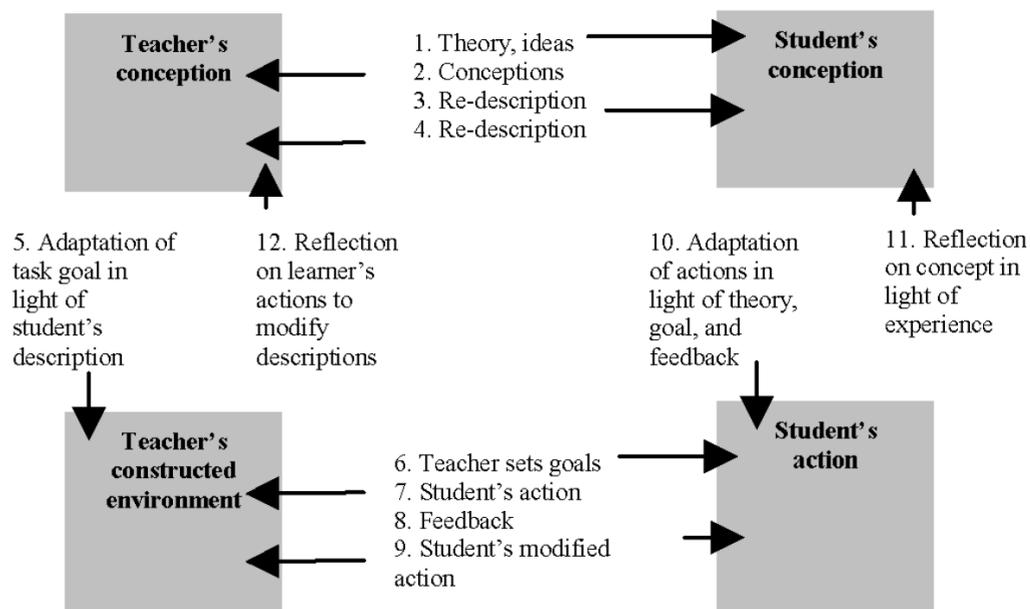
Pask (1976), Ramsden (1992) and Scott (2001) contributed to the development of Conversation theory. The theory is based on cybernetics, which is a scientific representation of a conversation as a strategy employed to discuss differences in understanding in order to reach agreement and construct new knowledge. Conversation theory has at its heart the interaction between the teacher and the learner. The principles of this theory are that: i) to learn subject matter students must understand the relationships between concepts, ii) the explicit explanation or manipulation of the subject matter, e.g. using a teach back technique where the student reflects back to the teacher what they have understood, facilitates this understanding, iii) there are two types of learning these relationships that individuals prefer and they are learning things serially or learning things in the context of the whole (Pask 1976). The skeleton of conversation developed by Pask depicts verbal communication between the teacher and the learner happening on two levels, that of the *why* indicating comprehension learning that sets out the context in which the *how* indicating operation learning becomes meaningful. The vertical lines represent causal connections such as feedback. Scott (2001) says that this theory is not just about learning by doing, it is also about awareness, review and reflection on experience and learning how to learn is important in this theory.

Figure 2: The “skeleton of conversation” (after Pask) Source: Scott 2001 p. 352



Laurillard has applied the underlying ideas of dialogue developed by Pask (1976) and Ramsden (1992) and created the Conversational Framework which was first published in Laurillard (1993). The framework depicts the communication process that occurs between the teacher and the student in the developing of the student's knowledge. The framework reproduced below is the 2002 version where four elements of the learning process are depicted. There are twelve stages that are recommended to take place when teaching students and this includes three cycles in which a student has the opportunity to communicate with the teacher. The teacher has the opportunity to evaluate the student's understanding and correct any misperceptions. Laurillard (2002) suggests that there is no one right medium for the conversation, each communication medium has its own drawbacks and so it is important to maintain a variety of dialogic mediums, making it very relevant to all learning mediums and particularly to blended learning (Heinze, Proctor & Scott 2007).

Figure 3: Laurillard's Conversational Framework Source: Heinze, Proctor & Scott 2017 p.112



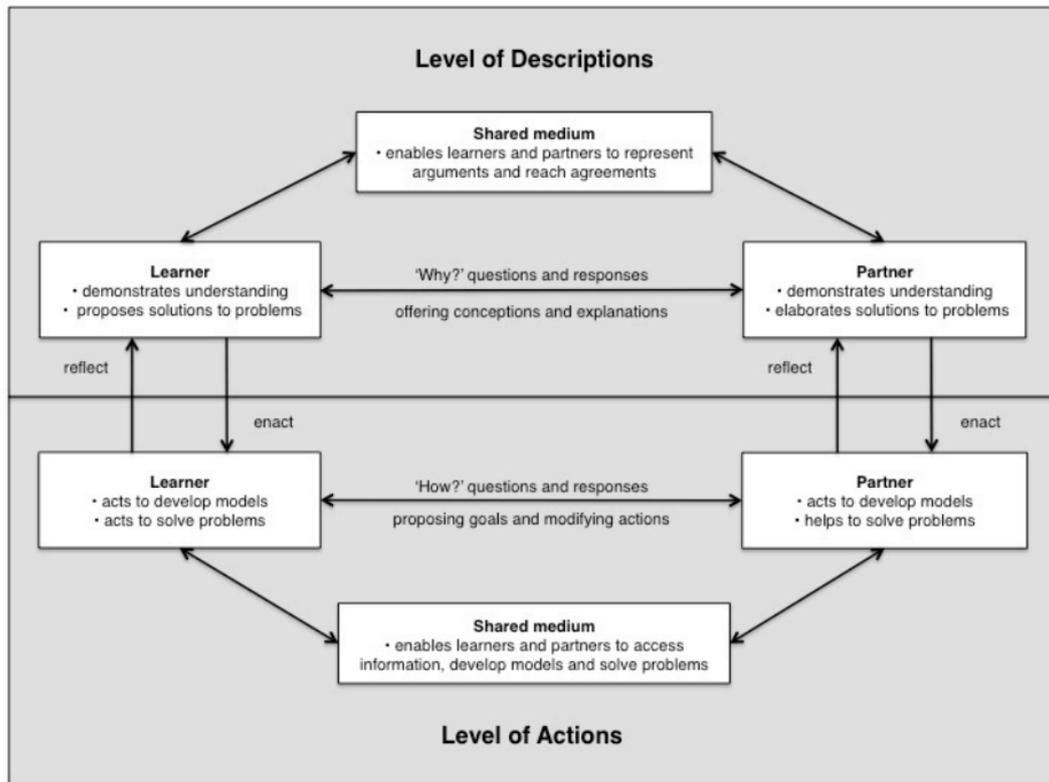
Source: Adapted from Laurillard (2002, p.87)

This is a theory which is based on experiential learning, reflective learning and learning conversations which is similar to other learning theories such as Kolb (1984) and Schon (1991) however both Pask and Laurillard intended this framework for use with learning technology thus making it different from the others. The conversational framework has been frequently used to inform the design of online learning environments and has informed the design of the FutureLearn MOOC platform (Sharples & Feguson 2019).

Subsequent criticism of the Conversational Framework includes the work of Draper (1997), who argues that there is a lack of attention to the management of learning and the need for learning negotiation between the student and the teacher. Other limitations include the application of the Conversational Framework to online group based learning where the teacher may not be present (Britain & Liber 1999). Student to student collaboration issues are acknowledged by Laurillard and she has stated that there is a need for further research into the student-student dialogue that leads to learning (Laurillard 2002, p.159).

Sharples and Ferguson (2019) have attempted to rethink the Pask and Laurillard Frameworks in order to provide the software team at the MOOC provider FutureLearn with a pedagogy-informed design for learning at a large scale based on learning as conversation. They have adapted Pask and Laurillard's Frameworks (See Figure 4). They postulate that conversations with others can be between teacher and learner or learner and learner and occur at the levels of actions and descriptions, with each level requiring a shared medium and an evolving language. At the level of actions, a learner and either the teacher or other learners discuss e.g. a practical activity. The learners ask "how" questions and share experiences and interpretations. At the level of descriptions, learners converse with each other about why things happen, offering their conceptions and questioning the understanding of others. A shared medium is needed for this that can support a process of coming to know through constructive argumentation, where learners can express and adjust conceptions in relation to the expressed understanding of others. This adapted framework relies on getting the right design of learning activities in order to promote the desired type of learning conversation and the authors say that although the process of learning through conversation is exploratory and often learners manage their own activities and discussions, there is a strong role for the educator in facilitating discussion and promoting reflection. Although the tracking of conversations in groups is highlighted as essential in this process, this rethought framework does not explain how this tracking can be used by instructors to detect when this process is going well in groups and when it is not.

Figure 4: A framework for learning as a conversation Source: Sharples & Ferguson 2019 p.4



3.2.5 Mapping online learning theoretical concepts

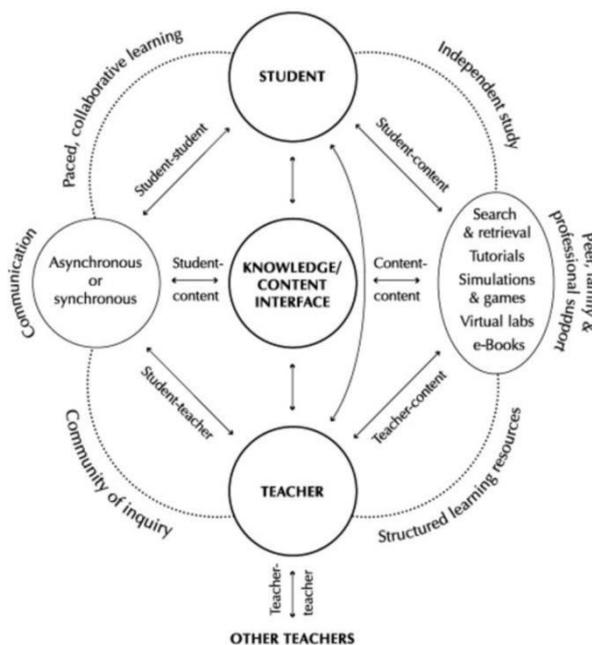
Anderson (2011) looked at the possibility of building an integrated theory of online education but acknowledged the difficulty of this task given the divergence in online learning theories. Anderson pays particular attention to the potential of the internet which he sees as capable of achieving almost all modes of education delivery with the exception of face to face delivery.

After consideration of a number of models he focused on the work of Bransford et al. (1999) who postulated that effective learning environments are framed by the following overlapping lenses: community-centredness, knowledge-centredness, learner-centredness and assessment centredness. He sees the most critical component consisting of the interaction between multiple actors, student-teacher, student-student and student-content (Anderson 2002).

Combining these lenses with the affordances of the internet and interaction he constructed the map depicted in figure 5. This map identifies activities in relation to what Anderson sees

as the two major human actors, the student and teacher and their interactions with each other and the content. The map depicts two major theoretical stances of online learning. On the left of the map the learning that is depicted is taking place within a community of learning using a variety of internet based synchronous and asynchronous activities e.g. video, audio, computer conferencing, discussion forums. This involves the development of personal relationships among participants. On the right the learning is depicted with the use of structured learning tools that are associated with independent and individual learning including search and retrieval, electronic books and virtual labs. (Anderson 2011).

Figure 5: Anderson’s Integrated Map of Online Learning Source: Picciano 2017 p. 177



Anderson’s map illustrates the dichotomy in how online learning has been theorised with the collective “together” learning on the left and the “individual” structured instructional learning on the right.

3.2.6 Summary

There are a number of theories that have emerged over time about how online learning in general can be best understood. These are the Community of Inquiry theory, Connectivism theory, Online Collaborative Learning theory and Conversational theory.

Anderson’s integrated map of online learning sums up the major dividing line between these theories emphasising either learning with others or those emphasising structured independent learning. The purpose of this thesis is the exploration of the experience of

learning in collaborative groups and therefore theories of learning theorising learning in the collective offer the most compelling fit to frame and direct this work and so Garrison, Anderson and Archer's Community of Inquiry theory and Harasim's theory of Online Collaborative Learning have been used to do this. In these theories there is a strong emphasis on learning in collaboration with each other. There is detailed theorising of the interaction between the instructor and the student. Student to student interactions are deemed to be integral to both the Community of Inquiry theory and the Online Collaborative Learning theory, however the process by which students learn from each other is not yet adequately explained.

Laurillard's Conversational theory focuses on the conversation in the process of learning has also influenced this thesis. Whilst Laurillard theorises learning conversations between the instructor and student, this thesis focuses on student to student learning conversations and how they are enacted in collaborative learning activity.

3.3 Online writing applications and asynchronous online discussion

This section focuses on what is known about collaborative group writing activities and asynchronous online discussion in higher educational practice which at the core of what this thesis sets out to explore. This section has been difficult to structure and this reflects the fact that these types of learning are now used together i.e. most wikis used in education have asynchronous online discussion embedded into them. Wikis outside of education however do not have discussion as an integral part of them. Alongside this asynchronous online discussion is seen as a key pedagogical approach in its own right in online learning. This makes the research in these areas difficult to separate and navigate.

3.3.1 Collaborative writing applications

Collaborative writing applications (CWA) such as wiki and Google Documents have been used widely to distribute knowledge outside of higher education, the most widely known being Wikipedia. The information contained in a wiki is maintained by all users rather than one individual. Wiki users oversee the content creation and maintenance. Wei et al. (2005) defined wikis as "online workspace that allows members to collaboratively create and edit web pages without requiring HTML knowledge, using no more complicated technology than a web browser" (p. 204). CWAs have been seen as emerging information technology that has become promising collaborative system for knowledge management in organisations who are investing increasing amounts of funding to their development (Alqahtani 2017). Many current projects involving large CWA's are still exploratory and have not yet been researched systematically, for example a Cochrane Review attempted by Archambault et al. (2017) focusing on CWA use in healthcare was unable to identify any suitable studies. Early

evaluations have been mixed (Alqahtani 2017). Some see CWAs as a way of capturing tacit and often frequently changing organisational knowledge that traditional knowledge management systems have failed to capture and they are seen as inexpensive, fast and supporting the collaboration of people in distributed locations (Kiniti & Standing 2013). These authors looked at 23 articles and identified some challenges in using wikis for knowledge management within organisations. These issues included the lack of a clear purpose for the wiki, with many starting without management authorisation; problems with technical difficulties and quality assurance of the information; problems with integrating the wiki into established work practices and whether the organisational culture supports collaboration; and knowledge sharing. Bolisani and Garcia-Perez (2017) compared two organisations, one using wiki to support their customer care process and the other using it as a knowledge sharing tool among research active staff. They found positives of openness, perceived inexpensiveness and good usability and speed. Where there were problems this was due to a lack of critical mass of users problematic, the time required to use to wiki, a lack of balance between top-down directions and bottom up suggestions and a lack of real willingness to share knowledge.

3.3.2 The wiki as a collaborative learning activity

The use of a wiki as a collaborative writing activity in online and blended education is widespread (Chu et al. 2017). Collaborative writing offers the opportunity for students to work together to build representations of knowledge and they do this in groups where they share responsibility for the creation of a single document (Dillon 1993). Argument and critical reflections accompanying the revisions may be made in the asynchronous discussion page. Students can contribute content, revise this content and the content of others in a shared online space and all the changes are visible. Examples of the types of activities that collaborative writing has been used for include story writing among students learning a second language (Castaneda & Cho 2013), group report writing in inquiry based learning (Biasutti & El-Deghaidy 2015) and they have been used in all educational settings from primary school to higher education. Wikis have been promoted as providing teachers with opportunities for creating tasks that require active student participation in their learning (Duffy & Bruns 2006). While collaborative writing is not new in educational settings, for example in group brainstorming, case based discussion and problem based learning (Kim & Bonk 2006), wikis offer new opportunities to work in groups, and as such, they facilitate collaborative writing and group discussion (Lundin 2008).

The collaborative group activity that is examined in this thesis is assessed as part of a masters' programme. This wiki is used as an assessment to examine a learning outcome

specifying the need for students to demonstrate the ability to working together in a way that replicates their subsequent practice in the specialist healthcare field. Wikis are being used as a method of assessment in both online courses and in courses using blended learning approaches and the literature supporting their use focuses on assessing skills such as teamwork, leadership, communication and collaboration (Chu et al. 2017). They have been discussed in the literature in relation to many specialist areas for example healthcare practice (Cunningham et al. 2016) and business (Rodero 2019). The assessment of individuals undertaking a group project is made possible by the technology allowing students in a group to cooperate with each other to complete tasks whilst a complete history of the contributions submitted can be viewed (Klobas 2006). These functionalities allow teachers to easily follow the individual and cooperative progress of each student (Ortega-Valiente et al. 2013). They have also been discussed in relation to being an “authentic” assessment of how students relate to others and perform in social situations in comparison to more traditional methods of assessment such as essay writing or examinations (Balderas et al. 2018). The term authentic assessment was first introduced by Wiggins (1989) and can be defined as aiming to replicate the tasks and performance standards typically found in the world of work.

The impact of taking part in a wiki in a second language has been considered both as an advantage in learning a language and to the improvement of writing performance (Sanchez-Gomez et al. 2017). The use of wikis to promote learning of second languages have been increasingly integrated into programmes (Lee 2010) and have been used for collaborative learning (Parker & Chao 2007) and knowledge construction (Cole 2009). This has been a particular focus for research into wikis and findings have indicated a positive impact on the content quality and the linguistic accuracy of individual writing (Hsu & Lo 2018), and that revising co-constructed text opens the possibilities for evaluating existing contribution and suggesting constructive changes (Bradley et al. 2010). Singman (2017) compared a wiki and a non-wiki group that were set a knowledge construction task in an English as a Foreign Language course and found that in the wiki group more students tried to go beyond information accumulation and regurgitation of facts to a more knowledge generating, integrating and synthesising approach. They did however report a number of challenges in both groups but particularly from the non-wiki group that suggest that many students do not develop the habits and skills of planning, searching, maintaining and communicating that are needed for conducting and learning from inquiry due to the fact that those skills are not necessary to be successful in traditional school practices. Singman found that students were more likely to engage in inquiry learning in wikis suggesting that they can be used in information management and integration as well as knowledge construction.

Some researchers have found issues with the capability of using wikis to support collaborative writing. Hadjerrouit (2013a) reviewed this literature and found some problems. Lack of engagement and collaboration due to unfamiliarity, lack of experience and a dominant learning paradigm argued by (Karasavvidis 2010; Huang & Nakazawa 2010). Mindel and Verma (2006); Arnold, Docate and Kost (2009) and Ebner et al. (2008) observed some students tended to accumulate or aggregate content rather than collaborate, some rarely revised peer's contributions and some dropped out before completion of the task. Wheeler and Wheeler (2009) and Britcliffe and Walker (2007) reported that students were reluctant to edit peers' work. Cole (2009) commenting on the student that drop out made specific reference to the expectation that students would automatically participate. Carr et al. (2007) reported some students had lack of motivation and that sometimes a minority of students performed much of the wiki activities while other students contributed minimally or not at all. Time management has also been identified as a problem. Forte and Bruckman (2007) reported that students had a tendency to postpone important parts of the wiki as the deadline approached and Allwart (2011) said that some students were frustrated by groups that were inactive until just before the deadline and did not reply to postings in a timely manner. Student acceptance was also identified as an issue. Elgort et al. (2008) said that a significant number of students felt that they could have done the assignment better on their own, some students preferred working along and Wheeler et al. (2009) indicated that students tend to resist to having their contributions altered or deleted by their peers and want to protect their own work. Hadjerrouit (2013b) reported that most students do not collaborate when they were editing but focused on adding information and technical aspects. Research on the process involved in student's collaborative writing with wikis is still very limited. Most of the studies have involved the teaching of languages and they have focused on the activities and interactions of learners in relation to different elements and stages of writing for example (Hazari et al. 2009; Li & Zhu 2016; Singman 2017). Al-Samarraie and Saeed (2018) comment that despite the increasing use of CWAs in online learning, little is known about how cloud based collaborative learning is being experienced by students and its effect on achievement and engagement in students in higher education.

3.3.3 Asynchronous online discussion

Asynchronous communication is a term that describes forms of communication that do not occur at the same time. The term asynchronous has a longer history of use than the term synchronous, having been used to describe correspondence education or distance learning, first utilising the postal system at the end of the 19th Century and then adding other forms of communication as they were developed for example recorded audio and then video (Spector

et al. 2008). This type of discussion is viewed as one of the mechanisms by which students who may be geographically and physically distant can be brought together with each other online to engage in peer learning (Ertmer et al. 2011; Gao et al. 2013; Astall & Cowan 2016).

Asynchronous discussion in online learning has been the subject of much educational literature linking it to both knowledge construction and collaborative learning (Darabi et al 2013; Macfadyen & Dawson 2010; Rovai 2007; Thomas 2013). Discussion as a pedagogical strategy for developing critical thinking can be appreciated from constructivist, connectivist and conversational theoretical lenses (Rourke & Anderson 2002; Siemens 2004; Laurillard 1993). In the act of discussion, articulation and reflection the critical thinking skills of interpretation, analysis, synthesis and evaluation which support knowledge construction is said to be promoted (Gilbert & Dabbagh 2005). Asynchronous text-based discussions present several advantages as compared to synchronous discussions. Students can have more opportunities to interact with each other than in face to face teaching and students can have more time to reflect, think, and search for extra information before contributing to the discussion (De Wever et al. 2004; Pena-Shaff & Nicholls 2004). Asynchronous online discussion gives students opportunities to engage with each other by combining thinking with discussion in writing (Prasad 2009). The delay in this communication can be advantageous allowing time for reflection (Greenlaw & DeLoach 2003) and the use of thinking and expressing thoughts in writing facilitates critical thinking (Hara et al. 2000). Reading posts from peers also exposes students to a diversity of viewpoints and prompts them to explore phenomenon from multiple perspectives, make judgements about them and draw their own conclusions (Schellens & Valcke 2006; Birch & Volkov 2007).

Some literature is clear that online discussion boards have the potential to be very effective, contributing to co-construction of knowledge and higher-order thinking and collaboration (Akyol & Garrison 2011; Cho & Tobias 2016; Rovai 2007) and they have the potential to increase participation from students who are reluctant to participate in live discussions (Bassett 2011; Gerbic 2010). Not all the literature, however, is positive and some identify that online discussion boards have limitations. Albon and Pelliccione (2005) have identified that linear discussion boards are difficult to navigate and synthesize (Darabi et al. 2011) although efforts have been made to improve online discussions, both in trying to improve discussions within the linear, threaded discussion board format that is most commonly used (Koskey & Benson 2016).

3.3.4 Asynchronous online group discussion in collaborative writing activities

In terms of asynchronous discussion to support a wiki activity, Hadjerrouit (2013a) says that the discussion page of the wiki is not powerful enough to support communication. This is because it is difficult to follow a discussion thread without writing down the name and the date of the contributor and one way around this is to combine it with other Web 2.0 technologies such as Google Talk or Twitter and other communications such as mobile phones or emails. However, there is a difficulty then in analysing contributions.

Dennen (2005) says that little actual discussion takes place in online discussion, Khlaif et al. (2017) say that there is little evidence of real interaction and Darabi et al. (2011) say there is little evidence of higher level processing . Some research has demonstrated that high levels of critical thinking were not achieved and that there is a lack of understanding about what approaches are best at promoting critical thinking (Buraphadeja & Dawson 2008; Shindler & Burkholder 2014). Darabi (2013) highlighted the importance of using structured and well-designed strategies in online discussion. Overall, discussion boards have not proven to contribute to learning as much as expected (Lapointe & Reisetter 2008).

Compared to synchronous communication tools however the research is more positive. A study by Khalil and Ebner (2017) investigated the effect of using synchronous and asynchronous communication tools in online group activities. Synchronous communication tools included in this study were video chat similar to FaceTime or WhatsApp Video, video-conferencing using Skype, and Etherpad which allows a document to be edited in real time by more than one individual. The asynchronous communication tools in the study were emails, discussion forums, blogs and Google docs. This study found that using asynchronous communication tools was more likely to develop critical thinking skills in students by allowing more time for responses and better facilitated students who were studying flexibly and in different time zones.

The interactions being studied in this thesis are between students or peer to peer. There is literature exploring both peer to peer asynchronous discussion and a range of other learning where there is peer facilitation, where the instructor is leading, contributing or monitoring discussions and there is some disagreement about which has the better impact. Dennen (2005) examined nine different online courses in terms of course design, activity design, instructor facilitation and surveyed students asking about the impact on their interactions. Dennen found that the quality of interactions and levels of participation varied widely. A factor in this was found to be that quantity of participation had an impact on quality and the

more there was an expectation of discussion contributions centred on discussion activities, the higher the quantity and quality of interactions. Other factors included task or assignment structure, clarity of instructions, and relevance to other course activities. In terms of instructor presence this study found that it was important for students to know that their instructor was reading their discussion contributions, however when instructor presence was considerable students were writing responses to the instructor and not each other. An et al. (2009) researching an online educational technology course found similarly that when instructor intervention was minimal students tended to express their own thoughts and opinions and Arend (2009) found that critical thinking may be best encouraged where the emphasis is placed on the discussions and where instructor facilitation is less frequent and more purposeful. In order to sustain the instructor's role and provide effective support for the pedagogical features that will foster learning, such as the facilitation of the collaboration, some of the instructor's roles could be delegated to students (Ravenna 2012; Koch 2014). Gasevic et al. (2014) has argued that meaningful student –student interaction that results in deep learning could be organised without the instructor's direct involvement in discussions. Gasevic points out the importance of instructional design that provides students with guidelines on how to discuss rather than setting quantitative expectations e.g. the number of messages that need to be posted to facilitate this process.

3.4 Behaviour analysis in asynchronous online group discussions

Investigating what happens in asynchronous online discussion groups and providing something that has pedagogical meaningfulness is very difficult because the development of critical thinking and argumentation skills are only developed through consistent discourse practices (Garrison et al. 2000; Garrison et al. 2001). The studies that have tried to do so have employed a diverse range of analysis methods including a quantitative approach for measuring students' participation and a qualitative approach for analysing content in an asynchronous online discussion. Zheng et al. (2012) compared diverse methods including conversational analysis, analysing the conversational patterns of a conversation, social network analysis which is the mapping and graphical representation of social communication networks, content analysis which is looking for the presence of certain words, themes or concepts and sequential analysis. Among these content analysis and social network analysis are the most used methods. The use of multiple methods have been suggested by Laat et al. (2007) and Kim & Lee (2012) because of the benefits and limitations of each of the methods.

Learning analytics is the analysis of the digital “footprints” (or trace data) that learners leave when they interact in online learning environments (Gasevic et al. 2015) and this field has become an important tool in up-scaling pedagogical approaches for large online courses such as MOOCs (Khalil & Ebner 2015). An application of learning analytics that are embedded in the online discussions and extracted from it as a pedagogical intervention is considered to have potential and is being used in the design of online learning activities in MOOCs (Corrin 2019). Embedded analytics are traces of activity integrated into the learning environment itself that can be used by the learner in real time. Extracted analytics are traces of activity extracted from the learning environment and presented back to learners for interpretation as a separate exercise from the original activity (Wise et al. 2014). Wise et al. (2013) say that this allows for integrated and reflective meta-cognitive activity. One of the other common learning analytics themes aspires to providing an early warning to help instructors notice progress at an early stage by using these two classes of analytics e.g. Purdue Course Signals (Arnold & Pistilli 2010). These metrics collected are quantifiable e.g. the number of posts made or the percentage of posts read, or average post length (Clow 2013). Concern has been expressed in the field of learning analytics that the evidence base used for analytics is very diverse and very fast growing but also incomplete and in some cases inadequate (Ferguson et al. 2019). Ferguson & Clow (2017) state that the way to strengthen this evidence and produce high quality evidence is also contested with some arguing for strengthening it with more rigorous quantitative evidence and others seeing that the answers lie in fixing a range of problems including, but not limited to, the limited evaluation of commercially available tools and how learning analytics can move from researching the data to having an impact on the optimisation of learning. Of particular relevance to this thesis is that it is still rare to involve educators throughout the process of developing and implementing learning analytics and even rarer to involve the learners who will be end users, except as participants in trials (Ferguson et al. 2019). (Buckingham Shum et al. 2019) outline how learning analytics as a field could benefit from adopting a more human-centred approach that takes full account of critical stakeholders and their needs, desires, and experiences.

Cherney et al. (2018) in their meta-synthesis and critique of predominantly quantitative or mixed methodologies studies related to online student collaboration present a meta-synthesis of 41 articles. These studies examined online groups in higher education at undergraduate and postgraduate levels using a qualitative meta-synthesis approach. The authors of this meta-synthesis found that there was a lack of consistent definitions within the literature they reviewed about student collaboration online and a lack of interdisciplinary contributions to online course group literature. From this literature Cherney et al. extrapolate

two major themes. These themes relate to group formation and group interaction processes. In terms of group formation they identify sub-themes of group size, assembly of the group and group roles.

They found an agreement in the literature in relation to group size. When groups were made up of between two and seven students, groups of five outperformed all other options for group size. AbuSeileek (2012) argues that this is the optimal size due to the opportunity for individuals to contribute while still leaving opportunity to learn from others contributions. In terms of group assembly they can be arranged based on student choice, randomly assigned or based on matching interests. This is acknowledged by Vercellone-Smith et al. (2012) to be difficult to achieve in an online environment. Groups formed based on learner preferences score higher than those formed randomly selected or selected by the instructor. Some researchers advocate culturally homogenous whilst others suggest heterogeneous groups. Arguments range from homogenous groups encouraging more participation groups (Stepanyan et al. 2014) to heterogeneous groups creating understanding and acceptance of heterogeneity in the group (Lim & Zhong 2006). In terms of group roles there seems to be roles that are assigned or ones that emerge. Wise & Chiu (2014) say that when roles are assigned they can be beneficial in making students more likely to read each other's posts and Hew & Cheung (2011) say that they are more likely to contribute to discussions. Roles that emerge that are consistent among studies include the information or opinion giver, roles that negatively affect group performance e.g. not meeting deadlines or trying to take control and the role of leader (Morgan et al. 2009; Yeh 2010).

In terms of the second major theme found by Cherney et al. (2017) that of group interaction processes there were sub-themes identified related to the quantity of interaction, patterns of interaction, social loafing or free riding and social presence. There is an overwhelming amount of literature related to the number discussion board posts. Chiong & Jonanovic (2012) categorised these posts to identify students as active, borderline and inactive participants. Several other ways to quantify these posts have been made. Social network analysis has been used to quantify patterns of connections between group members. These networks become denser with more participation. In multiple studies the pattern of interaction that is a differentiating factor in high and low performing groups is the speed of initiating collaboration (Thompson & Ku 2006; Jahng 2012; Siqin et al. 2015). The term social loafing has been defined by psychologists as a feature of group processes and a cause of group conflict. Karau & Williams (1998) as a tendency for individuals to expend less effort when working collectively than when working individually, Social loafing can be explained as (a lack of) individual responsibility, where the lack of individual accountability

may reduce feelings of personal responsibility triggering social loafing behaviour (Johnson & Johnson 2009).

Social presence is the final sub-theme. This has a huge presence in the literature and is a key feature of Garrison, Anderson & Archer's Community of Inquiry Framework (2000) and has been defined and referred to in the literature in many ways. Some authors focus on what the technology allows in terms of communication (Short et al.1976), some focus on how the person is perceived in mediated communication (Gunawardena & Zittle 1997). In more recent literature there has been more focus on being nice to each other, either at a surface level or more interpersonally to create a feeling of connection and increase accountability and interdependence (Newberry 2001).

3.5 Predicting behaviour in groups undertaking online collaborative tasks

There are several recent studies looking at a range of factors that may predict how individuals will behave in collaborative online groups. The majority of these studies apart from Panadero et al. (2015) are based on survey data and these studies are identifying lack of data from student interactions within online groups as a limitation and a need for research to develop an understanding of these groups. This makes the data from this study important and identifies a need for further research using data sets of group interactions in order to advance this understanding.

Du et al. (2018) explored factors related to students' self-efficacy beliefs in online collaborative group work by surveying 204 graduate university students. They found three variables related to group work self-efficacy. The first variable was that both the individuals' self-efficacy and the groups' willingness to handle the group work challenge were related to individuals' willingness to take up challenges. The second variable was that self-efficacy was positively associated with trust relationships in that students felt more secure, confident and competent in the steps they were taking if they felt there was trust and it also had an impact on the overall relationship dynamics of the group. The third variable was that self-efficacy was positively associated with perceptions of leadership. They related this to self-leadership which the paper identified as is a self-imposed leadership as defined by Prussia et al. (1998). Where teams followed the self-leadership model, this increased self-efficacy and individual and group performance.

Wengrowicz et al. (2018) looked at the collaborative learning attitudes and satisfaction of 698 Masters of Business Administration (MBA) students undertaking an online collaborative

case based course using a survey questionnaire with 5 point Likert scale responses. They used the concept of transactional distance by Moore (1997, 2013) which is defined as a pedagogic, psychological and communication distance. The idea is that if learning outcomes are to be maximised, the transactional distance of students needs to be minimised. The study found that when students were asked whether they would recommend a friend for their course, those who would recommend a friend have a lower (good) transactional distance. In terms of satisfaction they found that while on the surface it might appear that the effectiveness of the instructor in communicating with and understanding teams is what drives student satisfaction, the reality appears to be that unless peer members of a team are communicating and understanding each other, the instructor has little or no chance of having a satisfied class. In their conclusions they identify how important it is to online learning that students understand how to effectively function as a member of a virtual collaborative team.

Xu et al. (2013) studied time management in online collaborative group work as an indicator of self-regulated learning. Their work surveyed 204 graduate students from the same course. Important findings from this research are that feedback from instructors and from peers in the group can promote a sense of connection among group members, help them learn to keep to the pace at which others move through the task and promoting task orientated interactions developed a sense of commitment to and responsibility towards timely task completion. This has important implications for instructors to design tasks that encourage students to take more initiative and encourage students to share successful strategies and give personalised and timely feedback to group members about their efforts.

Panadero et al. (2015) have studied the relationship between individual self-regulated learning (SRL), socially shared regulated learning (SSRL) and group plus the effect of an intervention promoting socially shared regulation of learning. Their research method was a survey of 103 first year teacher education university students. Whilst there is a large and growing amount of research about SRL, they found no evidence in the literature about the influence of SRL on group learning and regulation. This may be because group regulated learning is a relatively new research area. Their results identify that students with higher individual SRL use more advanced shared regulation strategies while working with groups. This has implications for the composition of groups with the way forward being controlling the formation of groups.

Xing et al. (2014) have attempted to build a student performance prediction model that is based on Hrastinski's (2009) proposition establishing online learning as online participation. Hrastinski proposed that online learner participation is a complex process of communicating

with others. They built a prediction model based on 6 variables, Subject, Rules, Tools, Division of Labour, Community and Object and is based on quantitative coded key word data from the discussion logs. They identify the practical implications of this to be the potential to predict the student's final performance from group participation data. A big weakness of this method identified by the authors lies in their acknowledgement that communication and language are powerful ways in which learning occurs. Lesser consideration of the qualitative aspects of collaborative work i.e. the impact of group interactions is one of the limitations of this prediction model. The authors suggest further work incorporating qualitative analysis of chat logs could improve the prediction rate. They also acknowledge the problem of the understandability of the model in educational practice which might limit the usability of this model for online teachers. These online educators may have multiple groups undertaking collaborative tasks and the ability to read discussion conversations within the group and reliably identify the need for an intervention is currently not possible and is a frustration for online teachers.

3.6 Summary

Collaborative writing activities and asynchronous discussions are widely used in online and blended learning, with asynchronous discussion being used as a separate pedagogical approach and combined with collaborative writing activities.

Whilst knowledge construction and management is at the purpose of a collaborative writing activity, the accompanying asynchronous discussion can be used to evidence interpretation, analysis, synthesis and evaluation in the construction of knowledge.

Student to student interaction occurs in asynchronous discussions, however the ability of teachers in practice to identify where this is occurring and conversely where an intervention is needed when it is not happening is limited. There is a huge amount of research that attempts to analyse the content, content and conversations embedded in these discussions. This research is limited in terms of the quality of this information and in terms of the focus. The current focus of this research is on data collection rather than its application to improve the student experience. This leaves educators without a reliable method of identifying how groups are working together in online collaborative groups.

3.7 Chapter Summary

This literature review has explored what is currently known about how students learn from each other in online learning environments.

From the review of the literature the following important concepts emerge:

1. There have been developments in technical capability and approaches to teaching and learning in distance, online and blended learning environments that have enabled a shift away from the transmission of knowledge and instructional teaching practices. This shift has moved to embrace a range of pedagogical approaches to learning that put the student and their engagement with learning at the centre of educational practice.
2. Despite this shift and the proliferation of the use of digital capability in learning, developments in teaching practice using technology have remained stubbornly out of the mainstream in higher education. Technology-mediated learning is still perceived as a specialism with skills in using these technologies confined to pockets of expertise and not easily accessible and usable to all who teach in higher education.
3. There are a number of theoretical models and frameworks for online learning that have been developed and refined in the last decades. These have their genesis in the existing major educational learning theories. Despite being theories of online learning, these theories often focus their explanations of learning in the teacher-instructor relationship. Some identify student to student learning as integral parts of the theory but do not adequately explain this how this happens, leaving this aspect of the learning process under-theorised. This is a major weakness in theories for online learning which have their basis in student to student collaboration.
4. Collaborative writing activities and asynchronous discussions are widely used in online and blended learning and these can be aligned to more than one online learning theory. Whilst knowledge construction and management is the purpose of a collaborative writing activity, the accompanying asynchronous discussion provides evidence of interpretation, analysis, synthesis and evaluation which support knowledge construction.
5. Whilst student to student interaction occurs in asynchronous discussions, the ability of instructors to identify where this is occurring and conversely where an intervention is needed when it is not happening is limited. This gets even harder where there are large numbers of students involved in small group activities.
6. There is a wealth of research that attempts to analyse the content and conversations embedded in these discussions. However the quality of this information is problematic in quality and focused on data collection rather than its ability to be used by teachers to improve the student experience.

7. Further research is needed to develop current theories to explain how students learn from each other in conversations. This will help inform educators about what to look for in these conversations that can reliably indicate that learning is taking place.

From this literature review it is clear that there is further work to do in the investigation of what is happening in collaborative online group activities. The intention of this thesis is to explore the asynchronous online discussions linked to a collaborative writing activity of groups of students undertaking an online postgraduate programme in higher education. This will be done in pursuit of the development of a mechanism for educators to interpret what is happening in these groups that is contributing to the collaborative activity, based on the conversations that they are having with each other.

Chapter 4: Research Approach, Study Design, Methods and Reflexivity

4.1 The Research Paradigm

This thesis sets out to understand the meanings of online group communications and the effectiveness for learning of their interactions. The dataset for this investigation is a large corpus of online posts by students working on a group task. The fact that the students were all working on the same task as part of the same module makes the data relatively homogenous and allows for the detection of patterns and regularities. Consequently, interpretations of this data can be supported by pointing to the frequency with which students post contributions of one sort or another. However, the investigation aims to understand the significance of these posts from the perspectives of the students, and this inevitably requires an exercise of judgment on the part of the investigator. Moreover, the investigator is also the programme leader and module tutor and is therefore already part of the community within which these interventions are being made. Consequently, it would be a mistake for the investigator to assume or aspire to an absolute objectivity where she stands apart from the community under study and attempts to record their interactions without influencing them or being influenced by them.

For these reasons, this research is methodologically closer to participant-observer studies in which a researcher lives with the community under study and attempts to understand its culture from the inside than it is to studies that focus on economic or demographic data. However, the relatively homogenous dataset and the controlled conditions under which it was produced mean that quasi-statistical argument is more feasible than is normal in participant-observer studies.

4.1.2 The Research Approach:

This study explores the practices and cognitions of students undertaking collaborative online group work and what these experiences mean for the students.

The object of the inquiry is the experience that the students create by interacting with each other. The context shapes the learning experience of the students and it is this individual and group experience in the online learning environment that is the focus of this thesis.

This study does not directly ask participants about their experiences, rather it explores and interprets the meanings of individual and group communications in the form of discussion posts contributing to an online collaborative task. These communications are dependent on the nature of the educational intervention and the group culture that is created in response and they are also influenced by the combination of group members that have been put together for this purpose. By interpreting practices and cognitions in this situation, an

understanding of their common characteristics will inform educators about how this group learning experience can be understood and how learning could be maximized in this environment.

Looking at eight different groups undertaking the same collaborative task reveals commonalities between them, which will inform the recommendations for educational practice in chapter 7 of this thesis.

4.1.3 Social constructivist pedagogy and the co-construction of knowledge:

This research is focused on collaborative group learning in an online environment, an educational strategy that has been influenced by social constructivist approaches to learning. This type of learning emphasizes the role of others in the individual's construction of knowledge. Within educational practice, the discussion about what knowledge is and how we acquire it builds upon longstanding debates between various scientific paradigms.

Social constructivist educational researchers view learning as a search for meaning rather than a transfer of information between individuals. Russian psychologist Lev Vygotsky (1896-1934) was a major theorist of social constructivist pedagogy. The main assumption of this view is the idea that knowledge is constructed in collaboration with others. Important in this pedagogy is making a distinction between knowledge and learning. Learning is seen to occur in individuals and is a product of knowledge creation with others. Knowledge is therefore thought to be co-created in the learning environment with others. The socio-cultural approach emphasizes that the active process of knowledge construction is carried out in groups and communities, not just by individuals. This study seeks to use this assumption of learning being best facilitated in the social, to understand the circumstances under which the co-construction of knowledge can be achieved in an online collaborative group activity and to identify what the indicators are that this co-construction of knowledge is happening.

4.2 Study Design: Exploratory Case Study

The case study as a research methodology has a long history and has its origins in anthropology, history, psychology and sociology (Merriam 1998). The case study has been often criticized for its inability to support generalizability and thus considered to provide limited validity as a research design (Johansson 2003). An increased interest in qualitative methodologies in the 1960s and the development of inductive methodologies using systematic approaches e.g. Glaser and Strauss's grounded theory methodology (1967) led to renewed use of the case study in a number of disciplines. Inductive reasoning operates by spotting patterns in data, i.e. the data is collected first and then conclusions are drawn

from this data. This is different to hypothetico-deductive reasoning which uses data to test a prior theory. Grounded theory research uses a systematic approach to inductive reasoning starting at its first point with the gathering of data. Once gathered, the data are analyzed using coding and theoretical sampling procedures. Constantly comparing categories helps the investigator understand the construction of interrelationships and theories are generated from this.

In the wake of this revitalization of qualitative research Robert Yin (2003) developed a structured process for undertaking case studies. This qualitative case study research maintains a qualitative and inductive approach but also has an emphasis on testing formal propositions or theories as part of the outcome. For Robert Yin (2003, 2009) and other key proponents of case study methodology including Robert Stake (1995) and Sharan Merriam (1998) the philosophical underpinnings of the case study approach are in the constructivist paradigm. Miles and Huberman (1994) talk about starting intuitively until you find the “heart” of the study suggesting that cases are what you make them, and what you make of them depends on the theoretical perspective and framework that grows out of your unit of analysis. However, many including Yin and Merriam focus on the relationships in the research and argue that cases are socially constructed and co-constructed between the researcher and the respondent.

This study will utilise case study methodology as defined by Yin in 2003. Yin (2003) talks about the case study approach supporting the deconstruction and the subsequent reconstruction of various phenomena. This study lays emphasis on the importance of undertaking this deconstruction and reconstruction process in the online learning environment, exploring an activity aimed at collaborative learning in order to understand the learning processes involved. Shedding light on the interactions of group activity whilst this process is being enacted has potential to offer valuable insight into the impact of the virtual learning environment on the group’s work.

Yin (2003) identifies circumstances under which a case study design should be considered. This includes when the focus of the study is to answer “how” and “why” questions, the desire to understand contextual conditions because of the belief that they are relevant to the phenomenon under study and where the boundaries are not clear between the phenomenon and the context. In this case I am interested in how the process of learning in online learning environments is played out and why it is played out in this way. This is based on the assumption that it is difficult to separate the influences of online learning strategies from the context or community in which it occurs. Other methods would not be likely to provide the rich data about the conduction of group interactions that are needed to understand such a

complex phenomenon. This view is supported by Yin (2012) who says that the in-depth focus on the case goes beyond the study of isolated variables and uses data that are likely to come from multiple and not singular sources of evidence. It is my intention to use quantitative data from the University VLE related to the use of time, frequency of discussions and patterns related to pace of learning as well as qualitative analysis of student discussions as this it is believed that this will give rich data to work with.

The next stage of this process is to consider what type of case study will be conducted. Yin (2003) and Stake (1995) use different terms to describe a variety of case studies. Yin categorises case studies as explanatory, exploratory or descriptive and he differentiates between single, holistic, instrumental or collective. This case study fits most comfortably into the exploratory category i.e. used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes (Yin 2003) and it will be a single holistic case study. The guided discussion from the eight separate wiki groups will be considered as sub-units or embedded units that will enable the researcher to consider the influence of the collaborative activity in relation to the specific group learning process that the students are experiencing. Baxter and Jack (2008) say that the ability to look at sub-units that are situated within a larger case is powerful when you consider that data can be analysed within the sub-units separately, between the different sub-units and across all of the case. The richness of this analysis serves to better illuminate the case study as a whole.

This case is then bounded to contain the experiences of a cohort of students exposed to the learning strategies employed during the first module of a Master of Public Health (Online) Programme at the University of Hertfordshire. The cohort of a particular module run will be considered as a whole case and the small groups identified to work together on this task will be the sub-units. The rationale for focusing on this programme is that it is a programme delivered entirely online and has asynchronous discussion as the central group learning pedagogy.

4.2.1 The value of a case study approach

The use of an exploratory case study methodology i.e. one that debates the value of further research, suggesting various hypothesis as defined by Yin (2003), has been used purposively to shed light on the conversations within group activities in online environments. Yin (2003) considers exploratory case study to be particularly pertinent to “how” or “why” questions and in situations where the researcher has little control of events. It was used because the questions that the researcher wanted answers to was *how* do these conversations contribute to learning and there was a desire to understand the contextual conditions in which this contribution occurs. This embedded case study has been subjected

to within case, between case and cross case analysis. This has allowed the greatest possible use of this data to understand the cultures and key overall characteristics of these groups and to compare individual sub-units and consider the contribution of these sub-units to the whole.

Bergen and While (2000) argue that poor definition of the term 'case study' results in a variety of assumptions being made about the robustness of the method and this contributes to a poor perception of the methodology when compared to other methodologies. There are many authors in a variety of professions who argue conversely that case study provides a valid methodology, including education, sociology and psychology (Hammersley 1984; Yin 1994; Stake 1995; Woods 1997; Bergen & While 2000; Hewitt-Taylor 2002; Corcoran et al. 2004). With this in mind, McGloin (2008) uses Lincoln and Guba's (1985) model of trustworthiness to examine the "case for the case study".

In the first of Lincoln and Guba's categories, that of truth value, McGloin argues that the constant contact with the researcher and those studied enables constant reflection (Burgess 1984; Lipson 1991). In this way the case study clearly acknowledges the place of the researcher in the process rather than trying to hide them as other methodologies can do (Bryar 2000). In this thesis the researcher was observing as a researcher and also in the role of a tutor. This meant that she was sometimes in contact with these groups whilst these collaborative groups were undertaking the task and the group discussions were taking place. Therefore when collecting and analysing the data the researcher was cognisant of the context of this data and it was felt that this enhanced the process of understanding and meaning-making. Whilst the potential for the beliefs and values of the researcher to influence this meaning making is acknowledged, this closeness to the data, brought about by being an insider, is argued to provide unique insight into a topic that has been heavily researched but where this research has not been able to be effectively applied to enhance educational practice and the student experience.

The second of Lincoln and Guba's criteria is applicability, defined by them as the degree to which the findings can be applied to other contexts or groups. While there is a consensus of opinion that findings from case studies cannot be applied easily to a broader research population (Yin 1994; Burns and Grove 1997; Woods 1997), a caveat to this position is postulated by Corcoran et al (2004) who suggest that if the purpose of the case study research is to contribute to the wider evidence base, the case study research design can be adjusted to influence the way that it is conducted and disseminated. Yin (2003) agrees with this position and argues that case study methodology can be designed to expand and generalise theories and this can then be used by the broader research population. A

limitation of the case study that has potential to affect the applicability of findings and trustworthiness is sample size with authors debating the applicability of a small sample size to anything other than the context in which it occurs (Platt 1988; Burns and Grove 1997; Woods 1997). Palmquist (2006) argues that a small sample size runs the risk of identifying circumstance rather than fact. Yin (2003) disputes this and says that focusing on such a small sample size results in the generation of “deep data”. The sample size in this thesis is relatively large and relatively homogenous and the conduction of asynchronous online discussions attached to collaborative group activities are believed to be played out in relatively uniform ways and so it is believed that the findings of this thesis, based on sample size, can contribute to other online learning contexts in higher education. Lincoln and Guba’s third and fourth criteria will be considered under the data analysis process sub-heading in this chapter.

4.2.2 The Research Questions:

In this study the focus of the investigation is educational practice and student experiences in the online learning environment. The purpose of the study is to investigate to what extent asynchronous discussions aid group members to complete a collaborative learning activity and meet the module learning outcome related to working together and to investigate whether there are any characteristics of these groups that can help educators to anticipate their need and facilitate them towards task completion.

The overarching research question is:

In what ways does the use of asynchronous discussion impact on a wiki assignment in an online programme?

Supplementary questions to this are:

1. What characteristics are evident in asynchronous discussion interactions that support the collaborative online assessment?
2. What is the impact of these characteristics on the group’s ability to engage with the assessment

The focus will be on the active learning strategies i.e. not on the loaded module content but on the group collaborative writing exercise and associated asynchronous discussion. The rationale for this focus is that the researcher wants to evaluate how these students engage with this learning activity and investigate what their contribution is to the learning of individual students and the group or learning community.

4.3 The Study Methods

4.3.1 Study participants

In September 2016, 42 students enrolled onto the Master of Public Health (Online) Programme, either in part time or full time mode. Students in the part time and full time mode were all enrolled on the first module called Public Health Foundations. This module was four months in length and took place from September 2016 to January 2017. Students accessed the teaching materials and interacted with the module team and their peers via StudyNet, a managed learning environment which is bespoke to the University of Hertfordshire. No face to face teaching occurred and students came from a range of geographical areas in the UK and from a range of countries around the world.

4.3.2 The relationship between the researcher and the participants

At the time of conducting this research the researcher was the programme lead of a Master's in Public Health (MPH) (Online) programme. This was part of a portfolio of programmes taught in a University School of Life and Medical Sciences. The relationship between the researcher and the student participants was one of programme leader/student and within the module of study they were undertaking it was tutor/student. As the students' programme lead, the researcher, as previously discussed, was in a position of influence over the students. Overlaying this was that the research focused on their engagement in a collaborative writing activity and linked asynchronous discussion that was an assessed element of their module of study. The decision to use an assessed collaborative activity rather than an unassessed one was based on the structured nature of the activity. The fact that this activity was assessed and part of this assessment was how they interacted in the asynchronous discussions was also intended to promote maximum participation although this did present potential to impact on the students and the study.

In order to minimise the pressure on students and to minimise the perception of influence on the marking process the researcher, who would normally be the module lead, was replaced by another member of the teaching team and the researcher took the role of module tutor. This action was also considered in the light of considerations of the Hawthorne effect, also referred to as the observer effect, where individuals modify aspects of their behaviour in response to their awareness of being observed. Coombs & Smith (2003) identified the Hawthorne effect as a being regarded as the "Achilles heel" of participatory-based research. Coombs argues that the participatory researcher is attempting to uncover findings that are unique to the setting in which they occur by studying qualitative real-life episodes in action. It needs to be considered however, that this particular research project is a relatively

homogenous dataset and quasi-statistical arguments are derived from this data. Whilst there was very little contact with the participants and no participation in the group conversations when the group activity was running, information was given to those who requested it from tutors via email. Under these circumstances the attempts to reduce the impact of the researcher on the collaborative writing activity being investigated was considered to be valid.

4.3.3 Rationale for the design of the assignment and links to co-construction of knowledge:

The rationale for the design of the assignment is for students to be able to demonstrate that they have met a learning outcome about working together across institutional and sector boundaries to meet public health challenges. This is one of the professional competencies identified by the Public Health Skills and Knowledge Framework published by Public Health England (2016) on which the design of this programme is based. This principle of working together in public health has been conceptualised by the programme team as in keeping with the notion of the promotion of communities of practice in public health as articulated by Lave and Wenger (1998). Co-constructivist ideas of learning (Vygotsky 1926) (translated by Cole et al 1978) have informed the design of the assessment that measures this learning outcome and is the subject of this research. This is the first module of an online programme and its design is intended to seed and develop a student community of learning where the co-construction of knowledge between learners is facilitated.

4.3.4 The collaborative learning activity:

The research undertaken in this thesis is focused on a collaborative learning activity. This took the form of a wiki worth 40% of the module marks and the intention of the wiki was to meet the learning outcome of working together to meet public health challenges. For the wiki, the module cohort of 40 students was split up into 8 groups. The groups were required to agree on a public health intervention to meet a public health challenge in London, England and then select one borough of London to apply it to. The task was to write collaboratively a five section wiki that explores the public health challenge in that area, assesses the population/s most at need and identify an intervention and a strategy for implementation.

The section titles were as follows:

1. Focus on the public health issue and identify the need within the borough that the intervention would address
2. Explore appropriate theory based interventions and choose an intervention,

3. Explore the evidence base for the intervention
4. Discuss the feasibility of implementing the chosen intervention
5. Identify how the community can be engaged in the intervention.

Participants were randomly allocated to groups using a numbering process. Each group was asked to go to the wiki group site to which they were allocated to and contact their group members to decide on the London Borough and the public health intervention to meet an identified health need. They were to use an asynchronous discussion area of the group wiki site to communicate with each other during the process.

A deadline of one week was given to accomplish this task and for one of the group to email the module lead with the groups' choices. Each member of the group was then allocated a section to lead. This person would write that section of the wiki and be responsible for that section in the editing process that would follow later.

The weighting of marks for this wiki were as depicted in Table 1:

Table 1: Weighting of marks for the wiki assignment

Written assignment (Wiki) carried out in groups comprising the following:	
- Individual Student contribution to the wiki under an assigned heading	20%
- Editing of the wiki by individual students aiding its completion	10%
- Group Mark for the Wiki Final Action	10%

Once the section responsibilities had been allocated, students had 4 weeks to write and submit their individual 500 word sections. This was submitted for marking. After the contributions has been submitted students were asked to combine their individual contributions together to form the group wiki and were asked to collaborate using the asynchronous wiki discussion pages to organise the editing of sections to improve the wiki with each section writer leading for their section. Students were made aware that their entries on the discussion pages as well as the editing they took part in would be looked at to evaluate individual contribution to the wiki completion.

4.3.5 Ethical considerations:

The ethics of this research process is considered to be extremely important to ensure that that this research does not harm the participants and the integrity of the researcher is safeguarded. It is the researcher's responsibility to ensure that all participants of the study give voluntary informed and un-coerced consent and that they are aware that they can withdraw from the study at any time. It was recognised that the researcher was in a position of power in relation to the research participants in that the researcher was the lead for the programme that the students were enrolled on. The researcher is normally the module leader for the target module but during this module run, the module leadership role was taken by another member of the teaching team. Regardless of this, the fact that the researcher was taking part in the module as a tutor was judged to have the possibility of unduly influencing the participants to agree to take part in something they were not very comfortable doing and participants may have felt that not participating could have influenced the researcher's disposition towards them in the performance of the assignment which was recognised as high stakes for these students. In an attempt to minimise this risk it was decided to recruit the participants once the module had been completed and the results of the module had been issued to students. When researchers are investigating their own practice or within their own practice area, the issue of bias is an inevitable potential consequence. This research study cannot be said to be totally free of bias as it is practically impossible to demonstrate this wholly convincingly. Reflexivity undertaken by the researcher throughout this process contributes to mitigate against the risk of bias. This is practice based insider research due to the researcher's insider role and it acknowledged that there may be subjectivity on the part of the researcher. The process by which the analysis was undertaken and by which the data was interpreted will be elucidated later in this chapter. There is a declared acceptance of the researcher's influence and possible impact on the study and this must be considered in order to mitigate any questions that might be raised in relation to the validity of the study. A reflexive approach was undertaken throughout this study and will be implicit throughout and made explicit at stages throughout this thesis. All participants in this study were given written information regarding the nature of the study as well as being told they could withdraw at any point (Appendix E). All participants signed an information and consent form (Appendix C) which was developed with regard to institutional (University of Hertfordshire) guidance and BERA national guidance. Participants were told that any information that the researcher was given access to would remain confidential and any published results would not identify any individual participant in any way. Ethical approval for this study was sought from the University of Hertfordshire ethics committee and was granted on 9th June 2016 (Appendix D).

4.3.6 Reflexivity in participant observer research

McCurdy and Uldam (2014) who offer a reflexive framework to assist researchers in locating the type of participant observation research in social research, identify implications of participant observation for both the researcher and the subjects under study and reflect on how the researcher's role may shift over the course of the data collection.

The first consideration in McCurdy and Uldam's reflexive framework is whether the researcher is an insider or outsider researcher. Insider research has been defined as research conducted by people who are already members of the organization or community they are seeking to investigate as a result of education, employment, social networks or political engagements (Coghlan & Brannick 2007). Insider educator-researchers can become desensitised to potential role conflicts (Humphrey 2013) and therefore the need to take a reflexive approach to this research is essential to prevent an abuse of this power. The research in this thesis has been conducted by an insider researcher as module tutor and programme leader for the participants' programme of study. This puts her as in a position of power over these students and as such, students may have perceived participation as a requirement when made by a figure of authority influencing their studies. The privilege of seeing and influencing the academic performance of students may make them very vulnerable to this kind of abuse of power. Given this possible pressure the researcher needed to make a decision about when to recruit the participants to this study. The decision was taken to recruit participants after the module had been assessed and the ratified results given back to the students. This was done in order to ensure that students did not feel pressurised into agreeing to participate given the power differential between the researcher and potential participants.

The second consideration in the reflexive framework is whether the research is covert or overt. Covert research is controversial and complicated with ethical challenges and risks of harming research participants that outweigh the potential benefits (McCurdy & Uldam 2014).

Given the decision to recruit to the study once the module was complete, there was the potential for this to be covert research, in that the students undertaking the collaborative activity could have not been introduced to this research before the activity took place and could have been given information about it after the event. There was felt to be a risk of significant harm to the participants if this course of action was taken and those actions were deemed unethical. Therefore this research is overt research with full disclosure of the research proposed to the participants before the collaborative activity. Therefore the students were informed of the intention to undertake research using the discussion

communications but consent to participate was sought once the collaborative activity had taken place.

Possible influences on the students in the consideration of this request for participation in the study was their own perceived “performance” and also the objective assessment of that “performance” i.e. the student’s score for the wiki activity. It was made clear to participants that the focus of the study was on the group conversations and not on the performance of individuals. This individual perceived performance did have an effect on the study as the students who did not pass this module did not agree to participate. This had the potential to influence the results reducing the possible examination of problematic conversations. In reality the number of students not taking part who failed the module was a very small proportion (less than 10%) of the cohort and they did not represent more than one group member in any group therefore meaning that all groups could be included thereby providing a fuller picture of the performance across all groups.

4.3.7 Participant Recruitment

Students undertaking this module were made aware of the researcher’s aspiration to undertake this study in the first few weeks of the module. This occurred when the collaborative learning assignment guidance was discussed with students in a live online session using the online classroom. At this point it was introduced to students as a possibility, not as a firm intention. They were made aware of the purposes of this research and it was made clear to them that they may be approached in an attempt to recruit them for the study once the assignment had been completed, marked and the module results had been released. Permission to recruit participants was sought from the module leader, permission was not required from the programme leader as this was a role the researcher held. Permission was sought from the Head of School within the university to recruit participants from a programme that was delivered and quality assured by the School. Once the module results had been released invitations to participate were made by email to all students who undertook the assignment.

4.3.8 Participant Numbers

The aim of the researcher was to recruit as many participants as possible in this study. As well as desiring maximum recruitment across the case study, recruiting within each group was also desired so that the group interactions could be explored as close to saturation as it was possible to achieve. Recruitment and selection was purposeful. This was the strategy adopted because selecting participants specifically because they have the characteristics being sought was thought to be the logical way to gain the best insight into the phenomenon

under study. The more complete this picture is the better and the way to achieve this is to have as many of the group member's interactions under scrutiny as possible.

The subjects of the research are referred to as participants. This term is used because it indicates that they were not passive in this process but contributing in an active way to the group dialogues that supported the learning activity. Meanings have been construed from these dialogues as a consequence of the shared experience of the group. Meaning has been construed from the perspective of the individual in terms of their influence on the group and from the group's influence on the individual.

4.4. Data Collection and Management Methods

The data for this thesis was collected from the VLE utilised by the participants' university programme of study. The data takes the form of online posts in the discussion area of the collaborative learning activity. Password protected access to this data was given to students who could only see the posts related to their allocated groups and not the posts of other groups. The module teaching team and the module external examiner had password protected viewing access to these discussions. Access to the discussion posts for students was discontinued once the module assessment results had been ratified and the students progressed to the next module. After the module had run and participants were recruited, the data from the online group posts from all participants recruited to the study, was transferred by the research directly from the VLE using NCapture, a free web-browser extension that enables the gathering of web content to import into NVIVO coding software. The web pages were captured in pdf format and appeared in NVIVO in the way that they were formatted on the VLE. It was not possible to anonymise this data in NVIVO as it was transferred in pdf format. NVIVO was encrypted on the password protected computer that was used to code the data in NVIVO until the process of coding was done. The data was transferred out of NVIVO for further analysis at which point the data could be anonymised and the codes and raw data were reproduced verbatim into tables for further analysis.

Data was also generated from the group wiki sites that related to the timing and frequency of postings that was cross referenced and analysed alongside the conversational data.

4.4.1 Method of Analysis

The data was analysed using the Framework Analysis principles of Richie and Lewis (2003) and the worked framework analysis example provided by Smith and Firth in (2011) was used to guide this process.

4.4.2 Framework Analysis

The framework method was developed at the National Centre for Social Research (Richie and Spencer 1994) in the 1980s. It is a matrix based method of analysis which allows the researcher to demonstrate how the data was managed such that all the stages involved in the analysis can be systematically conducted and recorded.

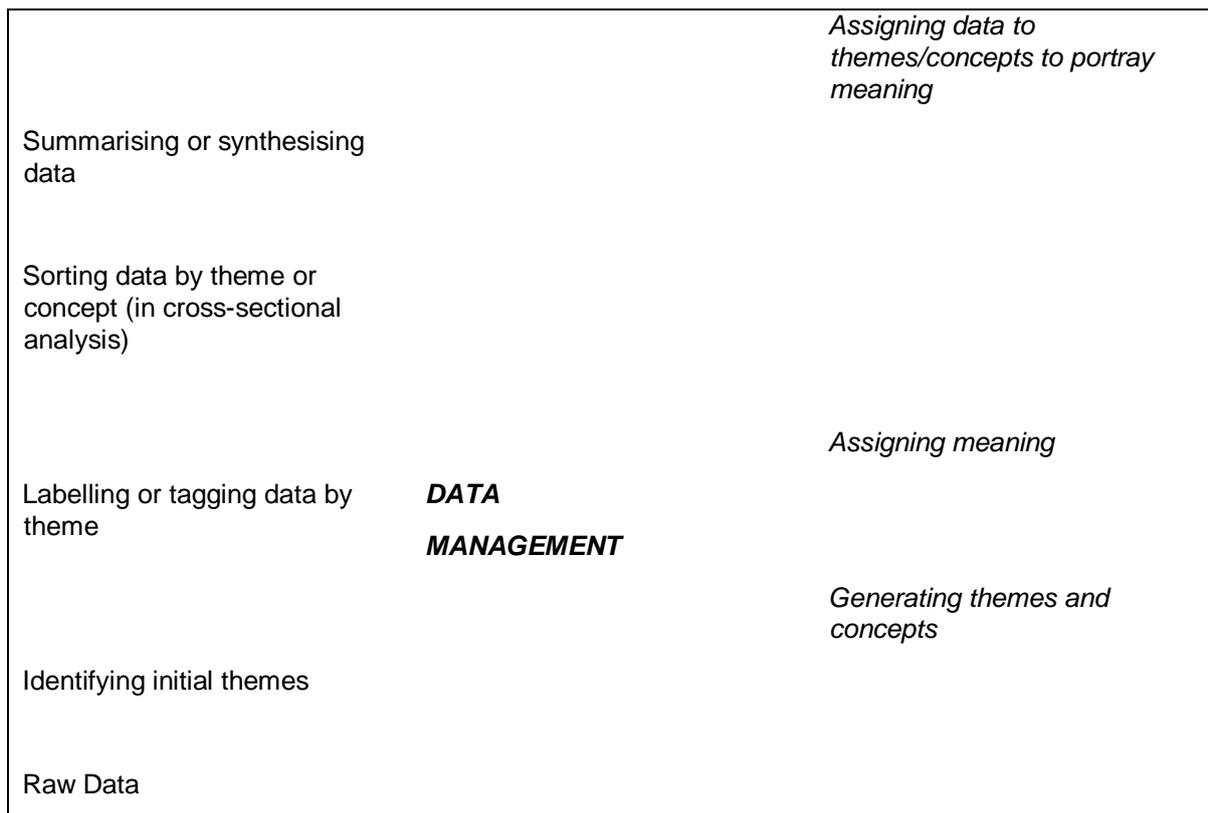
It also allows the analyst to move back and forth between different levels of abstraction without “losing sight of the 'raw' data” (Richie and Lewis 2003 p. 220).

The name 'Framework' comes from the 'thematic framework' which is the central component of the method. The thematic framework is used to classify and organise data according to key themes, concepts and emergent categories. The research analyst develops a distinct thematic framework comprising a series of main themes, subdivided by a succession of related subtopics. These evolve and are refined through familiarisation with the raw data once the research judges it to be comprehensive. Each main theme is displayed or 'charted' in its own matrix. Richie and Lewis (2003) identify the analytic process that the framework method follows (see Figure 6) starting with raw data at the bottom of the hierarchy.

Figure 6: The Analytic Hierarchy (Adapted from Ritchie, J. and Lewis. J. (Eds.) (2003) *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. Sage Publications, London p. 212)

A depiction of the stages and processes in qualitative analysis

Seeking application to wider theory/policy strategies		
Developing explanations (answering how and why questions)	EXPLANATORY ACCOUNTS	<i>Iterative process throughout the analysis</i> <i>Assigning data to refined concepts to portray meaning</i>
Detecting patterns (associative analysis and identification of clustering)		
Establishing typologies		<i>Refining and distilling more abstract concepts</i>
Identifying elements and dimensions, refining categories, classifying data	DESCRIPTIVE ACCOUNTS	



A worked framework analysis example provided by Smith and Firth in (2011) was used to guide the research process (Appendix F). The framework approach is similar to thematic analysis but framework analysis has a greater emphasis on making the data analysis transparent and enabling the researcher to move back and forth across the data until a coherent account emerges (Richie and Lewis 2003). The framework method was chosen for this study because the researcher anticipated that a large amount of data would be generated for analysis within the eight wiki groups. This approach allows for the data to be revisited across and within groups to ensure that interpretations were justifiable and transparent across all the data. This approach also allows for cross-sectional descriptive data such as timings and frequency of discussion threads to be considered enabling different aspects of the phenomena under investigation to be captured and considered (Richie and Lewis 2003)

4.4.3 Data Management and Analysis:

4.4.4 The framework analysis process

The process of analysis followed the framework analysis example provided by Smith and Firth (2011).

Stage 1 Codes were identified: Thereafter codes were developed by considering each line of the discussion dialogue in each group. The method of coding was inductive, i.e. the

researcher read and interpreted the raw textual data and represented her interpretations of the data as codes (Corbin & Strauss 1990). This is different to deductive coding where the researcher starts with a pre-defined set of codes and then assigns those codes to the new data. The research questions led this coding process and each piece of data was assigned a single code in this process with the researcher asking herself “What is the main idea being conveyed” as Cresswell (2015) suggests for researchers using this strategy. This was done systematically across all groups and individually from groups 1-8 consecutively. The strategy of assigning one code to each piece of data was decided on pragmatic grounds. The researcher was interested in identifying dialogue types as well as identifying how frequently certain types of dialogue are used. Coding only once is considered by Elliot (2018) to be a good idea in this type of instance. Although Richie and Spencer (1994) consider that multiple indexing can begin to highlight patterns of association within the data, Miles, Huberman & Saladina (2014) say that too much simultaneous coding can suggest an unclear or incomplete vision for the coding system and thus, the research design. Once the coding began, new data were compared against existing codes and if there was no match a new code was identified until all data was coded. NVIVO was used for the process of tagging data into relevant codes. Key phrases were summarised and coded using the participants own words when the words were self-explanatory (in-vivo codes) and the number of times they were mentioned in the discussion thread, which threads they were mentioned in and explanatory accounts. A coding matrix was developed encompassing all groups. A coding matrix was also developed for the eight individual wiki groups. Alongside the codes, the number of times that this code appeared in the discussions were recorded. The frequencies with which the codes were recorded subsequently contributed to the analysis of the individual groups who may have had categories that were less represented than in other groups and to the analysis of the cross group data. This frequency contributed to the significance given to that category in the analysis, for example the presence or absence of positive regard at the beginning of the task was linked to the development of team identity. An example of one of the coding matrixes is presented in table 2.

Table 2: Coding Matrix Example

Coding Matrix Group 1					
Number of Discussion Threads: 22					
8 Strong categories Addressing the group, Promoting Action, Praise, Information Giving, Asking for help, Expressions of doubt, Disagreement, Gaining Agreement		5 Weak categories Apologies, What I think, Deadline reminders, Decision Making, Asking for Contribution		4 Missing categories Confusion, Positive regard, Motivation, Leadership	
Initial codes	Sources: Number of times mentioned in the discussions threads	Discussion Thread Number 1-22	Related Categories	Descriptive Account	Explanatory Account
Suggestions	1	6	What I think/Persuasion Weak Category	Suggested actions, decision making Views, ideas, thoughts put forward for consideration What I want, am happy with, agree with What participants think is missing/needs to still be done	There are not many posts aimed at persuading the others in the group and where they are present, are early on in the task. This indicates high group consensus and agreement with the ideas of others.
What I think	2	3, 6			
What I want					
What is missing					
Confirmation of helpfulness	1	6			

Stage 2 Descriptive accounts were written: Descriptive accounts involve summarizing the range and diversity of coded data (see Table 2). This was done to elucidate the critical thinking that took place in relation to how the participants conversations were coded, links between the codes and categories and links between the categories and themes. This allowed for the data to be synthesized

Stage 3 Categories were developed from the codes: Data management using the coding retrieval and search facilities within NVIVO was the first stage of a more in-depth analysis. Each in-vivo code initially formed a potential category. This helped preliminary thoughts to emerge across cases and linkages to be seen between codes, allowing the grouping together of codes to develop the categories.

Stage 4 Initial then final themes: A number of categories developed and then they were grouped together to form initial themes. These initial themes were then refined and final themes then identified. These categories and their linked final themes formed a coding index that was used as a means of organizing the whole data set. The coding index was constantly refined through the process of data analysis as new insights emerged. An excerpt from the cross group coding index is presented in Table 3.

Table 3: Cross Group Coding Index

Cross Group Coding Index					
Initial codes	Sources: Number of discussions in which code is mentioned	Number of times the code is mentioned	Refined to categories	Final Themes	Dialogue Type
Suggestions	19	39	What I think/Persuasion- Participants use a range of strategies to outline thinking and try to persuade others. They have varying degrees of success (this may be case dependant)	Cognitive contributions towards the task	Dialogue promoting shared cognition /learning
What I think	24	32			
What I want	4	4			
What is missing	2	2			
Confirmation of helpfulness	7	9			
Agreement with suggestion	21	40			

Stage 5 Explanatory accounts: These were written reflecting back on the data as a whole in order to ensure that the communication within the discussion threads were accurately reflected and to minimize the possibility of misinterpretation (see Table 5)

Stage 6 Final themes to typologies: The final stage of the framework analysis involved making sense of the themes in relation to the initial propositions and research questions. Richie and Lewis (2003) say that once the nature of the phenomena has been described and the themes have been identified, typologies may emerge which appear to explain how the themes operate (see Table 3). The final themes were synthesized leading to 3 types of dialogue and how the types of dialogue may relate to each other was considered. The contribution of the use of time within these themes and typologies was also considered and quantitative statistical findings related to the use of time and pace of learning will be considered alongside the dialogue types that have been identified.

4.4.5 Reflexivity in the data analysis process

Lincoln and Guba’s third and fourth criterion of trustworthiness is the consistency and confirmability of the data. Consistency is defined as where the findings would be consistent

if the study were to be replicated (Guba 1981) and Krefting (1991) considers that this relates to the notion of dependability. Guba (1981) suggests that a greater degree of variability is to be expected because of the naturalistic nature of qualitative research. Confirmability concerns neutrality i.e. interpretation of the data should not be based on the researcher's own preferences and viewpoints but needs to be grounded in the data. Guba suggests that the notion of dependability of the data be assessed through the use of an audit trail to ensure accurate data analysis.

Framework analysis (Richie & Spencer 1994) allows the researcher to demonstrate how the data was systematically managed and conducted and is now described in order to provide an audit trail of the process used in this thesis. The distinctive feature of framework analysis is that it forms a series of thematic matrices in which every participant is allocated a row and each sub-theme a column. This allows the analyst to move between multiple layers of abstraction without losing sight of raw data (Ritchie et al., 2013). Four phases in the framework analysis method were moved through as identified by Richie and Spencer (1994) as applied by Smith and Firth (2011).

The first phase is familiarisation. Ritchie and Spencer (2002) identify that when undertaking research where extensive material is available, judgements have to be made as to how data for analysis are to be selected and broken down into a dataset of a manageable size. The familiarisation stage was followed first of all by coding the raw data once it was transferred into NVIVO coding software. The data was labelled and tagged by group and then coded for each group. The researcher randomly assigned consecutive groups numbers and started the coding process with group 1 and went through all eight groups in numerical order. Data was compared against existing codes and if there was no match a new code was identified and so the process developed iteratively. The coding was kept within group for this phase of the analysis. The codes used were in the participants own phrases initially and the number of times that these phrases were mentioned were recorded in order to identify the strength of this code. The advantage of using NVIVO for this stage was to be able to revisit the raw data and check the accuracy of the researcher's interpretation of meaning throughout the analysis process. Once the data was given initial codes in NVIVO the codes were transferred out into coding tables however the researcher continued to use NVIVO to revisit the raw data at each stage of the process.

The second phase was constructing an initial thematic framework. This was achieved by returning to the aims and objectives of the study (Pope et al. 2000). Tables were made for the eight individual groups and one table representing all eight groups. Descriptive accounts were written for the initial codes and categories were developed by merging the codes that

were thought to be related. This allowed for reflection on how they were related and whether the categories sufficiently represented this merging process. The extent and frequency of which the codes were represented across all groups and links between the codes was taken into consideration in the development of categories.

The third phase in this process was indexing and sorting. Indexing refers to the process whereby the thematic framework or index is systematically applied to data. It is not a routine exercise as it involves numerous judgments about the meaning and significance of data (Ritchie & Spencer, 2002). A process of refining the coding index from codes to categories and then moving these categories into initial themes took place. Explanatory accounts were written using the raw data to reflect back on and ensure that the discussion threads had been accurately represented. It is this judgement process and interpretation that can allow individual subjectivity to emerge in a study, as ultimately the researcher has been immersed in the dataset for a long period of time and preconceptions will inevitably shape the interpretation of what is being read. This is seen as a strength of framework analysis as applying an indexing system to the whole dataset makes the judgements and assumptions in what meaning the researcher has made of the data transparent for all to see (Richie & Spencer 2002). It is this level of transparency and potential for replicability that adds robustness to this method of analysis (Kiernan & Hill 2018)

At this point in the analysis explanatory accounts were written for the initial themes. This follows the Smith and Firth's (2011) example whose process was followed during the analysis. These explanatory accounts allowed reflexive consideration of what the meaning of the themes were for the researcher and the basis for this meaning being ascribed.

The fourth phase in this process is charting. Pope et al. (2000) describe the charting stage as rearranging data into the appropriate parts of the thematic framework, and more recently Ritchie et al. (2013) have characterised this stage as a way of organising data into more coherent groupings, as usually initial thematic frameworks are rather crude and disorganised. In this thesis the researcher, using the explanatory accounts, moved from initial themes to fewer overarching final themes by a process of merging and renaming. This process was guided by returning to the research aims and 9 final themes were identified. Associations between these themes allowed the identification of a typology of dialogues within the dataset and this typology has been used to guide the interpretation and application of the findings to existing knowledge in asynchronous online communication in higher education.

4.4.6 Reflexivity in the data synthesis process

In the analysis and synthesis of the data in this thesis, the validity of this data has been assumed. Bosk (1979) says that every qualitative research conducted by a single field worker has always invited the question “why should we believe it”? Putnam and Conant (1990) point out that in conducting qualitative enquiry there will never be one correct objective account or “God’s eye view”. Maxwell (2002) refers to this quote and says that as observers and interpreters of the world, we are inextricably part of it and we cannot step outside our own experience to obtain some observer-independent account of what we experience. Thus it is always possible for there to be different, equally valid accounts from different perspectives.

Maxwell (2002) presented a typology of validity and thought that the following types applied to qualitative research; descriptive, interpretive and theoretical validity and generalisability. These will be applied to this thesis starting with descriptive validity. Descriptive validity relies on the accuracy of recording the data and the integrity of the researcher to provide an adequate account of this. Kiernan and Hill (2018) say that a strength of framework analysis is that textual data is “lifted” from the source and are made visible during the familiarisation phase. The descriptive and explanatory accounts that have been used in this thesis to index and construct themes are all recorded in charts and applied to test assumptions. These accounts have been transported verbatim into the charts so that it is possible to track each of these assumptions back through the process to the raw data on which it is based. Using NVIVO search and find facility, this process has been followed backwards and forwards to the complete raw data to check the assumptions throughout the analysis process.

Maxwell’s interpretive validity refers to the inferences made from accounts that have led to the development of the categories, themes and typology. In respect to this the charting process provides a clear, transparent picture of the researcher’s subjective inferences prior to mapping.

Theoretical validity is another type of validity in Maxwell’s typology. Maxwell (2002) defines this as the validity of an account as a theory of some phenomenon and says that what counts as theoretical validity, rather than descriptive or interpretive validity, depends on whether there is consensus within the community concerned with the research about the terms used to characterize the phenomena. Whilst the intention of this thesis was to look at the data without a framework or model to shape how the data would be categorised, the influence of the researcher’s exposure to the existing theories of online learning are clear in the use of constructs such as *cognition*, demonstrate an influence from Garrison, Archer and Anderson’s (2000) Community of Inquiry theory. Whilst these are widely used terms to

indicate evidence of thinking and processing knowledge, the fact that these theorists use this as a label for one of their categories of online presence needs to be considered as an influence and this influence is discussed in the literature review and discussion chapters of this thesis. The typologies that have been identified by this thesis relate to student dialogue. A central purpose of this thesis was to explore the conversations between students in asynchronous discussions and therefore this influence is overtly expressed. The influence of Laurillard's conversational theory is not surprising and also discussed in this thesis in chapter 6. These theories have proved to be an influence on the themes and typologies that have been interpreted from the data considered in this thesis and attempt to offer further explanation and extend these theories further.

Maxwell's next validity type is generalisability. Generalisability is the ability for a random person to be able to take experimental results and apply them successfully to their own situation (Firestone 1993). This study has as its central purpose a commitment to understanding the culture of asynchronous discussion groups from the inside and is not setting out to test a hypothesis using numerical methods. Therefore the study is not statistically generalisable and does not set out to be so.

It is argued, however, that qualitative research has transferability as long as the results are applied to similar groups (Firestone 1993; Williams 2000; Maxwell 2002). This study focuses on a large group of postgraduate students in higher education in asynchronous discussions. It is argued that the use of asynchronous discussions alongside collaborative activities are very similar to other groups in higher education contexts. This thesis also has the benefit of being analysed using framework analysis which has the capability to manage and systematically process large amounts of qualitative data based on multiple case observations. The dataset is a relatively homogenous one and the conditions under which it was produced were controlled. Therefore it is felt that quasi-statistical inferences can be made from this data.

4.4.7 Section Summary

The purpose of this section has been to demonstrate how the reflexive process has been employed to ensure that the researcher has remained aware of the need for rigour and integrity at all stages in this thesis. In addition to this, within this chapter a reflexive consideration of what needs to be when undertaking insider, participant observer research, the validity of the case study methodology has been considered

4.5 Chapter Summary

This chapter has given an account of the methodology and methods employed in this thesis and this process has then been reviewed reflexively applying relevant frameworks to systematically consider the value and validity of the research design and the rigour and the validity of the data analysis and data synthesis methods. The purpose of this undertaking has been to demonstrate how the reflexive process has been employed to ensure that the researcher has remained aware of the need for rigour and integrity at all stages in this thesis.

Chapter 5: Study Findings and Analysis

5.1 Introduction

This chapter presents the findings of the analysis of eight asynchronous discussion communications supporting the collaborative learning activity undertaken by the groups of study participants. There were three types of dialogue identified across the supporting discussions of the eight groups. The findings are presented for all groups simultaneously in the 9 themes and how these relate to the categories and original coding will be elucidated. How these themes have been grouped to identify a typology of dialogue will also be elaborated. The final section relates to the use of time within each group and data is presented relating to the timing, frequency, length of communications and number of communications within each group and across the whole collaborative group activity. The names of the participants have not been used and all identifying information has been removed. Direct quotes from participants are as they appear however misspelling has been corrected where it was considered to aid the clarity of the intended expression.

The themes presented reflect only those aspects deemed salient to the primary and supplementary research questions.

The primary research question is:

In what ways does the use of asynchronous discussion impact on a wiki assignment in an online programme?

Supplementary questions to this are:

1. What characteristics are evident in asynchronous discussion interactions that support the collaborative online assessment?
2. What is the impact of these characteristics on the group's ability to engage with the assessment?

It is hoped that the findings of this thesis will assist online teachers in minimally facilitated collaborative group activities to recognise groups who may require intervention and to give the most effective help in the timeliest fashion.

5.1.1 Main Study Findings: Dialogues types

Three types of dialogue were identified that featured across all of the groups in this collaborative group activity. These dialogues are as follows:

1. Dialogue indicating shared cognition and learning

This is the posting of communications where the purpose is to engage with and respond to other participants with the purpose of supporting the group to develop and improve the quality of the knowledge and thinking demonstrated by the written wiki assignment. Five of the groups demonstrated this dialogue. Key characteristics of this type of dialogue include the role modelling to other participants of effective learning strategies, e.g. accessing and posting of information and the questioning of the content in development. Another key characteristic is the effective use of time in terms of using more time in discussing the content with others and the sustained increase in the use of time. These types of dialogue also demonstrate that these participants are considering their responses, have strong motivation to work together to complete the task and express positive regard to other group members. In this study the presence of this type of dialogue was a strong prediction that the group would meet the assessment criteria.

2. Dialogue indicating the organisation of learning

These postings are communication which is aimed at the organisation of the content of the wiki, individual and group tasks contributing to the wiki and communication aimed at delivering the key components required for the successful completion of the wiki in a timely fashion. Key characteristics of this type of dialogue were the acknowledgement and recognition of the contributions of others in the group and the presence of communications aimed at positively motivating and spurring others to action. In this study the presence of this type of dialogue was a strong predictor that the group would complete the task.

3. Dialogue indicating uncertainty and lack of progression

This type of communication has the purpose of conveying unease, uncertainty or frustration with the progress of the task or the quality of the content being produced or both of these phenomenon. Key characteristics of this type of dialogue are the repeated expression that the participant is unsure or uneasy about the task or the expression that there is something preventing the participant or group from progressing to complete the task to the best of their ability. In this study, the presence of dialogue 3 when dialogues 1 and 2 were also present, indicated that the group were likely to be very successful in meeting the assessment criteria for the task in the time allocated.

In some groups this is used to trigger others into problem solving and decision making. In some groups who are missing these elements, expression of doubt or uncertainty is not met with a direct response from the other participants, the response from others may be general in nature or absent. This appears to fuel uncertainty and unease and often leads to repeated

requests for contact or information that remains unanswered, replied to in general terms or responded to by another question creating the situation where the postings are not dynamic in nature and not typical of a dialogue between two people. These have been identified in this study as monologues in parallel. In this study where dialogue 3 was present but dialogues 1 or 2 were not, this represented a group in trouble who did not complete the task to meet the assessment criteria.

5.1.2 What combination of dialogues is an indicator of success?

The three groups who are the most active in terms of numbers of posts and discussion threads and who manage to submit the task on time and meet the criteria have all three types of dialogue.

Of the remaining five groups, three of the groups have either dialogue 1 and 3 or 2 and 3 but all have one missing dialogue. These groups achieved the task but struggled with timing and with meeting the assessment criteria.

There were two groups who did not complete the task in a timely fashion and or meet the assessment criteria. These groups both were strong in dialogue 3 but had minimal or missing dialogue types 1 and 2.

5.1.3 The significance of the dialogues

In an unmonitored collaborative group activity over the length of a module of study, there are often relatively long periods where there is no contact or minimal contact between group members. It is often very difficult to balance the desire to promote the group to engage and interact with each other independently with the desire to provide support to a group who may be struggling with this. Being able to identify these types of dialogue, or the absence of them and understand the significance of them has the potential to assist the facilitators to identify groups who could be struggling at an earlier stage where support could be offered to overcome these difficulties.

5.2 Findings across all groups by category and theme

Across all the groups there were in total 130 discussion threads with varying between 1-21 posts per thread. After familiarisation fifty-eight codes were identified from these posts that were considered pertinent to the research questions. The frequency that these discussion codes occurred was recorded and are shown in table 4. These codes were collated with similar codes in order to form categories of data pertinent to the research questions. After further detailed examination of the categories, initial and then final themes were identified to represent the types of discussion data across the whole case. How the codes, categories and final themes relate to each other is displayed in table 4.

Table 4: From codes, to categories, to themes:

Codes	Frequency of code	Categories	Themes
Suggestions	39	What I think/Persuasion	1.Cognitive contributions towards the task
What I think	32		
What I want	4		
What is missing	2		
Confirmation of helpfulness	9		
Agreement with suggestion	40		
Finding it hard	2	Confusion/Finding it hard	2.Constructive challenge and problem solving
Stupid question	1		
Wiki page confusing	1		
Agree it's confusing	3		
What I don't know	15		
Correction of another's information	9	Challenge/Disagreement	
Did you remove something?	1		
Don't want to remove where I shouldn't	1		
Refuting others assertions	5		
Asking for a group decision	33	Decision Making	3.Considered content-based contributions and responses
Making a decision	2		
Decision Made	1		
What do you think?	3	Information giving/reporting	
Giving Information	8		
Hope information is helpful	2		
Informing tutor	3		
Reporting an error	17		
What the tutor says	11		
Clarification of meaning	1		
Posting completed group work	1		

Posting section contribution	15		
Promise of action	29	Promoting/Reporting/Promising Action	4. Action-based reporting and contributions
Reporting work done	54		
Asking for acknowledgement	6		
Asking for feedback	2		
From my own experience			
Instructing /Leading others	15	Leadership	5. Role Modelling effective learning practice
Group Leader	3		
Compliments	2	Praise/Compliments	6. Acknowledgement and Recognition
Praise	19		
Addressing the group	108	Addressing the group	
Introducing self	15	Good wishes/Thanks	
General good wishes	32		
Using humour	4		
Thanks	51		
Welcome	1		
Excitement about the task	1	Motivation	7. Encouragement and increasing the pace
Expressing enthusiasm	1		
Trying to motivate	5		
Call to action	58		
Making assumptions about agreement	3		
Reminder of deadline	15	Increasing the pace/deadline reminders	
Tell me what to do	8		
Check my work	6	I don't know what to do	8. Uncertainty
Expressing concern	2		
Individual responsibilities	10		
Asking for help	37		
Asking tutor for help	12	Asking for help	
Asking for clarification	33		
Asking for opinion	1		
Asking for agreement	6		

Trying to gain agreement	13	Gaining agreement to move on	9. Require something from others to move on
Asking to discuss further	1		

From these final themes, a typology of dialogue within the discussion supporting collaborative learning activity have been identified. These types and the themes that fit into them are depicted in table 5.

Table 5: Themes to Types

Themes	Types of dialogue
1.Cognitive contributions towards the task	Dialogue indicating shared cognition and learning
2.Constructive challenge and problem solving	
3.Considered content-based contributions and responses	
4. Action-based reporting and contributions	
5. Role Modelling effective learning practice	
6. Acknowledgement and Recognition	Dialogue indicating the organisation of the learning
7. Encouragement and increasing the pace	
8. Uncertainty	Dialogue indicating uncertainty and lack of progression
9. Require something from others to move on	

5.2.1 Theme 1: Cognitive contributions towards the collaborative task

Category identified within this theme: What I think/Persuasion

Participants used a range of strategies to outline thinking and to try to persuade others with varying degrees of success.

These included suggested actions.

“I suggest we each write our 500 word part separately, then combine them into one document that we all can edit” (Group 5, Participant 4)

Also views, ideas and thoughts put forward for consideration.

“I would suggest Smoking Cessation/Tobacco regulation in the UK” (Group 4, Participant 1),

They also include saying what they wanted.

“I hope we shall have a good discussion about the current interventions in place” (Group 5, Participant 3), what they thought was missing or still needed to be done “I was thinking

about (London Borough), I have attached the JSNA 2015 for (London Borough) re: substance misuse” (Group 7, Participant 3)

Also included are what was useful, helpful and has been used to good effect and agreement with suggestions others have made,

“The London Borough we are suggesting has the highest incidence of TB (Group 3, Participant 2)

Some groups had more instances of these type of posts and were groups whose communications related to the task.

“I have been looking at this and I would put forward (a London Borough) as a suggestion” (Group 2, Participant 1).

These groups had dialogues lasting more than 2 or 3 posts and they were interacting with each other about the theoretical content of the module and programme.

“I think I am still firmly behind the social media/website idea - simply because it can be aimed at our target audience, we are able to protect user’s privacy, it is something that can be used by the wider community as a whole if they want and because I believe it’s the main tool of communication, particularly amongst young people. I am prepared to be out voted though if you all choose a different direction” (Group 2, Participant 2)

Some groups focus on introductions and are friendly and personal and show positive regard for the other group members.

“Hey (name), Thanks for editing my little section...the computer I was working on was playing up!” So, well done on your additional/alternative sections!! (Group 7, Participant 2).

In other groups conversations are going on between individuals but when they ask the wider group to join in the posts go unanswered.

“Hi colleagues, Any ideas about the public Health Issue we are going to focus on? All ideas are welcome so that we agree on the topic and Borough of our focus” *post goes unanswered* (Group 4, Participant 4).

In one group with only 3 active individuals there is a lack of direct addressing of each other. Interactions are not personally directed and are instead targeted at the whole group despite no responses coming back. As a result dialogue between the active participants does not develop

“We are working on the topic: Alcohol misuse” *post goes unanswered.* (Group 6, Participant 2)

Across all groups there were some notable findings within this theme. Groups who had longer discussion threads had more opportunity to demonstrate personal interactions with other group members and within these threads cognition-based discussion was more likely to be taking place. This may indicate that there were more members of the group taking part in the discussion but this did not seem to be essential. Long discussions (5 or more posts) were noted taking place between two or three individuals for example in three of the groups.

Whilst quantity of discussion is an indication of cognitive contribution this is not the case in all long interactions and there is a variation in the amount of deep discussion about content versus superficial discussion about organisation of the wiki.

5.2.2 Theme 2: Constructive challenge and problem solving

Categories identified within this theme, Confusion/Finding it hard, Challenge/Disagreement

The number of posts in this theme across all groups were low. These posts were the lowest in the Confusion/Finding it hard category. Where the posts occur participants are expressing confusion and frustration about what to do at this stage in the process. Where confusion is expressed it seems to be shared and there is help available from the other group members.

Group 2, Participant 2: "This editing stuff is actually more difficult than I initially thought, we need to put our heads together"

Group 2, Participant 1: "I think it is incredibly difficult!! Completely agree"

In some groups expressing confusion was a helpful way to highlight areas needing work and increase discussion to facilitate problem solving.

"yea.. I'm not sure how it works as well, if anyone has a clearer idea about this??" (Group 7, Participant 5).

Sometimes confusion that was experienced in the past was reported "My understanding currently is (and I've been a bit confused) is...." (Group 5, Participant 4).

One post was about how to present the wiki "Should we wait for the end of the day? I'm really confused what to do about it" (Group 6, Participant 3).

Notable findings across all groups were that expressing confusion does seem to be a good way to connect with other group participants, it seems to be helpful to highlight difficulties and often provokes discussion.

It was noted that where individuals are addressing each other individually rather than sending communications out to the whole group, they are far more likely to get an answer.

This means that where the group is addressed as a whole there is a greater likelihood that these posts go unanswered.

This theme also relates to participants challenging each other about what others have done, or wanting to change what others have done. These posts are not frequent in most of the groups with 2 notable outliers, one for whom there were frequent posts and one for whom there were none. In the group posting frequently, the posts that relate to the choice of intervention are the most interesting as they relate to different perceptions of the influence of social media in the exposure to judgement and stigma of the intervention target group.

Group 2 Participant 2: "Social media may identify and stigmatise the target group for the intervention" Group 2, Participant 5: "I recommend targeting schools with a message about multiple sexual partners and casual sex".

After lots of strong opinions voiced about this the group does resolve the issue and move on with a better shared understanding of the purpose of the intervention.

"Thanks for some very interesting insights, we are agreed that going down this line is restrictive given the assignment asks for the creation of a new intervention..."

In the group that was posting frequently there is a direct challenge to a post about editing.

Group 2, Participant 4: "(name) can you please clarify why you stroke through some additions particularly in section (number). Does that mean the changes are not welcomed? I thought we had a consensus agreement to deliberate on all additions and deletions when we are done with editing".

Group 2, Participant 2: "sorry I should have made it clearer - what I have tried to do is to incorporate all the changes that everyone had made to make more sense overall, it had become very disjointed. So basically, I have rearranged it taking into account what everyone had done before. The stuff that now has the strike though is all incorporated into the new paragraphs, I struck through it to show that it was now included elsewhere? It would have been very useful if we could have used coloured font to represent what we were doing! It was getting very messy and unclear, so I was trying to be helpful".

Group 2, Participant 4: "It's okay that is much clearer now."

In the groups where this is an infrequent theme, the posts relate to the editing process, in particular removal of other people's work "I have also removed the map since you don't want it included here" (Group 6, Participant 1).

There is one group where there are no posts linked to this theme. This is because the group does not get into discussing the detail, no work is corrected or discussed therefore there is no opportunity to disagree or challenge it.

Notable points across all groups in this theme are that challenge and disagreement seems to be a helpful precursor to group knowledge construction and can trigger change or promote resolution. Of note also is that challenge and disagreement when focused on organisation issues only can be a sign of a group struggling with the task.

5.2.3 Theme 3: Considered content-based contributions and responses

Categories identified within this theme: Decision Making, Information Giving/Reporting

In this theme group members use a variety of strategies to promote decision making, discussions relating to decision making, giving opinions and demonstrate compromise in order to reach agreement. Three groups showed the most number of posts related to this theme. In two of these groups they were mostly posts that are pushing for a group decision and members ask each other for decisions regularly.

“All getting rather exciting, hopefully we can get to work on really narrowing down which areas of London/intervention we want to focus on. Has anyone who hasn’t already posted got any ideas or particular areas they are interested in?”. (Group 2, Participant 5).

At the beginning of the task this relates to the topic and the borough and this continues with decisions about the content of the wiki and then how to improve it right up to the end of the task. Responses from the groups to these requests are timely and positive prompting involved dialogue where theoretical concepts and information are discussed critically.

Group 5, Participant 1: “have edited the wiki so all sections are now on one page. Please can we be careful that previous work is not overwritten when our work is added.”

Group 5, Participant 3: “thanks (name) will try to add mine carefully (smiley emoji)” (Group 5).

For one group decision making is a missing category. There are suggestions but no posts directly asking for a group decision apart from the choice of borough that seems to go on for the entire task leaving little or no time to develop the finer details of the task.

In between these two extremes lie the other four groups. For these groups the focus of decision making seems to be related to the choice of borough. In two of the groups decisions are asked for but they are not responded to.

“Does anyone have materials for the find and treat strategy? I did an extensive search but couldn't find any” *post goes unanswered* (Group 3, Participant 3).

In the other two groups the decisions about the intervention appears to have been made or pre-determined with no alternatives suggested.

“We are working on the topic: Alcohol misuse” (Group 6, Participant 2).

In the information giving/reporting category group members are asking for information and giving information to each other. In the groups which have frequent postings in this category, the giving of information is more frequent than the asking for it. It is a very strong feature in two of the groups. In one of these groups at least three of the 6 group members start strongly with the giving of information about the topic to help inform others.

“For those of you who may have missed this evenings live tutorial, (the tutor) has suggested that we put our heads together and think of which London Borough we want to base our sexual health wiki on” (Group 2, Participant 2)

“Hi everyone, I've attached the references guidelines that we need to use. Some of the references in the wiki aren't in the correct format so over the next few weeks they'll need to be updated. Eventually we'll be able to put them into a single list at the end of the wiki rather than having separate one for each section. Best wishes, (name)” (Group 5, Participant 1)

There is one group member in both groups that does this from the beginning and is the most frequent information giver.

“Here is one last journal article before I go to bed. It is quite a good overview of the use of social media for HIV prevention, including evidence of its success across the world and some of the pitfalls. I hope you find it useful, if this is our approach! *Link to information is posted*” (Group 5, Participant 1)

“One of the higher risk groups for sexual health problems was those aged 25 years or less (I believe the reference to that was in the link (*name*) posted) - I was having a bit of a search through the library to try and increase my background knowledge on the subject and found the book 'Promoting youth sexual health' - Its American but I still think some of the principles are valid and its good for reference purposes. *Link to information is posted*” (Group 2, Participant 5)

This sets the tone for other who start this later and follow this pattern of behaviour. In this group there are frequent clarifications, reminders of the assignment brief and reporting of errors during the editing process and information giving often with in depth exploration of the issues being discussed. One participant in this group takes on this role and is accepted by

the group as the information-giver and guide. They readily and frequently give this information that is readily accepted by the rest of the group.

“In the context of obesity there are a few areas that I can think of... *lists suggested areas*... There are lots of options but we need to decide on one fairly soon” (Group 2, Participant 1).

In another group the collective shares information frequently at the beginning of the task. Thereafter the posts reduce and peter out, so there are less opportunities to discuss and debate information that may be useful to the task and more focus on organising submission.

“Can I just check which one is the final document?” (Group 1, Participant 2)

In group 7 there are 3 individuals who share information, demonstrating that the participants are keen to seek this information out and give it to others for the benefit of the group, however this does not trigger the debate and discussion it does in other groups as there is a poor response to information posted and often there is cross posting of information without debate or discussion.

Group 7, Participant 2: “My role is I guess writing the introduction....”

Group 7, Participant 1: “I was able to come up with other interventionsbut Naloxone is obviously the main focus...” *there is no reply to this from participant 2*

For groups where there are infrequent postings in this category theme, information is posted that relates to the posting of assignment timings and deadlines or the posting of assignment guidance.

“This is my original contribution which I posted on the (date given)” (Group 6, Participant 1)

“N.B. Please could we refer to the wiki assignment brief below” (Group 4, Participant 4) or where complete sections of work are posted without discussion of the content “Please see my section below” (Group 8, Participant 2)

There were some notable points across all groups relating to this theme. It is noted that group participants who are pushing for a group decision do trigger debate and trigger effective decision making. This pushing effort seems to need to come constructively with potential solutions to engage others. The presence of timely responses to these efforts to move the group on indicates that the group is engaged and working effectively

Where information is shared by group members who post questions or comments about it this seems to be effective in triggering academic conversation rather than posting information on its own. Presenting information in this way seem to make it engaging to

others and often prompts debate and discussion leading to the co-construction of knowledge. Where information is posted that is mostly organisational without this focus on academic development this does not generally lead to discussion, development of ideas and academic creativity within these groups.

5.2.4 Theme 4: Action-based reporting and contributions

Category identified within this theme: Promoting/Reporting/Promising Action

This theme relates to how group members reported intention to actual work done. Overall reports of work done were more frequent than prompting others for work. For all groups but one there were frequent posts relating to this theme.

Within this theme there are differences in the way some groups are promoting reporting or promising action.

Three of the groups are focused on the content and sustain this throughout the task. Of these three groups, one of them is way out in front with the most amount of posts and the best focus on improving the content through frequent revision of the material within the wiki. There is a lot of work achieved in this group, both incited by others and individually motivated. The work is evenly spread in the early stages however by the end there is a waning of activity by most group members and an increase in calls to action from one participant.

“Overall I think we've done really well with the content of the wiki and once we've got the structure right we'll be done.” (Group 5, Participant 1)

Some other groups frequently posting are demonstrating that they are getting down to the task very quickly and sustaining the focus on improving the wiki throughout the task.

“Just seen the post from (tutor) and we should probably move things forward and choose an area - from what I have seen so far we have all agreed Lambeth could be a good region to choose, anyone feel differently? I know I would like to get on and do some research, as I am sure you would too!” (Group 2, Participant 5)

“That sounds good- there are some interesting support mechanisms pertinent to the area- the Bengali Men's tobacco control group and giving up before Ramadan- (I have posted this on the other discussion so forgive me if I am repeating myself). I am off tomorrow so will be working on it then.” (Group 1, Participant 4)

For other groups, although there are frequent posts, they are in the main posting complete work and there is little or no discussion about the development of the material.

“Please look at what I have done, yours seems fine, check mine please!” (Group 6, Participant 1).

Calls to action are frequently made but not responded to, leading to increased frequency and directness and a possible sense of desperation in the caller.

“please we don’t have much time so let’s try to edit the compilation that was put together” (group 4). Posts relate to editing and referencing and not the content of the wiki “thanks for the correction it will be actioned immediately” (Group 3, Participant 3).

There is one frequently posting group that is different from the others in that there are very short dialogues between individuals for most of the discussion. However, at the very end of the task and long gaps between the discussion episodes, when the group is required to, it picks up the pace and group members respond very well to each other in a push to finish the task on time.

For one group there are only 4 posts reporting work done and no posts in the other categories within this theme. This group relates the discussion to the choice of borough and intervention and do not stray into the details of or question the validity of the wiki content.

There are points notable across all groups related to this theme. Early engagement with the task and longer discussion threads at the beginning and at the end of tasks could indicate a group that is working well and engaging in cognitive discourse. More posting by a particular individual or individuals is not in this wiki assignment necessarily a negative sign unless these posts are not responded to by other group members. Ebb and flow in activity in asynchronous discussion is present in all of the groups and could be considered normal especially for students in a higher education environment with competing demands. A more important indicator of a struggling group may be posts not responded to leading to inactivity or individuals engaging in monologues in parallel to each other with little reference to the postings of the other. Most groups demonstrate a peak of activity by increased posts close to the beginning of a task, this activity lessens as the work for the task is being done then a peak of activity is notable at the end.

5.2.5 Theme 5: Role modelling effective learning practice

Category identified in this core concept: Leadership

The postings linked to this theme cover a range of posts that relate to instructions to others, driving conversations forward with prompts related to the content and the organisation of the wiki and driving improvements to the wiki. This is seen in these posts both in how they communicate with others and role model effective inquiry and in the students’ criticality of the materials and the purpose and execution of the task.

“I think it’s great to share documents so we can share the load and widen our reading”
(Group 1, Participant 2)

“Looking at the Public Health England data, my suggestion would be to use B&D as our London borough. 68.4% of adults in B&D are classified as overweight or obese whereas (it’s 52.7% in Tower Hamlets (one of the lower boroughs) *posts link* How does that sound to everyone?” (Group 5, Participant 4).

Leadership was a frequent feature in the postings of 4 of the groups. Some of the participants appear to be very highly regarded by other group members and considered role models for the group. This is evident by the positive regard evident in postings about this person’s ability to drive other forward to keep improving their work.

“Hi (name) you took this to the next level-I’m impressed! I found it hard to judge if what we were doing was “good enough” because I wasn’t sure how in depth a wiki had to be but you really went for it, thank you for that” (Group 5, Participant 4)

Some groups have more than one of these role models, some groups do not have any and this seems to be a key factor in the group’s success in focusing discussions on the content of the assignment and in seeking to do the best job possible.

“I don’t want people to think that I’ve stepped on anyone’s toes or taken over. I want everyone to get the best mark we can for the wiki” (Group 5, Participant 1).

Clear attempts are made in one group to lead by one participant however without giving specific direction to others about what is required or offering suggestions about how it should be done.

“Please let’s start editing. We have to edit everything properly. We also need to add more references. Please we have very limited time so let’s start PLEASE. We can do it!!!! (Group 6, Participant 1).

Requests are repeated without changing the wording. This could be interpreted as catastrophizing by repeatedly drawing attention to and magnifying the significance of not getting a response. In this case some of the elements of leadership are present, e.g. trying to drive the group onwards, but the approach of the leader does not result in changing the status quo. This is mirrored in other groups where this theme is infrequent or non-existent with an absence of individuals stepping forward to take on this responsibility. One quote from a participant personifies this.

“Please who is the leader of this group?” (Group 6, Participant 1)

There are notable points across all groups in this theme. Group members that are highly regarded by others as indicated by the posts of others often demonstrate effective learning techniques and can role model this to others. Some characteristics of these people in this wiki assignment are that they are frequent posters, offer information that is knowledge based, drive the pace of the work whilst role modelling a strong work ethic. These people are seeking a solution from the knowledge and information available rather than seeking answers from individuals.

Group members who have an individual/individuals within their groups displaying this positive role modelling can and do change or improve the way they are interacting with the task based on this example from others. Groups where effective learners are not present appear to struggle to complete the task even if they are highly driven to do so.

5.2.6 Theme 6: Acknowledgement and Recognition

Categories within this theme: Addressing the group, Praise, Good wishes

There are frequent posts related to the category of addressing the group in all of the groups. This is because all groups attempt to gain the attention of other group members in order to fulfil the assignment requirements. What differs between the groups is the responses to these attempts to gain attention. 4 of the groups have posts addressing both individuals and the group in a friendly and personal way showing positive regard for the person/group. This is achieved throughout the task and is usually done confidently and directly.

In one of the groups these posts are addressed to two individuals and then latterly a third person. A significant number of posts that are directed to the group as a whole go unanswered. In another group a participant frequently attempts to address the group members but fails to elicit a response. In one instance where one individual is addressing another it is in a confrontational manner.

Group 4, Participant 3: "Hello everyone, I just wanted to let you know that I have not heard from (name) up to this point. I have emailed again but still no response so I think we should move ahead with our discussion."

Group 4, Participant 2: "pls I did not get the emails. Pls what can I do?"

Group 4, Participant 3: Hello (name) I did email you".

In another group there are more posts addressing the group than individuals. Although this is a small active group of 3 people there is a lack of interaction with each other on an individual level. Interactions within this group are not personal and therefore constructive relationships do not develop. Post are addressed to the wider group rather than responding

to the individual and this arrests discussion about the content of the wiki. In another group individuals do address each other initially and then at the end of the task. However, there is no interaction in between and this means that despite the very long dialogue at the end of the task, it is not enough to complete the task by the deadline required.

There are 5 groups which are frequent posters the praise/compliments category. Of these groups, 4 have a similar pattern. The posts are consistent throughout, and overall they are the strongest towards the end of the task indicating that their purpose could be to increase momentum and motivation.

“Good work (name). I think today we are going to have to be brave and slightly ruthless - my suggestion is that we start deleting the bits that are struck through, as long as we are happy with that. We will see what is left and then tidy it up a bit more.” (Group 2, Participant 2)

In two of these groups they are more evenly spaced throughout the discussions. There is frequent praise for group members in these groups. One participant gets a lot of praise towards the end of the task and this praise borders on the reverent.

“(Name), I didn't have a chance to make it to this tonight, but yet again you knocked it out of the park. You said exactly what I should have the first time around, I really wasn't thinking of things from that perspective. All I can say is thank you and I'm glad we had the discussion about this. I will definitely think more critically about it next time around!” Have a great week, it was a pleasure working with you” (Group 5, Participant 4)

Three groups were not frequent posters in this category. One of these were focused on other things at the beginning of the task. Once this settles down there is some praise but it is very sparsely given.

“Thanks that is great (smiley emoji)” (Group 1, Participant 5)

In another group there are not many instances of thanks and when they do occur they are brief and not elaborated on. This phenomenon fits with the presence of stress in some of the communications and lack of discussion of wiki content, therefore not much reason for giving praise. One word “Thanks” is used frequently and sometimes it is used in expectation rather than retrospectively to actually thank someone.

“I hope the other group members will also put in their views so that we get started. Thanks”. (Group 7, Participant 1)

In two of the groups there is only one post in this category. This example is expressing positive thoughts about working with the group in the last discussion thread.

“I am glad to be working with you on this topic which is a major Public Health concern”
(Group 8, Participant 1)

Participants in the good wishes/thanks category are sending posts giving general good wishes and thanks.

There are four groups frequently posting in this. For these groups the thanks and good wishes are consistent throughout the task and strongest towards the end of the task.

“That was a very wise idea emailing (the tutor) for us” “Thanks ...for pinpointing very crucial points which both of you detailed clearly” “Thanks for all your great work! Much appreciated”
(Group 2, Participant 1).

In the group which is exhibiting stress in their communications there are a number of posts expressing thanks however these are perfunctory, coming after a request and not in response to something done by other group members. This use of thanks could be more to do with making a point related to things that have not been done, despite several requests. In another group there is only one post fitting this category and it expresses positive thoughts about working in the group. This is in the last post and does not get a response from other group members.

There were notable points to be made in this theme across the groups. One of these is that a group's functionality could be better assessed by the quality of the posts addressing group members and the responses to posts rather than the frequency with which posts seeking attention are sent. Some are very superficial and others have a more meaningful impact. Confident and direct postings addressing people personally are most frequently responded to across all groups. Messages that address the group and individuals that are not responded to do indicate a struggling group in this study. The presence of praise and compliments can be an indicator of group functionality in that they are present within groups who are engaging in positive discussion. Praise and compliments are often being used to motivate and congratulate. A group that is lacking in praise for each other may be an indicator of a group that is struggling with the task. Consistent good wishes and thanks seem to be an indicator of good group dynamics. Sometimes, however when used in expectation rather than appreciation it can indicate stress in communications and could indicate frustration with others. Similarly good wishes that are expressed and not responded to seem to indicate problems with group dynamics or absence of engagement with the task in others.

5.2.7 Theme 7: Encouragement and increasing the pace

Categories within this theme: Motivation, Deadline Reminders

In this theme the groups are split evenly between frequent and infrequently posting groups.

Participants in the motivation category are posting the type of posts that express encouragement to push forward and improve or complete the task.

Four of the groups have large numbers of posts in this category. In two of these groups members are regularly asking for responses from others and getting these responses. These posts are sustained throughout and come from several group members. This suggests that they are attempts to keep momentum up throughout with a view to completing the task to the best of everyone's ability. In another of these groups there are no overt expressions of enthusiasm but there is a sense of persistence and a drive for improvement from all members of the group. There is one particular member who persists until the end to make improvements. One particular group has frequent posts in this category however the motivation is not maintained through further engagement. Frequent attempts to motivate are made but they are not responded to. This could be due to the repetitive nature of the request but also could be due to the competing agendas of the group members who are posting what they want to post but not responding to others.

There are two groups where these posts are infrequent and there seems to be an absence of striving for excellence in the task from group members. There is one motivational post to listen to the workshop about the assignment. There is no follow up post however about implementing the instructions in the workshop.

For one group there are not posts relating to this category. There are posts asking for action but they are not encouraging or motivating and they are not responded to.

There are notable characteristics across all groups. The most motivating posts appear to be the ones that ask for something and at the same time role model how to go about fulfilling the request. Posts aimed at motivating the group or an individual that are not responded to often are not isolated incidents and are often repeated.

Participants in the deadline reminders category are addressing the time frame for the task and making sure that group members are aware of their responsibility to the group task

There are four groups who have frequent posts in this category. In one of these groups most of the posts are to remind people of the deadline. There is no holding back in these posts, they are direct and clear and responded to well

Group 2, Participant 5: "...considering we have only 11 days to get our 500 words collated we really ought to think about picking up the pace! (smiley emoji)"

Group 2, Participant 2: “Thanks (name) I am not very good at leaving things until the last minute as you might be able to tell”

In another of these groups there is a consistent recognition of the deadline and who is responsible for what throughout and the pace increases towards the end as expected.

In two of the frequent poster groups there are regular reminders about the deadline therefore the category is strong but they are not effective in mobilising the group to respond and there is an increasing sense of frustration particularly from one group member. There are reminders to other group members from one participant which are not responded to. These posts outline what needs to be done, but do not give suggestions about how it should be done.

For the other four groups there are infrequent posters in this category. For one group this category of post is very weak, happening only at the beginning of the task and once commitment to the task is secured they disappear. This group maintains commitment throughout the task and therefore the need to remind group members of deadlines may be redundant.

In another of these groups posts are infrequent and not sustained throughout the wiki even through the group’s commitment is not given throughout the task. Where deadlines are mentioned it is the very last day and so the amount that can be done is very limited. There are infrequent deadline reminders and these are just at the beginning of the task. Despite big gaps in contact, in most of the groups the members of the group display responsiveness at the time they are needed in order to meet the deadlines of the task without deadline reminders. In the least frequently posting group there are some drawing of attention to the tasks needing to be done but only one post that mentions deadline or what needs to be achieved by when.

5.2.8 Theme 8: Uncertainty

Categories identified in this theme: I don’t know what to do, asking for help

In this theme participants seek out other group members asking them to tell them what to do or gain help from others for their work.

Only one group is a frequent poster in the “I don’t know what to do” category. These posts are evenly distributed into self-doubt and what someone doesn’t know. There is no reluctance in coming forward about this and participants seem to be using this as the push needed to find out. This doesn’t seem to hinder the group’s progress, rather it starts a process of investigation for this group.

Four of the groups were infrequent posters in this category. These posts relate mainly to what participants don't know. They are usually responded to in these groups and the problem is solved with the help of another.

Group 1, Participant 2: "Hey guys, I've already edited section 4 and uploaded it a few days ago but for some reason it says (name) edited it. So I'm a bit confused how they will know who has done the editing"

Group 1, Participant 5: "Hi, Sorry, I just looked at it- didn't change anything! "

For three of the groups this is a missing category. For one of the groups the reason could be because the discussion is limited to the deadlines and the logistics of submission and not related to the content of the wiki.

In another of these groups there is a sense of urgency but no conversations are had about the content of the wiki beyond the choice of borough. It seems that the group members who are active are concentrating on pushing for action but they are not talking to each other about how to go about the task and expressing any doubts they may have about how to complete the task e.g. the editing process is pushed for but there is no sense that participants know how to do this.

For the final group who were missing these type of posts the group do not reach the point of discussing the detail of the content there is no opportunity for posts expressing doubt.

In this category group members are asking for help, support and advice to varying degrees for their individual work.

In terms of asking for help, four of the groups were frequent posters.

In two of these groups most entries are asking for help or clarification from each other.

"...I have been assigned to write about the intervention effectiveness, cost etc., but I am not sure if it's an intervention I choose to focus on or one we choose as a group from that area of London" (Group 2, Participant 2).

In these groups posts asking for help coming mainly coming from one or two participants.

"Thanks (name), so I have my work in a word document, what are we supposed to do next?"

"Hi, are we just to edit our individual contributions? What does it mean to edit?" (Group 4, Participant 1)

In these groups, this is usually responded to with help and positivity from other group members. In these instances, with posts stating what participants don't know and asking for

help, often act to trigger discussion that potentially develops knowledge and understanding within the group.

Group 5, Participant 2: "Our topic is obesity/unhealthy weight. But are we looking at it only in adults or childhood obesity will be put in perspective as well?"

Group 5, Participant 1: "Hi (name) I think we should concentrate on adults. When we are looking at interventions it will be easier to decide on one for adults as the evidence base for children is mixed as far as I can see from looking"

For the other two groups the posts are more frequent at the beginning of the task and relate to decision making around the choice of topic and the geographical area. These posts are present at the beginning of the task, seem not to be present in the middle but re-emerge towards the end. This suggests that the early questions have been resolved and group members are clear about what they need to do during the individual sections. However the editing process at the end of the task creates more questions.

In these two groups the responses to asking for help is very different from the other frequent posters. There are many instances of asking for help but not many responses to the requests. The requests are repeated however they are still not responded to

"The deadline for the 500-word essay is the 15th December. Hope we can review before. Thanks" (Group 4, Participant 1).

In one of these groups the asking for help comes from one participant regularly. In particular this participant is asking for help with the editing process but there is no speculation or no attempts to model how the editing process can be carried out

"I believe that we will have enough time to make the final submission an excellent one if we start editing and communicating through the discussion" (Group 6, Participant 1). *This post is not responded to*

The final two groups were infrequent posters in this category. The requests for help come almost exclusively from one group member but is not a frequent occurrence and it is responded to.

Group 3, Participant 1: "Hello, I say that you two were able to merge your references. How do I merge mine to yours?"

Group 3, Participant 3: "Hi (name), Good to see you on here. I merged them by going onto the Wiki and under Edit cut and paste them alphabetically there may be an easier way but that seemed to work."

5.2.9 Theme 9: Require something from others to move on

Categories identified in this theme: Gaining agreement to move on, asking for help/contribution, apologies

In this category participants are trying to get agreement on a decision, agreement to get started or so that they can move ahead with the task.

There were two groups that were frequent posters in this category. These posts relate in the main to agreement with other people's suggestions. There are strong voices in the groups however there seems to be an acquiescence to the majority where disagreements persist.

Group 2, Participant 1: "Yes- although I thought that the social media was being used to advertise a central website aimed at young women in Lambeth about HIV prevention? Am I wrong?"

Group 2, Participant 3: "Hi (name), I'm sure as you have written that is the consensus"

In these groups there is lots of agreement apparent, they seek each other's agreement regularly and express support for these agreements. Frequent posts of this type where the group are challenging opinions often lead to decisions being made and in the act of this the co-constructing knowledge and understanding to feed into the development of the wiki.

"I am happy and (it) makes sense as obesity rate is high as you mentioned. I would say let's go with it unless we hear any other objections?" (Group 5, Participant 4)

Four of the groups were infrequent posters in this. Sometimes the posts relate to what do about a missing group member.

Group 1, Participant 4: "What are we going to do about the people who have not contributed? Has anyone asked (the tutor)?"

Group 1, Participant 1: "I will message her now and ask advice and let you guys know (smiley emoji)" (Group 1).

These groups are able to develop the wiki content without the non-contributing group members and complete their task.

Six of the groups were infrequent posters in this category. In four of these groups there is very little searching for agreement and where it is sought there is no response. There are instances where there are frequent posts asking for a response but these are mostly not responded to. There is one instance, early on confirming the group's choice of intervention and choice of borough. There are repeated posts asking for agreement with a

predetermined suggestion however there are no posts responding to it. Some of the repeated requests are just re-posts of the same wording.

In the other two infrequently posting groups there is a mixed pattern. In one of these groups where there is a post trying gain agreement it is well timed to push the group on, but it does not happen enough to increase the pace or get the task done in a timely fashion. In the other group an agreement is gained at the beginning of the task on the choice of London Borough however no further agreements are discussed. Where these type of posts are not responded to on a regular basis the group cannot then move on and the momentum in the group stalls and causes the pace to lessen with less frequent postings.

In the asking for help or contribution category participants are asking for contact with a group member who is not responding or they are asking about what to do about having no contact with a group member or members.

In one of the groups there were frequent posts in this category. There are repeated requests for contact and contribution to the editing process.

“Looks like we are late with the discussions but we can still do it and finish on time if we all agree and get involved with it! Please reply. Let’s get in touch” *Post goes unanswered* (Group 6, Participant 1)

This post is repeated verbatim twice and then versions of it repeated on six other occasions throughout the duration of the discussion activity with no response to most of these. There is no direct mention of particular group members not contributing. The pursuit of people not contributing without any dialogue contributing to the development of the wiki content has the effect of stalling this group’s activities.

Five of the groups had infrequent posts relating to this category. There were related to the to a missing group member. Sometimes the question is only asked once despite the group member not contributing from an earlier point until the end of the task. This suggests that in these groups the group member’s participation is not considered as vital to the finished product and they have the resources to go on without them. In two of these groups the active members at this time discuss this and seek advice from the tutor and move on when attempts to contact the missing member fail. There is a missing group member who joins late and this is discussed in the group and also another who is missing entirely whose lack of presence is not discussed. There are also posts about a group member who is missing from the start. One group member who was involved in the earlier discussions is missing from the editing process. However, this is not referred to by any of the other group members.

For two of the groups there are no postings in this category. There is no mention of people non-contributing in these groups despite there being a lack of responses from several group members in each of these groups.

In the final category in this theme, participants use apology to acknowledge or excuse work not done or not done well and to express regret. They also use apology to excuse a challenge from them to others.

One of the groups have frequent posts in this category. In this group apologies are made mostly for delay in engaging in the task and for complications arising from accessing via a mobile device.

“Hello all apologies for the delay, just to let you know that I am following through and will give a more detailed perspective later today. Unfortunately using my mobile phone to login at the moment.” (Group 2, Participant 3).

Regret is expressed for actions not taken or for work not done. There are two participants who apologise for being late, one contributes effectively to the end, the other participant does not continue to the end of the task. Where regret is expressed for actions not taken, these are minor and seem to have little impact on the ongoing work.

Six of the groups were infrequent posters in this category. There is one apology for posting in the incorrect place and expressions of regret are made by one group member, for joining the group so late and for not being active on the discussion page earlier. In one of the groups there is only one of these posts and it is in the form of an excuse. In another group apologies are not frequent but they do all come from one participant who goes on to contribute consistently but follows direction from others rather than initiating improvement to the wiki.

“Sorry I haven’t contributed just yet. Been travelling for the past two weeks but I’m back now”

“It’s been slightly challenging due to other work commitments but I should be able to get my section in on time (smiley emoji)” (Group 5, Participant 2).

In two of the groups there is only one apology, one for the lateness of the contribution and the other apologising for a delay in getting to the wiki site and this is responded to positively.

Group 7, Participant 5: Hello Guys...took me a while to find this discussion board and sorry for the late response as well”

Group 7, Participant 2: “Hi..Don't stress..the good thing is that you are here in time..welcome”

Apologies are given in these groups and received positively. Although some people are missing at various times there are no recriminations or expectations voiced.

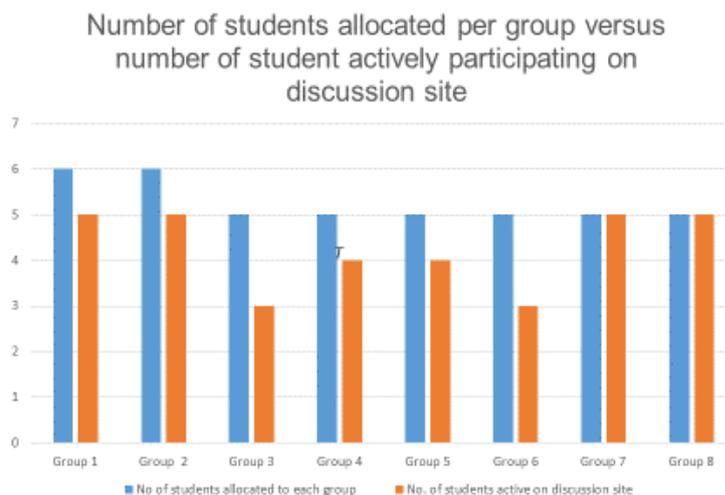
For one group this is a missing category. All group members are present at some point on the discussion pages however no real discussion gets going that would lead to apologies being needed.

There are notable points across all the groups in this category for example, apologies are usually posted by a small number of individuals in the groups and relate to their late arrival to the discussion group or the lack of input from them. Apologies seem to be rarely challenged by the other group members and do not appear to impede the group's progress in most cases. When they are challenged, it is about information that is perceived to be factually incorrect.

5.3 Use of Time within the groups

The cohort size beginning the module was 42 but there were 4 drop outs to the programme, making the number of students starting the task 38. The number of group members in each group varied from 4 to 6 students. There is discussion data missing from groups 2, 3, 4 and 6 and this missing data represents 4 students who did not give consent to the study, making the number of participants in the study 34.

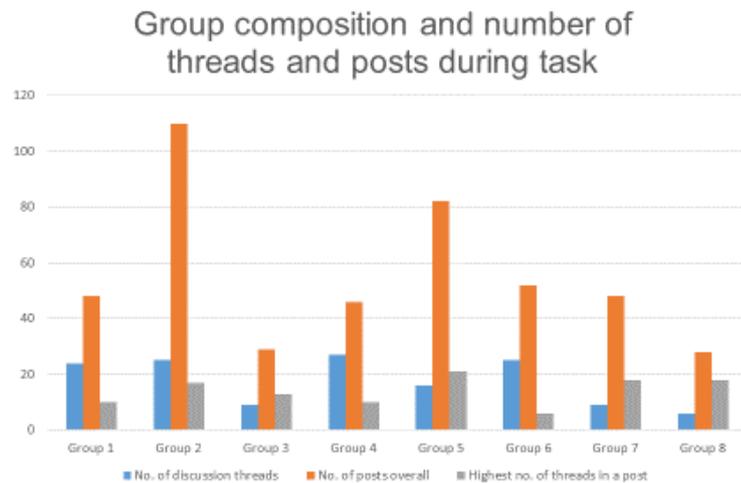
Figure 7: Number of students per group versus student actively participating



The numbers of group members per group varied from 5 to 3 and there did not appear to be a correlation with the numbers in the group and the progress that the group made. Where group members were not active this did cause the group some disruption and concern.

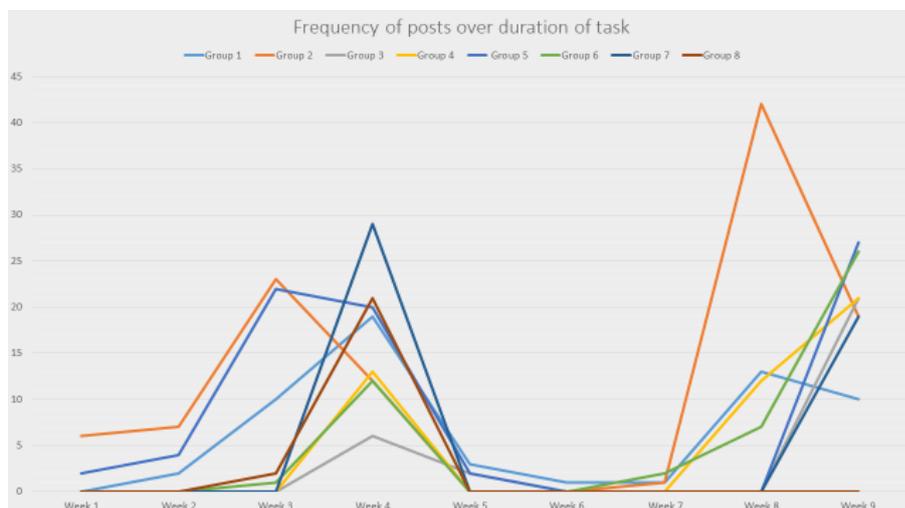
Some groups coped with this disruption well and sought help from tutors to overcome this. Other groups took longer to deal with this and a small number of groups struggled to overcome the non-responsiveness of some group members.

Figure 8: Group composition and number of threads and posts during the task



There is a correlation between the groups having all three types of dialogue and the number of posts overall. In this study this is a strong indicator of group self-sufficiency and engagement. There is a more complicated picture when it comes to the number of discussion threads. It would appear that the number of discussion threads is not as important an indicator as the number of posts. This suggests that the quality of interactions may be better indicated where there is extended dialogue and therefore more posts per thread than it is by the number of discussion threads overall.

Figure 9: Frequency of posts over duration of task



Most groups in this study experienced a peak in longer discussion threads where a key decision is being made. The peaks are linked to the decision about the choice of London Borough which each group member needs in order to complete their individual contribution by the end of week 5 and editing the final wiki just before submission in week 9.

This data indicates that there were long periods of time when there is no activity within these groups but this is not necessarily a cause for concern. What appears to be more important is the pacing of activities, where the groups are coming together just at the right time to achieve the task.

Length of response time within threads varied and this may not be a cause for concern over the short term. This may indicate that respondents were taking time to consider the responses they were giving. What appears to be more significant are postings that were unrelated to the last post and this may indicate that group members were not in dialogue with each other, rather they were engaging in monologues in parallel to each other.

5.4 Chapter Summary

This main findings of this chapter are the presence of three types of dialogue which featured across all of the groups in this collaborative activity. These dialogue types were:

1. Dialogue indicating shared cognition and learning
2. Dialogue indicating organisation of learning
3. Dialogue indicating uncertainty and lack of progression.

All three dialogue types were important in predicting the groups' success with the task however groups featuring all three were far more likely to successfully complete the task and groups who struggled were missing at least one dialogue type.

Chapter 6: Discussion

6.1 What was revealed from within the distinctive online dialogues that have been identified and how this can contribute to educational practice?

Recognising where support is needed in un-facilitated collaborative group activities is difficult. This is particularly challenging when these groups are not meeting face to face when behavioural clues that this may be happening are traditionally given. This chapter will explore ten key characteristics of the dialogues that have been identified by this thesis and how they represent the way that the collaborative learning groups went about completing the group task. It will then go on to comment on what this thesis research has revealed in relation to the relevant literature in each of the key characteristics and how this may help online educators to identify which groups are experiencing difficulty and may be in need of an intervention. Finally where this thesis sits in terms of theories for online learning and its contribution to the use of asynchronous discussion in online collaborative groups will be discussed.

Drawing on the categories that had been formed from the initial coding of the data, some key characteristics were identified that were thought to be influencing group interaction. Table 6 identifies how the categories informed these characteristics and Table 7 shows how these characteristics link to the themes in this study.

These are the ten key characteristics of the dialogues which were found to influence group interaction:

1. Development of team identity
2. Effective decision-making
3. The modelling of effective learning strategies
4. Early engagement with the task
5. Positive regard
6. Confident, direct communication
7. Responding to each other
8. Problem-solving
9. Resolving disagreements
10. Dynamic two way conversation (as opposed to monologues in parallel)

Table 6: How the categories have informed the key characteristics

Categories	Key Characteristics
What I think	Team identity
Addressing the group	
Decision Making	Effective decision making
Leadership	The modelling of effective learning strategies
Reporting, Promoting, Promising action	Early engagement with the task
Information Giving	
Praise/Compliments	Positive Regard
Good wishes/Thanks	
Challenge/Disagreement	Confident, direct communication
Motivation	Responding to each other
Increasing the pace	
I don't know what to do	Problem-solving
Asking for help	
Gaining agreement to move on	Resolving disagreements
Addressing the group, challenge, reporting, promoting and promising action, asking for help, information giving, gaining agreement to move on.	Dynamic two way conversation

Table 7: How the characteristics link to the themes

Characteristics	Themes
Early engagement with the task/Team Identity	Cognitive contributions towards the task
Confident, direct communication/Problem solving	Constructive challenge and problem solving
Responding to each other/Dynamic two way conversation	Considered content-based contributions and responses
Early engagement with the task/Team identity	Action-based reporting and contributions
The modelling of effective learning strategies	Role Modelling effective learning practice
Team Identity/Dynamic two way conversation	Acknowledgement and Recognition

Positive regard/Responding to each other	Encouragement and increasing the pace
Problem-solving/Resolving disagreements	Uncertainty
Responding to each other/Dynamic two way conversation	Requires something from others to move on

6.1.1 Key characteristics within the dialogue of the asynchronous discussion groups and their relationship to the literature

1. Development of team identity

This feature is demonstrated in the groups who referred frequently to the group as a team. They gave each other information about the topic to help inform others. This information was often unsolicited but if group members were asked for information they responded promptly and gave detailed and helpful responses. Good teamwork identity was demonstrated in these group by the regular asking for responses from others and the getting of those responses from others. These communications were confident in their expectation of a response and direct, Group members were asking for something they were specific about, what it is that they wanted and often included an example of what was required, post information or provide a link to information. All active members were engaged in the group and were regularly asking for responses from others and getting those responses.

Where team identify was not strong in the groups there were some characteristic signs of this. These were groups who were:

- a. Not introducing themselves in the early stages of the task with the aim of getting to know each other
- b. Addressing each other as a group but not individually as well.
- c. Showing a lack of response to posts addressing the group

These were all indications that teamwork identity may have not been developing well.

The literature related to identity development in online collaborative group activities is almost in its entirety gained by interviewing participants about their experiences and often concentrates on individual identity formation rather than group identity. It also focuses on a range of collaborative group activities including virtual reality experiences such as Second Life, a massive multiplayer online role-playing game, and frequently investigates identity development through the lens of cultural diversity. Ren et al (2012) focused on the development of group identity in their paper about building attachment in online communities. They conducted a six-month field experiment in a film review online

community and gave some participants tools for inter-personal communication with each other. They found that participants who were exposed to inter-personal communication activities visited their community twice as frequently as participants who were not given the same tools. This provides a strong rationale for the educational practice of giving group participants the tools by which they can communicate with each other whilst taking part in an online task. In this thesis access to a shared group discussion page was given to participants for this purpose.

What this thesis adds to this work is how educators can recognise this development of teamwork identity within the dialogue of this communication tool and importantly what the key indicators are in the dialogue that this team identity is not developing well. In this thesis evidence of team identity development in some of the groups was not there at the beginning of the task where the emphasis was on action and in these instances it developed later, but these groups later struggled with effective decision making possibly as a result of this lack of team development earlier on.

2. Effective decision-making

This was seen when groups were using a variety of strategies to promote decision making, asking the view of others and challenging each other's contributions. The posts relating to decision making were often frequent at the beginning of the task and consistent all the way through with all or most active group members posting them. There was a strong sense of people being held to account by others for engaging in the decision-making in a supportive way in some of the groups. This dialogue was demonstrated when opinions were sought and freely given. There were efforts from all participants in the groups who were demonstrating this dialogue to influence others but an increasing agreement as the task progressed when the groups focused on the agreed task at hand. There were clarifications and information given often with an in-depth of explanation and exploration of the issues being considered in order to prompt the decision-making.

Where effective decision making was compromised in these groups this was indicated by:

- a. Group members posting whole sections of work and asking for others to review the whole thing
- b. Not asking for a decision from others about what goes into that work in advance of posting it.
- c. Not getting into the details or questioning the validity of the assignment content.

This is linked to the development of teamwork identity, where interactions were not personal, a relationship between participants did not develop and this led to a lack of discussion of the

assignment detail. The presence of these type of dialogues could be a good indicator to online facilitators that this group is not engaged in cognitive conversations about the task and may need encouragement to start doing this.

Early studies related to online collaborative group decision making focused on identifying the relative advantages and disadvantages of online collaborative learning versus face-to-face groups. This focus later switched to designing learning tasks. Later studies have focused on a comparison between synchronous versus asynchronous decision making and the perceived lack of general decision-making skills of online users. There have been several group decision-making software tools developed focused on reaching consensus and promoting participation but very little research into the fostering of group decision making. Oliveira, Tinoca and Periera (2011) studied the different types of collaborative practices in online courses based on the analysis of a variety of inputs including online interactions on whole group discussion forums, the work produced by the students and online questionnaires. These researchers suggest that where there was no agreement reached in the discussion forums participants were forced to move on with their work and make individual decisions about it. Some were able to do this and other were not.

As an educator awareness of this potential inability to move on can help identify the need to intervene to assist groups if key decisions are not being made to facilitate the group to move on with the task.

3. The modelling of effective learning strategies

In the groups demonstrating this feature the modelling of effective learning strategies was often evidenced from the start by the giving of information or posting of link to information with clear instructions to others and suggestions about the way forward. This continued with a sense of direction and purpose being clearly communicated. This leadership was often shared between key participants with a key person or by the group having accepted one key person as having group leadership status. These persons gave information, promoted urgency among the group, promoted discussion and prompted decision making. Their posts attempted to motivate the whole group to do the best that was possible in the time given. This status appeared to be assumed by the person with the group then acknowledging them and supporting them in this role. Sometimes this leadership was held throughout the task but in other groups the mantle was passed on to another at some time in the task. Others often demonstrated high regard for this group member in their posts.

In groups who did not have this modelling there were signs of this in the postings.

a. Some groups did not have anyone who assumed the role of motivator to others.

b. There were sometimes good relationships demonstrated but a lack of urgency and there could be long gaps in the group's communications resulting in a very rushed dash at the end of the task to get something submitted.

c. The groups with sub-optimal performance rather than poor performance did submit something but it lacked co-ordination and there was late submission in these cases.

d. Some groups who took up the leadership mantle and posted reminders about deadlines and posted with the aim of encouraging others. There was no accompanying information about how this could be achieved or posting of examples of work or information that could prompt others to understand how to go about developing the content of the assignment.

The general nature of the requests and the lack of clarity about what was being asked of others or who was required to respond weakened the effectiveness of the communication. Group members may have wanted to help but were not sure what it was that they needed to do and therefore did not respond. This lack of response led to increased frequency and directness in the postings and this communication of stress in the messages led to further lack of response. The groups got into a circle of increasing stressful monologues that were not responded to.

There is very little published educational research focusing on the modelling of effective learning strategies by group members and there is a dearth of literature focusing on the impact of this modelling in online groups. There is however a wealth of literature documenting the influence of peers within education. Jaime Shook and Jennifer Keup in their chapter on the benefits of peer leader programmes in *New Directions for Higher Education* (2012) review the significant literature on the benefits of peer leadership and catalogue the increasing use of peer leadership in higher education. Peer leadership programmes are focused in all contexts, from leading groups to providing support outside of academic work. The key characteristic of peer leadership is the use of students who have been selected and trained to offer educational services to their peers that are intentionally designed. In the case of this thesis and in most other online collaborative activities the allocation to groups is random or not based on perceived leadership characteristics. This makes the chance of having group members who fit this profile difficult to predict. In these cases identifying groups who may not have members modelling effective learning strategies early can give educators the opportunity to and demonstrate this behaviour to the group so that they can follow this example.

4. Early engagement with the task

Early on in the task these groups have members who were interacting on the discussion pages. They were interacting with others, offering ideas and commenting on suggestions from other group members. This can be seen as a process of assimilating to the purpose of the group and setting the rules by which the group is going to progress. Early assimilation into the group can facilitate early engagement with the task and in this study it was a key feature in helping these groups to complete the task on time. This indicates that participants were thinking about the work and what comes next. This early start put participants in a better position to make early decisions that influenced the ability of group members to progress with the task both individually and as a group. This group activity level in most cases reduced as the task progressed but re-engagement with the group was indicated by surges of activity when a key assignment deadline needed to be met was apparent in the groups demonstrating this feature.

Some presentations of this feature could be considered to be predictive of groups who went on to struggle.

- a. There was a strong correlation between groups who started later in the task and their slower progress in the assignment task.
- b. Where these groups started later there was also a tendency to work backwards from what had already been done, to ask for agreement for it.

This could be that the discussions related to this were taking place elsewhere or it could have been that the individuals were playing lip service to the requirement of the assignment that groups would use the discussion pages to support the development of the content and the production of the completed assignment task at the end.

There has been increasing concern in recent years about the engagement and persistence of students in online courses, most starkly there has been concern about this in relation to massive open online courses (MOOCs). Students' engagement online is usually measured by engagement with course materials, interpersonal interaction and performance in tasks and assignments. Soffer and Cohen (2019) examined student engagement in four online courses using learning analytics and found that students who completed their courses were highly engaged in all course activities. They make recommendations that support the design of interactive course materials to promote engagement.

Redmond et al (2018) have proposed an online engagement framework for higher education informed by the student engagement framework in higher education by Pittaway (2012) which focuses on cognitive engagement, behavioural engagement, collaborative

engagement, emotional engagement and social engagement. These are very broad categories and some of these are difficult to isolate and evidence. It is also difficult to differentiate between these types of engagement as an online educator tasked with promoting engagement, particularly when supporting students in tasks designed to promote student learning. It is even more difficult to identify and support students who are struggling to engage and further research is needed to support tutors in this regard. This thesis does provide some evidence of how this engagement or lack of it can be recognised and acted on whilst online tasks are in progress.

5. Positive regard

This feature was evidenced by good wishes and thanks being present regularly through the task. There were posts thanking active group members for their contributions and evidence of praise and positive regards to each other. Praise and compliments were given regularly and these were most evident towards the end of the task indicating that their use could have been amongst other things to increase momentum and motivation. There was frequent praise, thanks and general good wishes throughout the task in the groups who has the most of these type of posts. These were conversations that were friendly and personal and showed positive regard for other group members. When apologies were given there were no recriminations or expectations voiced. These posts were from those who were keen to give praise and give specific thanks and compliments. There was a general sense of support and camaraderie which were reflected in these conversations.

Some presentations of this feature which could be predictive of groups who are struggling are:

- a. A delay or absence in posting communications conveying positive regard.
- b. Not referring to each other directly. Two of the groups did not develop effective group identity and did not refer to each other directly. In one of these two groups these communications addressed to the whole group indicated stress and expressed thanks in advance of the request in a way that indicates frustration with others.

There is literature attempting to profile online groups to measure characteristics such as effort, motivation and group cohesion. The methods these studies are using are analytics. These analytics based on key questions are being used, among other things, to try to identify predictors for student success, outcomes and for identifying at-risk students. By their nature this data is general in nature and can sit alongside the contextual research completed by educational practitioners in their own areas of practice. Carretero et al. in 2015 completed an analysis of expressive speech acts in online task-oriented interaction by university

students using Searle's (1976) seminal classification of basic speech act types and concentrating on apologising, congratulating and thanking types of expression. They created a taxonomy of "expressives" of two general types, self-centred and other-centred. Self-centred "expressives" include concerns which express worries and other-centred includes good wishes. They identified contextual variables that may contribute to differences in the frequency of these narratives such as group size, age and cultural homogeneity. The study did not go on to analyse the use of these speech acts as a predictor of task completion. This thesis identifies how lack of expressions of positive regard can be used as an indicator of the presence of stress and how this alongside other characteristics could be an indicator of the need to intervene in groups in order to help them to improve their communications with each other.

6. Confident, direct communication

In these type of posts individuals were addressed, the group as a whole were addressed but also the whole group were addressed as individuals, indicating that there was an expectation of response and also respect being shown for others. Group members used these type of communications to address each other throughout the task and this communication was confident and direct. Where they worked well they came from more than one group member and acted to keep the momentum up and complete the task to the best of everyone's ability. Reminders of the deadline are also strongly represented in this type of post. There is no holding back in these communications, they are direct and clear indicating confidence and the anticipation of a positive reception from the recipient. There is some evidence that this influenced others to do the same. In some groups one individual would start off sending this type of post at the beginning of the task and by the end of the task all active participants were demonstrating similar characteristics.

Groups where there was not this direct confident communication had some characteristics in the dialogue:

- a. Students would highlight that work needed to be done but were not specific about what was required. This led to some confusion.
- b. Repetition of the same request several times in response to not getting a response. In extreme these posts have an air of desperation about them which may trigger anxiety in other group members.
- c. They sometimes contained the appearance of being polite and courteous but in the context of the narrative were anything but this. They are not accompanied by any useful suggestion or example of how the task can be approached.

The literature related to confidence in communication in online collaborative groups has been focused on the development of the online tutor for example Kukuska-Hulme (2004) in her book chapter “Do online collaborative groups need leaders?” The suggestion in this chapter is that the online tutor should be leading these groups. Other papers address designing activities to promote confidence in online learners. A third type of paper has looked at the impact of the collaborative learning itself on the communication confidence of learners. Skagen et al. (2018) used a mixed methods approach of interviews, student written reflections and found self-reported confidence in communications increased during the collaborative group activity. The importance of the confidence in which online students communicate with each other and the impact of this confidence or lack of it on the progress of the online group activity have not been considered. The predictive potential of this characteristic in whether a group is working effectively has not yet been considered in the literature but this thesis highlights how under-confident communications can be recognised and where intervention could be helpful.

7. Responding to each other

This characteristic is when all active members are engaged in the group discussions and are regularly asking for responses from others and getting those responses. This response dictates the efficiency and the speed at which the group functions. There were some gaps in the groups’ conversations and this may have coincided with a period of individual activity, either on this task or in other areas that demand their time. Where the responsibilities of the individuals are clear when this occurs, it did not seem to affect the ability of the group to re-engage when they are needed in order to meet the demands of the task.

- a. The absence of this characteristic was a key presentation of this feature in the groups in this thesis who struggled to achieve the task to the expected standard and a key indication that the group was in trouble and needing help.
- b. The posts were much more likely not to be responded to if they were directed to the whole group and not individual group members.

There is very little literature relating to response or non-response in online discussion groups and where there is literature it is focused on response rates to tutors in large online groups. Where there has been research focused on collaborative learning groups this research investigates the quality of the responses and response times not the impact of non-response on the group e.g. Yoo and Kim (2014). Thomas (2002) presents research on 69 students on a university undergraduate course in an online discussion forum and the study sought to describe and interpret the activities of students as they undertook the learning task. They found that in each of the discussion themes over half of students’ contributions received no

response. Thomas emphasises the important role of the tutor or moderator in an online discussion as the rich interactive discussion that can be promoted in a tutorial situation does not necessarily come naturally to students as they work in a virtual learning environment.

In this thesis, as is the case in other collaborative group activities, the tutor is not facilitating the discussion, non-response to group members in discussion groups was a significant red flag that the group were not functioning well in the task and indicated that an intervention from the tutor was needed to avert a negative outcome.

8. Problem-solving

Most groups had dialogue expressing confusion and uncertainty. This confusion and uncertainty was used best when it triggered similar responses in others and where there was help available from other group members. Where there was no reluctance to come forward about this confusion group members seemed to be using it as the push needed to problem-solve. This is exemplified in the problem of non-contributing group members. Some groups identified this as a problem and what to do about it and then moved on with the task. Groups who went on to successfully complete the task did not see this contribution as vital to finish the task and it seemed to have little impact on the ongoing work to complete it. This suggests that the groups that were most likely to succeed had members who are able to express concerns and the resources and confidence to solve these issues in order to complete the task.

Some presentations of this feature that were cause for concern in these groups are:

- a. Identifying the problem but either not being able to decide what to do about it or not reaching this conclusion in a timely fashion to enable them to complete the task.
- b. Stalling of activity. Where this expression of confusion was missing or where it is not responded to positively, the group experienced a stalling of activity and this affected their ability to work effectively to complete the task.
- c. Failure to articulate what is required. Although there were many indications that a particular group required something from others to move on, no one is identifying specifically what that is or expressing any uncertainty about what is required. This leaves them in a stalemate situation where no one is coming forward to model how this can be achieved or set out a vision of what achievement might look like.

Kukulka-Hulme (2004) discusses how the tutor can ensure that the collaboration in collaborative learning is maximised and suggests that learning occurs when group members have to solve a problem together rather than when they can work independently of each other to complete at task. Getting the right task that will create the amount of problem

solving is the task in designing the activity and the quality of learning may therefore depend on how online collaboration is managed. The focus of this research and other papers is the role of the teacher in the design and facilitation of group activities. Graham and Misanchuk (2004) postulate that the dissonance created by controversies can be constructive, increasing creativity, plan making, problem solving and decision making.

However this thesis has identified that some groups do not have the capacity to problem solve and that this can lead to online facilitators seeing a stalling of group activity following conflict situations that group members have been unable to resolve. In order to avoid this unresolved conflict stalling the group activity further online facilitators may need to intervene in order help group members to recognize and resolve conflict that has ceased to be productive in a constructive way.

9. Resolving disagreements

The presence of disagreements appeared to have a motivating effect on the groups. There were very strong voices in some of the groups. However, in the groups who successfully complete the task there seems to be an acceptance of the majority decision where disagreements persist. Early resolution of these disagreements allows the group to move on quickly and with good will expressed.

Some presentations of this feature that may indicate sub-optimal performance are:

- a. No expressed disagreement. Groups who had a lack of posts expressing disagreement or who did not respond to posts seeking agreement were less likely to be able to resolve these disagreements and this affected the group's ability to complete the task.
- b. Not getting past the first decision. One group never got to the point of discussing the detail as they were unable to get past the first decision therefore no work is corrected nor is any further disagreement aired and discussed for the remaining time in the task.

The literature relating to disagreement in online collaborative learning often focuses on the number of disagreements and in investigating whether disagreements are caused by "misbehaviour" Smith (2019) or "incivility" Han, Brazeal and Pennington (2018). They often use "big data" to evidence this e.g. research using Wikipedia by Tsvetkova, Garcia-Gavilanes and Yasseri (2016). The consensus in this literature seems to be that disagreement is a normal or usual phenomenon in collaborative online groups. Less work is focussed on the group's ability to resolve disagreement. One study by Lee, Huh and Reigeluth (2015) presented a case study based on high school classes involved in online discussion groups. The first research question in Lee et al was focused on what triggers conflict and they identified 3 types of conflict based on Piaget's theory of socio-cognitive

conflict, these being task, process and relationship conflict. Based on data from interviews, the participants reported that they experienced all the types of conflict to some degree. Participants linked task conflicts to competing interests and perspectives, process conflicts were in the main linked to social loafing, a concept coming from social psychology where a person is seen to be exerting less effort to achieve a goal than others when they work in a group. Relationship conflict was linked by participants to differences in personalities and lack of social skills. Interestingly the second research question in Lee et al was about how social skills impact on conflict and collaboration. The Lee et al study found group members' social skills as a whole were more important than individual members' social skills in management of intragroup conflict and collaboration. That is, if there was a member with low social skills in a group, the group would not be affected by the person if the other members' social skills were high. This finding from Lee et al does align with a significant finding in this thesis. In most of the groups in this thesis there were individuals who could be identified as having lower social skills than others however the performance of the group depended on the social skills of the collective, i.e. more successful groups were able to improve the performance of this individual or individuals by role modelling effective group social skills.

10. Dynamic two way conversation (as opposed to monologues in parallel)

These are monologues in parallel to each other and in this thesis this was a key presentation of a group who was struggling and who were in need of help. This was where group members were not responding in a dynamic way to each other's attempts at communication. These posts mimicked dialogue in the turn taking sequence of postings but were communications with competing agendas from participants who are not responding in a dynamic way to each other's attempts at communication. This was two or more individuals posting an expression of needs or requirements in between others doing the same thing. Each one was left frustrated that the other does not respond to their request. In turn they also seemed unable to respond to the other's request until their need was met creating a negative cycle of miscommunication. These postings were a key overwhelming feature recorded in one group who was struggling with the task and did not go on to meet the criteria for the task. They were present in other struggling groups to a lesser extent but these groups appear to have gone on to resolve to some degree the issues that are raised by eventually listening to each other. There was often uncertainty expressed continually but the groups lacked the ability to communicate with each other effectively enough to resolve this and move on.

A phenomenon similar to this has been identified by Pawan et al (2003). They examined online discussions from three online graduate-level language teacher courses. One of the

research questions was “Are interaction patterns evident in online discussions characterised by one-way serial monologues or by two way peer-to-peer interaction?” They define serial monologues as discussions in which participants share past teaching experiences and freely express their opinions with minimal effort made to connect to the contributions of others. This study found that whilst some discussions did stay on task, without the instructor’s guidance interactions were often one way.

Hambacher et al (2018) identify Pawan et al. (2003) serial monologue characterisation to explore how pre-service student teachers can be moved from these type of monologues to what they call “deep dialogue”. They identify some key design tactics including the use of “small learning communities” of four or five students, assigning roles and responsibilities to these students, they used one member as “first responder” the initiator of discussion and the other group members as “connectors” tasked with pushing the conversations forward. These roles are rotated among group members for further tasks.

The serial monologues identified by Pawan et al. encompass some aspects of the phenomenon that this thesis has identified. However, unlike Pawan et al’s serial monologues, the monologues in this thesis take the appearance of dialogue, in that students are taking turns to post, just as would happen in a dialogue. What is missing from these pseudo dialogues is the dynamic development of a normal conversation where participants respond to the communication of the other. This thesis also identified frustration in these posts from group members at the lack of acknowledgement from the other member of their expressed needs. Also highlighted in this thesis is the stalling effect that this has on the progress of the task.

6.1.2 Inferences from the ten key characteristics

These ten key characteristics were found in most groups to some extent but were less prevalent in groups doing less well and groups who were struggling. Some significant inferences come from these findings as follows:

- Most groups had members with lower social skills than others. The most successful groups were not adversely affected by individuals displaying poorer social skills and were more influenced by the social skills of the collective. In some cases these groups were able to improve the performance of individuals by modelling effective group social skills.
- Some of the presentations of these characteristics have a degree of overlap with each other and have less significance on their own in that all groups have some of them. Where these characteristics appear in isolation they may not be an indication of the need for intervention.

- Some presentations of these key characteristics could be good indicators of sub-optimal group performance. For example the posting of large sections of finished individual work with a request for the group to review it or a lack of posts from any group members giving information and suggestions about the way forward.
- In these cases recognition of these characteristics and intervention from the online facilitator to model effective learning strategies could increase the potential for the group to succeed in the task.
- Certain presentations of a number of these characteristics can indicate the probability of sub optimal performance and cumulatively can create an indication that the group is in difficulty and in need of an intervention from an online facilitator in order to avert the possibility of them failing to achieve the task.
- There are some characteristics that even when they occur in isolation are a significant indication that the group is in difficulty and not likely to achieve the task. These characteristics include not responding to each other when there is a direct communication and the presence of monologues in parallel.

6.2 Some general rules about the use of time

This use of time has been under-researched in online collaborative learning. In this thesis there appear to be general rules that all the groups follow e.g. the increase in posting around the times that a major decision is required, the sometimes long gaps without communication when working on individual contributions and the surge of activity just before the end of the task. Xu et al. (2013) identify this use of time not only an individual phenomenon but as a group one, that this is not just about “finding my own time” but more importantly “finding *our* time”. Xu et al.’s study involved asking 204 graduate students undertaking an online course to complete a scale-based survey based on amongst other things how the groups they were in managed their time including setting priorities, keeping track of what needed to be done and reminding the group about meeting deadlines. The more successful groups had a clear intent to get along and value the participation and contributions of others and group members provided timely feedback to each other. These groups showed the initiative to manage group work time, for example pacing themselves to meet the deadline. The less successful groups did not recognize or value peers’ participation and contributions, the group members provided delayed feedback or failed to provide feedback at all to each other and showed less initiative to manage group work time, seemingly more ready to allow the group task to slow down or stall. These findings are similar to the findings in this thesis and provide an insight into how time management varies in online group work. The greater understanding of how groups use time in the online environment is needed both by the

designers of collaborative learning activities and also by the facilitators in order to maximise the potential for learning.

In the groups considered in this thesis, finding the predictive value in the use of time is very difficult if time is used as the only indicator. This is because groups in the main follow the same pattern in terms of frequency of posting throughout the task.

There were some characteristics that were predictive of sub-optimal performance in the use of time:

- a. Groups displaying sub-optimal performance started later than their more successful counterparts.
- b. In terms of the increases of activity seen by all groups during major decision making times, these groups were later to peak.
- c. These groups had shorter discussion threads and a lower number of discussion threads in the peak times as well as over the whole time of the activity than the more successful groups.

Where the patterns in the use of time become more significant is when the characteristics in the types of dialogue that have been identified are added. That is they become more predictive in the presence of one or more of the presentations of the characteristics for example in the presence of not introducing themselves in the early stages of the task, lack of responses to direct communications or the presence of monologues in parallel.

6.3 Where the findings from this thesis fit with existing theories and frameworks of collaborative learning in the online environment

Theories of education in online environments are in their infancy in comparison to educational theory that has been based on live face to face educational practice. Many of the theories used to consider the online learning environment are borrowed from mainstream education although there is a widely held assumption that the current broad educational theories of behaviourism, cognitivism and constructivism that developed before learning started to take place in virtual environments may not act to fully explain and develop educational practice in these environments.

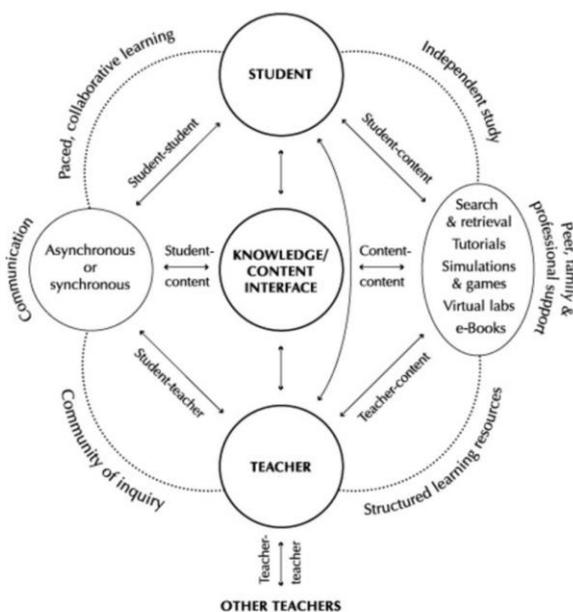
6.3.1 Anderson's Online Learning Map

Anderson (2011) attempted to find a way to integrate all theories of online education whilst acknowledging the difficulty of this task. Not only would it need to integrate the divergent theories of online learning delivery but it would also need to find commonality among online educational pedagogies whose applicability depends on the scale of delivery from large

scale educational instruction to smaller educational environments. He constructed a map which identified the breadth of pedagogical approaches which illustrated a dichotomy between learning in the collective and structured independent individual learning. Anderson's map depicted in Figure 10 identifies the broad range of ways in which online learning can be configured. The top left hand side of this model depicts the focus in this thesis which is paced collaborative learning and links this to the communication medium which in this thesis is asynchronous learning. Anderson calls the interactions in these asynchronous activities particularly rich, allowing for the learning of social skills, the collaborative learning of content and the development of personal relationships among participants. Anderson says however that the community acts to bind learners in time, forcing regular contact or at least group paced learning to achieve a task within a time frame.

This model helps to situate collaborative group activity which is the subject of this thesis within the context of the breadth of online learning. This thesis also attempts to elucidate the characteristics of dialogue in the asynchronous online discussion within which this group-paced learning is shaped and how the characteristics in the group dialogue can indicate the extent to which the collaborative learning of content is successful.

Figure 10: Anderson's Online Learning Map Source: Picciano (2017)



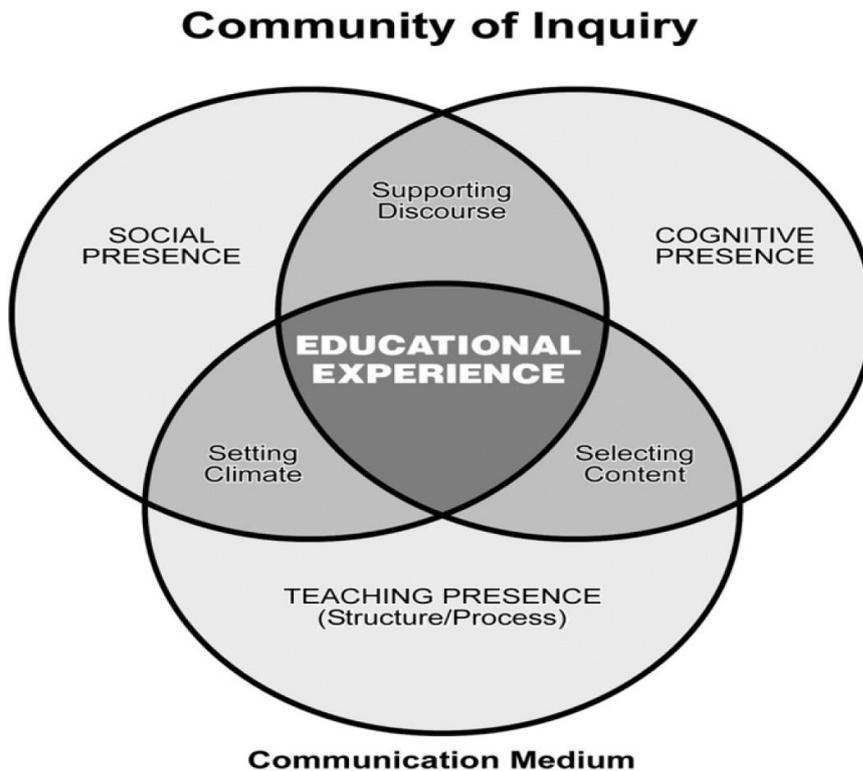
6.3.2 The Community of Inquiry theory

The Community of Inquiry (CoI) theory (Garrison, Anderson and Archer 2000) is reproduced below having emerged in the specific context of computer conferencing in higher education i.e. asynchronous, text-based group discussion. This framework depicts three presences comprising the educational experience in online environments. These are social presence,

cognitive presence and teaching presence. The teaching presence is not examined in this thesis but recommendations in relation to when teacher presence may be indicated are considered. The Community of Inquiry Framework has become a popular model for online and blended courses that are designed to be collaborative using discussion boards, blogs wikis and video conferencing and has been used in many research papers exploring online learning. Further work has been done since its publication to validate this framework as discussed in Garrison Anderson and Archer 2010, and there have been critical reviews of Col identifying a need to elaborate the meaning of the term community of inquiry in a virtual environment. Also highlighted has been the need to understand the theoretical foundations of this model in particular the conceptualisation of social presence. Cherney, Fetherston and Johnsen (2017) says that this hinders scholars' ability to fully operationalise and measure this concept in terms of online class groups.

The findings in this thesis can be seen to fit with this framework in the *supporting discourse* intersection i.e. it investigates the visible supporting discourse of asynchronous discussion within collaborative group activity. This supporting discourse is seen in this framework as the intersection of social and cognitive presence and these presences can be seen in this thesis. However, this thesis identifies key characteristics that may not be represented in the intersecting spheres such as the importance of group social skills in creating a community of inquiry. This thesis could be seen to fill in some of the detail in relation to how social presence and cognitive presence can be measured and the significance of dialogue as a communication medium in the educational experience.

Figure 11: The Community of Inquiry Framework Source: Garrison, Anderson and Archer (2010)



6.3.3 Online Collaborative Learning theory

Online Collaborative Learning (OCL) Harasim (2012) is a theory that focuses on using the educational technologies available to provide learning environments that are collaborative, and knowledge building. In this theory there are three phases of knowledge construction using group discourse that groups must go through in order to be successful. The first phase is idea generating, the brainstorming phase, where divergent thoughts are gathered. The second phase is where ideas are compared, analysed and categorised through discussion and argument. The third phase is intellectual convergence where intellectual synthesis and consensus occurs, including agreeing to disagree, usually through an assignment, essay or other joint piece of work (Harasim 2012 p. 82). This theory has been criticised for not identifying how learning is achieved through collaboration and that the development of reliable and valid student assessment techniques for online learning environments to measure student engagement and achievement is crucial to progress this theory.

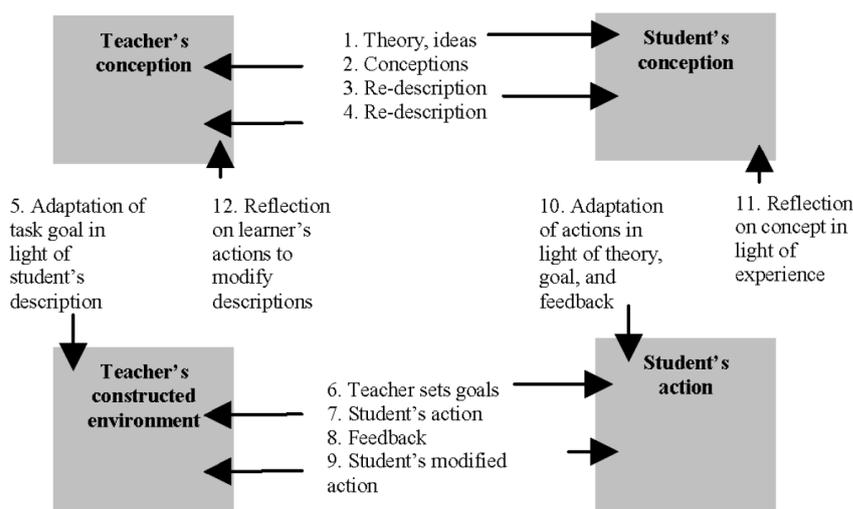
Harasim's three phases can be seen in the findings of this thesis, with the groups who progressed through these phases going on to successfully complete the task. What this thesis also identifies is what happens when Harasim's phases are not successfully

completed and how this can be predicted. A major proposition of the OCL theory in parallel with other constructivist theories is that even where the teacher is separate or apart from the group they have a role as an active facilitator of knowledge building. The identification of groups who are not progressing through these phases is arguably more important to online teachers than who do as they may be able to assist in this process.

6.3.4 Laurillard’s Conversational Theory

Laurillard’s Conversational Theory is a theory based on the scientific representation of a conversation as a strategy employed to discuss differences in understanding in order to reach agreement and construct new knowledge. This theory centres on the communication between the teacher and the student in developing the student’s knowledge. This theory is based on experiential learning, reflective learning and learning conversations similar to the theories of Kolb (1984) and Schon (1991).

Figure 12: Laurillard’s Conversational Theory Source: Heinze, Proctor & Scott 2017 p.110



Source: Adapted from Laurillard (2002, p.87)

This theory has been critiqued for the limitations of its application in online group based learning where the teacher may not be present and Laurillard has herself identified the need for further research into student to student dialogue that leads to learning (Laurillard 2002).

Sharples and Ferguson’s (2019) adapted conversational framework (see figure 5) puts emphasis on getting the right design of learning activities, whilst acknowledging that the process of learning through conversation is exploratory and often learners manage their own activities and discussions, they identify that there is a strong role for the educator in facilitating discussion and promoting reflection which is a view that is supported in this

thesis. Although the tracking of conversations in groups is highlighted as essential in this process, this rethought framework does not go as far as explaining how this tracking can be used to support instructors in the judicious use of facilitation or how the tracking can be used by to detect when these learning conversations are not developing in order to employ a reflective learning intervention to develop students' knowledge.

This thesis investigates the use of conversation in student to student asynchronous discussion and identifies ways in which students may be using conversation to share ideas, define and redefine concepts, influence and reflect on each other's contributions and adapt tasks and actions in the light of these influences therefore developing each other's knowledge.

6.4 Predicting behaviour of online groups by conversation in online asynchronous discussions

There is a substantial literature exploring research methods capable of analysing online interactions and discussion within educational literature and outside of this in larger public-focused online interactions and discussions. When in the educational literature these are generally focused on further and higher education and the subject areas dominating this research are computer sciences and the physical sciences. In both the educational literature and the broader literature there is a preponderance of the use of quantitative methods, coding single words or phrases and reporting the distribution frequency of these messages. The broader literature uses computer software to identify patterns in asynchronous discussion sites often with a pre-defined focus, such as supposed behaviour patterns. The large numbers of participants in the asynchronous discussion sites and the intention of these sites which are the subject of these studies mean that their findings do not necessarily match the focus of this thesis.

In the educational literature the focus has often been on asynchronous discussions in a range of online course designs from small groups and since the development of MOOCs have been on courses with a very large number of students. These studies frequently use a predefined framework or model of what is considered effective collaboration against which the coding system is measured. Learning analytics have developed as a way of impacting on the student experience and this data is being used as a way of helping students understand their engagement in online education although there has been concerns expressed about the quality of the evidence base e.g. early warning analytics used to help instructors notice lack of progress at an early stage. There are a variety of interaction models and engagement practice to measure against. Some are validated models for example the Structure of Observed Learning Outcome or SOLO taxonomy to measure

cognitive engagement used in Thomas (2002) and others e.g. Calvani et al (2010) who developed a model based on dimensions of participation and cohesion. This Calvani et al study reports on an in-depth analysis of ineffective interactions. They identify interactions that finish with the first response, a “poor socio-relational climate” evidenced by few greetings or reciprocal encouragements, short reply messages and superficial agreement without discussion which have been seen in the findings of this thesis.

There are many studies looking at factors that may predict how students will conduct themselves in online groups. These are mostly survey and there is a lack of data from student interactions that may develop understanding of this phenomenon, although An, Kim and Kim (2008) used in-service teacher perspectives to develop factors either facilitating or impeding online group work in an online programme. Twenty-four students were then asked to complete an online survey based around these factors. In this study they found that individual accountability, affective team support, the presence of a positive group leader, consensus building skills and clear instructions were critical for designing and facilitating online collaborative group tasks.

These studies provide insight into what researchers consider important indicators of engagement in online learning environments. They are largely based on self-reported data and this may be subject to social desirability bias i.e. over-reporting “good behaviour” and under-reporting behaviour deemed as undesirable or “bad”. There are limitations of using models or frameworks in that the coding is linking words or phrases to this pre-defined model and therefore it is predisposed to reinforce preconceived perceptions of what is happening and therefore open to the criticism of making the data fit the model rather than letting the data “speak for itself”. Calvani et al (2010) acknowledge that the integration of quantitative and qualitative analysis would add to the understanding of this phenomenon.

Pittaway’s Engagement Framework (2012) proposes five non-hierarchical elements of personal engagement, academic engagement, intellectual engagement, academic engagement, social engagement and professional engagement. The intention of this framework is to enable both staff and students to ask questions about how engagement is happening and a tool to develop engagement in online educational practice. This framework is broad and this makes the types of engagement hard to categorise, however in application to this thesis findings, two of the types of engagement are relevant to this thesis. The first of these is personal engagement. The author identifies this type of engagement as necessary to support other elements of engagement. The group members in this thesis could be said to have all demonstrated personal engagement in terms of what Pittaway suggests is the gateway into learning i.e. making the decision to enrol in higher education, intentions and

motivation driving enrolment and having or developing perseverance to continue. In this thesis there was a degree of drop out however the individuals who saw this task through to the end could be said to be demonstrating personal engagement.

The second type of engagement that is relevant is social engagement. Being engaged socially is defined by Pittaway as getting to know other students, forming positive relationships with fellow students and being proactive in becoming part of a learning community, in the case of this thesis, the group task community. This thesis has found that social engagement is not the only type of engagement necessary to achieve the task in collaborative groups but it could be the gateway to the other types of engagement identified by Pittaway's engagement framework that are necessary to complete it.

This thesis uses both qualitative and quantitative approaches to examine group conversations without a pre-developed model to allow the data to inform the development of the characteristics of the group interactions under study. The use of time in this thesis is treated as a quantifiable phenomenon which is thought to be better understood by the analysis of the group dynamics.

This thesis has found distinct dialogues and characteristics in conversations in asynchronous discussions that can help teachers identify where groups are functioning well in the completion of a task and conversely where groups are struggling to complete it and in need of an intervention.

6.5 Findings from the research

This thesis has identified three distinctive dialogues indicating shared cognition and learning, the organisation of learning or uncertainty and lack of progression. The presence or the absence of these dialogues and the impact this has on how well the groups are working has the potential to help facilitators to identify when groups are working sub-optimally and provide support at the right time for groups who may be struggling to complete the collaborative task.

In addition this thesis has identified ten key characteristics (see page 112) within these dialogues which detail key presentations which has the potential to provide further assistance to educators in identifying sub-optimal performance and predicting the need for educational support to help groups meet the task requirements and improve group performance.

The findings from this thesis do the following:

1. Provide educators with understanding of the way in which asynchronous discussion can support collaborative group learning in online environments and how these

discussions can be used to predict the need for additional support for groups displaying difficulties.

2. Provide an analytical framework that educators can use to recognise when groups are working well and make earlier assessment of the group's potential to successfully complete the collaborative group task.
3. Provide knowledge about the cumulative nature of these characteristics and the presentations within dialogue that may indicate where intervention is needed in order to increase the group's chances of a successful outcome.

The use of asynchronous discussion in online collaborative learning is widely used and has been widely advocated in the literature as a principal method of learning with others. Methodological approaches to understanding the electronic discourse produced by these asynchronous discussions have been in the main quantitative but there has been criticism of this kind of approach with Hmelo-Silver (2003) warning that the use of reductionist approaches to investigate the complexity of collaborative learning may be limited. The prediction of optimal group performance has been largely approached by coding words and phrases in individual communications usually in large online forums and make many assumptions that cannot be quantified e.g. the length of messages being taken as an indicator of cognitive complexity (Shcrite 2006). This thesis identifies that these kind of assumptions taken at face value may not be correct. It explores group communications to identify a typology of dialogue, not pre-defined, but coming out of the analysis to differentiate dialogue types. It has also allowed for the identification of characteristics of these dialogues, identifying the cumulative nature of these in indicating optimal or sub-optimal performance and also some red flag presentations of these characteristics which could point to the need for intervention from educators to help groups who are struggling.

Chapter 7: Drawing it all together

In this final chapter, the findings discussed in Chapter 6 will be considered in relation to the original research questions. The purpose of this is to examine the extent to which the research questions have been answered and to establish how this research has advanced understanding in new ways. Also discussed will be how this contributes to the advancement of the knowledge about student to student interaction in asynchronous online discussions and how this may impact on educational practice in online programmes. In addition, the strengths and limitations of the study will be considered and recommendations for educational practice and future research will be made.

7.1 Returning to the research aim and objectives

The aim of this study was to explore the role of asynchronous discussion in supporting collaborative group work in online environments. In order to do this, the study focused on a large corpus of online posts by students working on a wiki group task within a higher education postgraduate online programme.

The first study objective was to gain insight into the nature, impact and contribution of asynchronous online discussion to collaborative group activities.

The second objective was to explore the possibility of developing an analytical tool for use by online educators to assess the progress of groups in their task and aid decision-making about which groups would benefit from an intervention by the educator.

7.2 Returning to the Research Questions

The main research question for this thesis was:

In what ways does the use of asynchronous discussion impact on a wiki assignment in an online programme?

This study has identified, through reviewing the literature, the way asynchronous discussion is used in wikis (and other collaborative writing activities) is to provide a mechanism by which the collaborative process can occur. The use of asynchronous discussion acts as a way that dialogue can be used by group members to regulate the process and communicate with each other in the construction of the wiki product.

The study has identified a typology of dialogues within the discussion communications of the collaborative groups involved. Three types of dialogue were identified as having impact within the eight groups in regulating the process of undertaking the task and in communicating with each other in the construction of the content of the wiki.

The dialogue types that were identified are;

1. Dialogue indicating shared cognition and learning;
2. Dialogue indicating the organisation of learning and;
3. Dialogue indicating uncertainty and lack of progression.

Three groups were the most active on the discussion site in terms of frequency of postings and length of discussion threads and these groups submitted on time and met the criteria. These groups demonstrated all three types of dialogue consistently and frequently. The remaining groups had at least one of the dialogue types missing or minimally present. Three of the groups had either issues with time management or meeting the assessment criteria. If they were missing dialogue indicating organisation of learning they struggled to submit on time. If they were missing dialogue indicating shared cognition and learning they had issues with meeting the assessment criteria. The two remaining groups had dialogue indicating uncertainty and lack of progression but were very low in or missing dialogues 1 and 2. These groups did not complete the task on time or meet the assessment criteria. Therefore the pattern seems to be that the groups did best if all three types of dialogue were present, had more difficulties but were more able to overcome them if they had dialogue 1 & 3 or 2 & 3, and struggled significantly if they did not have either dialogues 1 or 2.

There was not a situation where groups had only dialogue 1 or dialogue 2. This situation would be interesting to follow up in further research. The presence of dialogue 3 in all groups who submitted on time and met the marking criteria would suggest that this type of dialogue may well be very useful in triggering others to engage with problem solving and decision making, however it could be that if this is uncertainty is not responded to positively, it may lead to a situation of spiralling uncertainty and frustration.

Supplementary research question 1 is:

What characteristics are evident in asynchronous discussion interactions that support the collaborative online assessment?

When combining the analysis leading to the dialogue types that were identified and the data analysis of the use of time in the groups, this study has identified ten key characteristics of the dialogues that were found to influence group interaction.

These are:

1. The development of team identity

Groups who demonstrated this characteristic in their interactions frequently referred to each other as a team, shared information, were prompt and confident in replying to each other and demonstrated a strong expectation of a response.

Characteristic signs of groups who were struggling were not introducing themselves in the early stages, consistently addressing the group and not individuals within it and groups showing a general lack of response to posts addressing the group. These characteristics may be key indicators that a group identity and responsibility is not forming and this may cause issues later in the task.

2. Effective decision-making

Groups demonstrating this characteristic had frequent posts, with an expectation that they will get a response and then receiving that response well. Group members tried to influence decision making but as the task progressed they were more likely to be in agreement with decisions made.

Where the dialogue can indicate compromised decision-making, this could be in the form of group members posting whole sections of previously un-reviewed work and asking others to review it. Not asking for a decision from others before posting completed sections of work, and not getting into the details or questioning the meaning or validity of the wiki content were indicative of this characteristic. These absences may indicate an absence of cognitive conversations about the task and the group may need encouragement to do this.

3. The modelling of effective learning strategies

This was characterised by group members freely giving information and opinions, with suggestions for the way forward. These posts demonstrated a sense of purpose and a stated motivation to do the best possible job in the time given. It was also characterised by other group members' stated high regard for this person.

Characteristics in groups who may be struggling were where no one assumed the role of motivator for others. A lack of urgency was evident coupled with long gaps in communications and were an indicator of this situation. Also where there may have been requests for action from group members but no clarity about what was being asked for and therefore these requests were left unanswered.

4. Early engagement with the task

This characteristic was seen to be influential in putting the group in a strong position to make early decisions and was seen as a key feature of groups who finished the task on time. Early engagement also went hand in hand with timely re-engagement when there was a lull in activity during the task.

Groups who started later made slower progress in the task and there was a tendency in these groups to work backwards from what had already been done, securing agreement for it rather than moving on to make other pressing decisions.

5. Positive regard

Positive regard was a feature of groups who were very active on the discussion sites and in particular there were no recriminations when group members apologised for what they had not done.

Groups who did not go on to complete the task sometimes did not post conveying positive regard and when they did, this was often delayed. One of the groups used a group communication that indicated stress with some sarcasm indicating frustration with the rest of the group.

6. Confident, direct communication

These were characteristics of groups who went on to successfully complete the task and they were motivating and had an expectation of being responded to. There was some indication that other group members adopted this style of messaging through role modelling from other group members as the number of group members doing this grew as the task progressed.

Groups who did not have this direct communication frequently expressed confusion and uncertainty and did not get a response. These were different from other posts expressing uncertainty in that they were not addressed to a person or a specific issue, but were general in nature, leaving it ambiguous who the response was required from. If the posts were not answered they were repeated sometimes word for word.

7. Responding to each other

This characteristic goes hand in hand with confident, direct communication. This characteristic is when all active members are engaged in the group discussions and are regularly asking for responses from others and getting those responses.

In the same way as with confident direct communication, the posts were not likely to be responded to if they were general posts and directed to the whole group and not individuals.

8. Problem-solving

Expressing confusion and uncertainty seemed to work well when it triggered similar responses in others or where help came readily from others. When this was happening groups seemed to use this sequence of dialogue regularly as a push to problem solve.

Some groups were able to identify the problem but were not able to decide what to do about it. In other groups this confusion led to a stalling of activity, which led to lack of timely completion of the task. Another key problem was in the failure to articulate what was required, with some groups not able to specifically identify what process was needed to solve the problem.

9. Resolving disagreements

Disagreements were often motivating to the groups. Strong voices were visible in the dialogue but the ability to reach a consensus depended on acceptance of the majority decision and was an indicator that the group would go on to successfully complete the task.

Groups who did not perform well had either no expressed disagreement or a lack of response to disagreement or groups who did not progress to the point where an agreement was needed i.e. not getting past the first decision.

10. Dynamic two way conversation (as opposed to monologues in parallel)

This characteristic was demonstrated by communication that was in direct response to another's communication. Where this did not occur, the discussion postings looked like dialogue but in fact were monologues from individuals whose stated agenda did not change in response to other's communications. Where there were two group members doing the same thing, these were in parallel to each other.

Supplementary question 2 is:

What is the impact of these characteristics on the group's ability to engage with the assessment?

On their own most of these characteristics were not predictive of whether the group would complete the task successfully. Some of them have some overlap with each other and on their own may not be indicative of the need for an intervention. There does appear to be a cumulative effect when they are present together. There are some characteristics that are more significant e.g. the lack of posts from any group members giving information or

suggestions of the way forward coupled or the posting of large sections of work asking others to review it. There are some characteristics that even when they occur in isolation are a significant indication that the group is in difficulty and these are not responding to each other's direct communication and the presence of monologues in parallel.

This thesis found that the predictive value in monitoring the use of time is very low if this is the only indicator used. This is because groups follow very similar patterns in frequency of posting. There were three characteristics related to the use of time that were predictive in this thesis and these were a later start, a later peak during major decision making times; and shorter and a lower numbers of discussion threads at peak times and across the whole activity.

7.3 Strengths and limitations of this research

7.3.1 Strengths

A key strength of this research is that it represents a shift away from the current research focus on individual contributions in collaborative groups as a predictive measure for performance. This is something that currently is very problematic for researchers and educational practitioners who are striving to strengthen how students can be supported in online learning environments. This study suggests that focus should be placed on the interactive and complex nature of group dialogue to predict where a timely intervention may be needed. As such it offers a way to act to support learning in advance of dips in performance. It is suggested that group dialogue types have the potential to be used as an analytical tool for instructors who are facilitating collaborative groups in low or unmoderated groups or when facilitating groups at scale. This analytical tool can be used whilst the groups are in progress when instructors need help to make sense of the data that they have to assess progress. The use of these dialogues could contribute to instructors being able to identify groups who are struggling earlier in the task process and provide them the support that they need in order to improve their experience and performance within the task.

7.3.2 Limitations

This research has been undertaken in a specifically designed collaborative group assessment for postgraduate students where the motivation to complete the task was built in to the design by making it contribute to the participants' summative assessment. The participants' levels of motivation therefore may not be entirely representative of all higher education students undertaking online programmes. The sample size was not small and the development of the typology of dialogues was systematically achieved. That said, this typology cannot be applied widely in its current form and would benefit from being applied to

other higher education groups in order to test and refine it. This would increase its applicability, validity and reliability especially in relation to collaborative learning at scale.

7.4 Recommendations for Practice

The findings identify that the focus on understanding what is happening in asynchronous online discussion can impact on student experience and learning and has the potential to improve student performance. The recommendations therefore focus on how this understanding can be developed, in order to gain better understanding of the impact of dialogue in asynchronous online discussion on the learning of individuals and of the group. They also focus on how this understanding can be utilised to make educational interventions whilst this collaborative learning process is playing out, as it would be in a traditional face to face classroom situation. This has implications for researchers, educational practitioners and students in online learning. There are also wider implications for all types of education practice in higher education.

7.4.1 Implications for researchers in online education

The findings of this research indicate that methodological approaches to understanding the discourse in asynchronous online discussion may have a significant impact on how students can be supported to improve their experience and achievement. Researchers in this field have produced a vast range of research either using quantitative methods or qualitative methods using a student survey approach. Whilst these approaches have merits, they contain many assumptions, for example the length of messages as an indicator of cognitive collaboration and complexity, and have not yet provided a reliable predictive method of identifying performance. This may be because the complexity of these interactions cannot be captured without analysing how the words and phrases contribute to communication in the collaborative learning process.

The research in this thesis has used theory-generating rather than theory-confirming research. This type of research is very useful where theoretical constructs of learning are under-developed, in this case theories explaining how student conversations impact on their learning.

Further research into how group dialogue impacts learning and how this research can be used to identify effective strategies for learning needs to be completed and this will provide a more complete picture of what is going on in collaborative groups that contributes to learning. This will be of interest to all providers of online education including those who are providing learning at scale and has the potential to enhance the student experience, impact student attrition rates and improve educational performance.

7.4.2 Implications for educational practitioners in online education

The findings of this thesis have the potential to provide educators with an understanding of the way that asynchronous discussion can support collaborative group learning and how these discussions can be used to predict the need for additional support for groups who are struggling. This is an important issue for educators as until now there has been no reliable way to do this in practice. This analytical tool can be used by educators to interpret discussion conversations and recognise when groups are working well and make an early assessment of the potential of the group to complete the task. Recognising key dialogue characteristics and understanding their cumulative impact can help educators to judge when intervention is necessary so that a successful outcome is more likely. This makes the educator's job very much easier and could provide more uniformity of educational practice, where educators are able to recognise and respond to student groups in a much more consistent way and decrease the variability of practice in responding to groups that is a feature of current practice.

7.4.3 Implications for the wider educational community

Although this research has been conducted on an online environment, learning in groups is an integral part of learning in all types of educational delivery and the findings of this research have significance for all group activity in educational practice regardless of delivery method. This research is based on the theoretical assumption that students not only learn from educators but also learn from each other. The way that this student to student learning happens is under-theorised, being assumed in learning theory but not yet adequately explained. Making student to student discourse the centre of this research has provided a starting point to understand how this learning occurs from the conversations that students have within this learning process. Understanding what elements in these conversations contribute to learning provides a way of working backwards from educational practice to complete the gaps in the theoretical explanations for how this student to student learning happens. Developing this understanding has the potential to benefit all educators in all educational contexts who employ collaborative learning strategies to promote learning and merits further research.

7.4.4 Empowering students to improve their experience, performance and achievement

This research suggests that focusing research on student to student conversations rather than their individual contributions provides a way to support students to their enhance performance and achievement. It may also provide a way forward for the use of learning

analytics as an educational intervention for students that could empower them to improve their experience, performance and achievement and that of others.

Transmitting this information to students as an educational intervention in all educational contexts will increase their awareness of the importance of their group interactions and help them to recognise when they are in effective learning groups. Importantly it can help them to impact their own learning and the learning of others by adopting and promoting effective dialogue for learning in the learning groups of which they are members.

7.4.5 Summary of recommendations for further research

The findings of this research indicate some areas for further research which would further inform educational practice:

- Further research of the types of dialogue that have been identified on more varied samples of collaborative learning groups in higher education in order to develop this typology and the group characteristics further to ensure validity and reliability as a predictor of student performance in online collaborative groups.
- Testing this typology in various online settings including programmes of learning at scale to identify how this analytical tool could be used by educators facilitating online collaborative groups.
- Further research into the contribution of student to student dialogues in all educational contexts to develop understanding of how student to student learning is impacted by group conversations.
- Theory generating research which explores the use of conversation in learning to help complete the theoretical gaps in online learning theory in the understanding of how students learn in collaboration with each other.

7.5 Contribution

This study set out to understand the meanings of online group communications and the effectiveness for learning of their interactions. In this respect this study is very similar to a large amount of research with the same aim. However this study challenges the view that measuring the individual contributions of students in asynchronous discussions on their own can improve the student experience and performance. Previous research has examined key

words or phrases using a pre-determined framework or used a survey to ask students about these discussions. What makes this research different is that it does not examine individual contributions in isolation but explores the impact of the dialogic exchanges that contribute to the collaborative learning process. Using a qualitative case study approach and framework analysis to develop a thematic framework, a systematic approach has been taken to the generation of a typology of dialogues for use in interpreting what is happening in these group discussions. Its contribution therefore is an exploration of the potential of using dialogic patterns and characteristics to increase understanding of the contribution of group conversations to learning for education designers, tutors and, very importantly, for students themselves.

These dialogic typologies and group characteristics have the potential to be used as an analytical tool by online instructors to judge when educational intervention may be needed to support the group in their task. In this respect it has the potential to promote a more consistent approach by educators in making the decision to intervene to support groups.

This research also has significance for wider educational practice where group learning is utilised. This dialogic typology has been developed using data from online conversations however it has importance for all educational contexts where student to student learning conversations occur. Making students aware of the impact of these conversations on learning and what constitutes effective learning dialogue has the potential to empower students. Students could impact their own learning and the learning of others by being able to recognise effective dialogue for learning and adopt and promote effective learning dialogue in their learning groups

This study also contributes to research that may help educators to fill gaps in online learning theories in respect of how students learn from each other. Using communication dialogue as a starting point to develop learning theory that will assist in a greater understanding of how students learn from each other in the process of educational collaboration.

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Appendix A: Citation Style

The American Psychological Association (APA) citation style was developed in the 1920s by a group of social scientists and is now used widely in the social and behavioural sciences. It is not dissimilar to the Harvard style of citation but there are some differences that can lead to confusion if the reader is unfamiliar with the style. The most distinctive of these are noted here:

Authors with the same surname are distinguished by the use of an initial before the surname regardless of whether the year of publication is the same or not. For example, an in-text citation for two authors with the surname Adams, could be (M. Adams 2003; T. Adams 2010).

Electronic sources are described as 'Retrieved from (link) rather than Available from or Accessed from, both of which feature in other styles.

When citing an edited book using APA style the first letter of the editor abbreviation is capitalised, as in 'Eds' whereas in Harvard style the abbreviation is lower sentence case as in 'ed'.

Multiple authors cited within parenthesis are joined with an ampersand (&). Multiple authors cited in the text and without parenthesis, are joined by 'and'.

Appendix B: Abbreviations and Glossary of Terms

Abbreviation	In full
AOD	Asynchronous online discussion
CoI	Community of Inquiry
CMS	Course Management System Knowledge Management System
DfE	Department for Education
HEA	Higher Education Academy (now known as Advance HE)
HEIs	Higher Education Institutions
KMS	Knowledge Management System Self-regulated learning SRL
LMS	Learning Management System
MOOC	Massive Open Online Course
OER	Open Educational Resource
PLE	Personal Learning Environments
SCP	Socio-Cognitive Presence
SLP	Social Learning Presence
SSRL	Socially-shared regulated learning
STP	Social Teaching Presence
TEL	Technology Enhanced Learning
UK	United Kingdom
US	US United States
VLE	Virtual Learning Environment

Glossary of Terms	Definitions
Asynchronous online discussion	A time delayed, text based communication using an online platform for multiple users
Authentic assessment	An assessment which aims to replicate the tasks and performance standards typically found in the world of work.
Cognitive Presence	The extent to which learners are able to construct meaning through discourse in a collaborative group.
Community of Inquiry	A shared commitment to meet the learning needs of all group members in a collaborative group.

Cybernetics	A scientific representation of a conversation used to reach agreement and construct new knowledge in teaching
MOOC	Web-based online learning courses designed for unlimited numbers of geographically dispersed students
NCapture	A web-browser the capture of online content for import into NVIVO
NVIVO	A software program used for the analysis of unstructured text, audio, video, and image data.
Semantic web	A mechanism for electronic educational information storage and retrieval, now known as search engines.
Social Presence	Behaviours that enhance rapport, trust and collegiality in a collaborative group.
Teaching Presence	The design and facilitation of learning tasks in a collaborative group.
Technology Enhanced Learning	Any form of digital learning, be that face to face technology enhanced classrooms or learning in virtual learning environments
Web 2.0	Refers to websites that emphasize online user-generated content and a participatory culture.

Appendix C: Consent Form

UNIVERSITY OF HERTFORDSHIRE

ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS

(‘ETHICS COMMITTEE’)

FORM EC3

CONSENT FORM FOR STUDIES INVOLVING HUMAN PARTICIPANTS

I, the undersigned [*please give your name here, in BLOCK CAPITALS*]

.....
of [*please give contact details here, sufficient to enable the investigator to get in touch with you, such as a postal or email address*]

.....
hereby freely agree to take part in the study entitled

An investigation into whether constructive learning strategies used in online learning can be transformative.

.....
1 I confirm that I have been given a Participant Information Sheet (a copy of which is attached to this form) giving particulars of the study, including its aim(s), methods and design, the names and contact details of key people and, as appropriate, the risks and potential benefits, and any plans for follow-up studies that might involve further approaches to participants. I have been given details of my involvement in the study. I have been told that in the event of any significant change to the aim(s) or design of the study I will be informed, and asked to renew my consent to participate in it.

2 I have been assured that I may withdraw from the study at any time without disadvantage or having to give a reason.

3 In giving my consent to participate in this study, I understand that voice, video or photo-recording will take place.

4 I have been told how information relating to me (data obtained in the course of the study, and data provided by me about myself) will be handled: how it will be kept secure, who will have access to it, and how it will or may be used.

5 I understand that my participation in this study may reveal findings that could indicate that I might require medical advice. In that event, I will be informed and advised to consult my GP. If, during the study, evidence comes to light that I may have a pre-existing medical condition that may put others at risk, I understand that the University will refer me to the appropriate authorities and that I will not be allowed to take any further part in the study.

6 I understand that if there is any revelation of unlawful activity or any indication of non-medical circumstances that would or has put others at risk, the University may refer the matter to the appropriate authorities.

7 I have been told that I may at some time in the future be contacted again in connection with this or another study.

Signature of participant.....Date.....

Signature of (principal) investigator: Date.....

Name of (principal) investigator [*in BLOCK CAPITALS please*]

MAUREEN BRENNAN

Appendix D: Ethics Approval



UNIVERSITY OF HERTFORDSHIRE
SOCIAL SCIENCES, ARTS AND HUMANITIES
ETHICS APPROVAL NOTIFICATION

TO: Maureen Brennan

CC: Hilary Taylor

FROM: Dr Tim Parke, Social Sciences, Arts and Humanities ECDA Chairman

DATE: 06/09/2016

Protocol number: EDU/PGR/UH/02645

Title of study: An investigation into whether constructive learning strategies used in online learning can be transformative.

Your application for ethics approval has been accepted and approved by the ECDA for your School.

This approval is valid:

From: 06/09/2016

To: 28/02/2017

Please note:

Approval applies specifically to the research study/methodology and timings as detailed in your Form EC1. Should you amend any aspect of your research, or wish to apply for an extension to your study, you will need your supervisor's approval and must complete and submit form EC2. In cases where the amendments to the original study are deemed to be substantial, a new Form EC1 may need to be completed prior to the study being undertaken.

Should adverse circumstances arise during this study such as physical reaction/harm, mental/emotional harm, intrusion of privacy or breach of confidentiality this must be reported to the approving Committee immediately. Failure to report adverse circumstance/s would be considered misconduct.

Ensure you quote the UH protocol number and the name of the approving Committee on all paperwork, including recruitment advertisements/online requests, for this study.

Students must include this Approval Notification with their submission.

Appendix E: Participant Information

UNIVERSITY OF HERTFORDSHIRE

ETHICS COMMITTEE FOR STUDIES INVOLVING THE USE OF HUMAN PARTICIPANTS
(‘ETHICS COMMITTEE’)

FORM EC6: PARTICIPANT INFORMATION SHEET

Title of study

An investigation into whether constructive learning strategies used in online learning can be transformative.

Introduction

You are being invited to take part in a study. Before you decide whether to do so, it is important that you understand the research that is being done and what your involvement will include. Please take the time to read the following information carefully and discuss it with others if you wish. Do not hesitate to ask us anything that is not clear or for any further information you would like to help you make your decision. Please do take your time to decide whether or not you wish to take part. The University’s regulations governing the conduct of studies involving human participants can be accessed via this link:

<http://sitem.herts.ac.uk/secreg/upr/RE01.htm>

Thank you for reading this.

What is the purpose of this study?

This is a doctoral study at the University of Hertfordshire investigating the educational potential of online learning.

Do I have to take part?

It is completely up to you whether or not you decide to take part in this study. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. Agreeing to join the study does not mean that you have to complete it. You are free to withdraw at any stage without giving a reason. A decision to withdraw at any time, or a decision not to take part at all, will not affect any treatment/care that you may receive (should this be relevant).

Are there any age or other restrictions that may prevent me from participating?

All participants must be over 18.

How long will my part in the study take?

If you decide to take part in this study, you will be involved for the duration of the Public Health Foundations module from September 2016 to January 2017

What will happen to me if I take part?

Data from the wiki site including the discussion pages from the Public Health Foundations module will be used to inform the research study.

What are the possible disadvantages, risks or side effects of taking part?

Participants may perceive a risk related to a fair and equitable assessment for this module. In order to negate actual and risk perceived by the participants the investigator will not be involved in first or second marking nor the internal moderation of work submitted for assessment. Therefore, the marking and moderation will be completed by other members of

the Public Health Foundations module team. This is intended to separate the investigation of teaching strategies from the module assessment and minimise the risk of bias both actual and perceived

What are the possible benefits of taking part?

We hope that this research will help inform academic staff about the potential of the use of technology to promote effective learning in the university setting.

How will my taking part in this study be kept confidential?

All students enrolling on this module will be invited to take part but study participants will not be identified to other students on the module who choose not to take part. Neither will the students choosing not to take part be identified to the module participants. The active learning activities being investigated i.e. the wiki and facilitated discussion will all take place in the context of the module of study and will be open to all the students enrolled on the module and the module staff. They will not be available to anyone outside of this community of study.

What will happen to the data collected within this study?

The active learning activities being investigated i.e. the wiki and facilitated discussion will all take place in the context of the module of study and will be open to all the students enrolled on the module and the module staff. They will not be available to anyone outside of this community of study.

Any transcriptions of the wiki and facilitated discussion will be held securely on the investigator's password protected computer or in a locked filing cabinet in the investigator's office for the duration of the study. Any computer generated or paper copies of transcriptions will be deleted or destroyed once the study has been completed.

Who has reviewed this study?

This study has been reviewed by:

The University of Hertfordshire Social Sciences, Arts and Humanities Ethics Committee with Delegated Authority

The UH protocol number is 08203160

Who can I contact if I have any questions?

If you would like further information or would like to discuss any details personally, please get in touch with me, in writing, by phone or by email to Maureen Brennan, Principal Lecturer, School of Life and Medical Sciences, Hillside House, College Lane, Hatfield, Hertfordshire, AL1 9AB. Tel:07932437732, email: m.p.brennan@herts.ac.uk

Or you can contact my doctoral supervisor Hilary Lee at h.lee23@herts.ac.uk

Although we hope it is not the case, if you have any complaints or concerns about any aspect of the way you have been approached or treated during the course of this study, please write to the University's Secretary and Registrar.

Thank you very much for reading this information and giving consideration to taking part in this study.

