



The Role of Social Media in Developing Online Learning Communities

Submitted by
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Abstract

The purpose of this study was to examine the role of social media in developing learning communities in both formal and informal learning contexts. The study was based on a theoretical framework to examine online learning communities from three levels: individual, interactional and group. This study selected two cases: the first case was a formal learning group that used networked learning via Twitter and WhatsApp within a blended learning environment in an academic module; this formal learning group was controlled by the teacher of the module. The second case was an informal learning group that used Twitter and WhatsApp to learn and practise English as a second language; this group was created and informally organised by an active member on Twitter who was interested in teaching and practising English. Semi-structured interviews, focus groups and WhatsApp discussion samples were the three main data collection methods of this study. The data were analysed using three procedures. Firstly, a thematic analysis of the interviews was conducted to generate a thematic research map and create a coding scheme for analysing the content of the WhatsApp discussions. Secondly, a social network analysis (SNA) was applied to the WhatsApp group discussions to map out the interactions among group members and select the sample of WhatsApp discussion for the third data analysis procedure. The third procedure was content analysis (CA), which was applied to the WhatsApp conversations that occurred during the selected sample (the three most active and connected weeks). Findings from the SNA and CA were used to triangulate the results of the thematic analysis. The findings revealed that the existence of similar learning needs, interactive communication among members and using appropriate communication tools are the main factors that develop online learning communities on social media. Also, it showed

that the main function of using Twitter for learning purposes was to develop the academic and social presence of the students/learners, while the main learning function of using WhatsApp was to provide an instant and open communication environment for online learning community members. However, there were different uses of these applications in formal and informal learning contexts, which were described in the study.

Dedication

I dedicate this work to my wonderful daughter Joud.

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1. Introduction

1.1. Introduction to the problem

The rapid development of technology and exponential growth in the use of Web 2.0 and mobile technology, creates new and different ways of learning and teaching (Johnson et al., 2006). The increasing use of Web 2.0 tools including social media in educational practices led to a reconceptualization of learning in which formal and informal learning can be integrated to build a potentially lifelong learning experience within online learning communities (Pettenati & Cigognini, 2007). Indeed, the growing number of networked learning activities (i.e., online learning discussion) on social media platforms applied by teachers, students or a group of like-minded users resulted from shifts that have occurred in learning theories and in the fields of communication technology and internet usage (McConnell, 2006): It seems that one of the main ideas underpinning the change in learning theories is the importance of the interaction between learners, which is a key aspect for their cognitive and social development. Consequently, all current learning theories and approaches, including constructivism, connectivism, situated and dialogical learning, emphasise the social nature of learning that requires the learners to connect and interact with their surroundings in a social setting. Since Siemens' article *Connectivism: Learning as Network Creation* (2005) and Downes' *An Introduction to Connective Knowledge* (2005), extended discussions have followed in and around the status of connectivism as a learning theory for the digital age (Kop & Hill, 2008; Ravenscroft, 2011). The main conclusion of these discussions is that learning does not only take place within educational institutions as a process of "knowledge consumption", but rather it considered a "knowledge creation process" occurred within networked learning communities.

Comparable change has occurred in the development of communication and internet usage, which is a shift from using the internet as a source of static information sites “web 1.0” to utilising user-generated content tools “web 2.0” that enable the user to produce and share content with multiple users (Ravenscroft, 2009; Torres Kompen, Edirisingha & Mobbs, 2008). It is commonly suggested that communication between users has become the dominant purpose of internet users. Social media or social networking technology can be a powerful communication platform, offering users an increasing number and range of opportunities for social and professional interactions in which they can create, access and share knowledge. Such pedagogical advantages of social media have led to the characterisation of new social educational themes (Torres et al., 2008), such as online learning communities, collaborative reflection, personal learning environments, and user-generated content, which affect teaching and learning practices (Dabbagh & Kitsantas, 2012; Brown, Czerniewicz & Noakes, 2016).

Thus, the new generation of web tools and the new means by which the users are connected and information is distributed on the Internet provides a solid base for developing online learning communities. And this initially garnered increasing attention in social media applications as spaces for creating networked learning communities (Pettenati & Cigognini, 2007). From that point of view, this study tries to present the current power and scope of the practice of developing online learning communities through social media applications such as Twitter and WhatsApp in both formal and informal learning contexts.

1.2. Statement of the problem

There is a considerable debate about the benefits and challenges of social networking technologies (e.g., social media) in everyday use for learning but a little exploration of the connections between formal, and informal learning such technologies might enable (Greenhow & Lewin, 2016). Several researchers have investigated the ways in which social media platforms are becoming increasingly incorporated into traditional classrooms or online learning management systems in order to foster student interaction (Bouhnik & Deshen, 2014; Voivonta & Avraamidou, 2018) and support students in developing metacognition skills (Dabbagh & Kitsantas, 2012; Jin, Zhong & Zhai, 2015). However, one of the main deductions derived from this literature is that cognitive and meta-cognitive development is only partially reinforced by technology, whereas the interaction of pedagogy and the technological affordances of such technology should provide an ideal environment for learners in today's environment.

Social media provides unlimited affordances that bring people together in many creative ways. Millions of users are playing, tagging, working, and socialising online (Christensen et al, 2017), however, the role of social media in bringing people together to learn through online networking and therefore developing online learning communities is still vague and uncertain (Parks, 2010). It seems that there are two reasons for this doubt, in which the problem of the study appears: firstly, the concept of an online learning community is multi-faceted as there are several aspects that can influence its formation (Chiu, Hsu, & Wang, 2006; Parks, 2010). Developing an online learning community creates distinctive learning atmospheres where learning goals, personal relationships and emotions are no less important because of their

“virtualness”, and for which traditional face-to-face instructions are not neatly transferrable (Dron & Anderson, 2007; Elwood et al., 2014; Garrison et al., 2000). Thus, many different definitions emerged to describe the construct of “Online Learning Communities” (OLC), based on many different aspects: social, technological, professional or even regional aspects (Parks, 2010). In addition, there are different existing theories that can be applied to address its development, including social capital and social cognitive theories (Chiu et al., 2006; Rourke, Anderson, Garrison & Archer, 1999) engagement theory (Kearsley & Shneiderman, 1998) discourse and interactional perspectives (Garrison et al., 2000). Furthermore, the design of an online learning community or its structure can lead to the generation of different meanings, particularly depending on whether they are applied to formal or informal learning contexts. For example, several authors have differentiated between learning communities as communities of inquiry (Garrison et al., 2000), communities of practice (Wenger, 1999), knowledge-building communities (Scardamalia & Bereiter, 1994; Swan et al., 2000) and massive online learning courses (Downes 2009; McAuley et al., 2010), suggesting that each type embodies a different focus of learning development and their members hold different roles or undertake different learning activities (McConnell, 2006). Consequently, there is a need to explicitly identify the construct of an online learning community from an integrated perspective, and a clear model or theoretical framework must be developed based on this definition in order to address the development of these communities in formal or informal learning contexts.

The second reason behind this problem is that the use of social media as a communal online learning platform has not been explicitly defined in the literature, since the typical usage of social media in learning or teaching practices deals with

fostering student interaction (Bouhnik & Deshen, 2014; Sun & Gao, 2017) or incorporating new teaching or learning strategies, such as flipped classrooms (Chen, Lang, Lu & Shi, 2018), or participatory learning (Krutka & Carpenter, 2016). Nevertheless, some studies have investigated the development of online learning communities using one social application, such as Twitter (Abdelsadek et al., 2018; Gruzd, Wellman & Takhteyev, 2011) or Facebook (FB) (Voivonta & Avraamidou, 2018). While the number and variety of social media platforms used by a group of learners are deemed to be a significant factor for influencing relationships and interactions, and therefore the community's formation (Carpenter & Green, 2018). Different means of communications and social networking applications have been known to impact the flow of information (Gruzd, Wellman & Takhteyev, 2011). Moreover, the development and sustaining of online communities does not only depend on the relationships that an individual has within a network (Daniel, O'Brien & Sarkar, 2007), but also on the type and strength of those relationships (McConnell, 2006; Ren et al. 2012). The use of different means or multiple tools for communication has also been shown to be related to the depth of the bonds connecting members of a community, suggesting that a conversation started in one medium may continue in another (Wellman & Gulia, 1997, p.13) with further resources or contributions from other members. Androutsopoulos (2006) has argued that studies focusing on the diversity of means used in computer-mediated communication have shown a shift over time from "medium-related to user-related patterns of language use" (p.421). This suggests that different communication media (e.g., instant text or photo messages, blogs, audio or video discussions) should be observed in terms of connection affordances that foster interactions within a community of learning (Androutsopoulos, 2006; Poquet, et al., 2018). This indicates a need for case studies that explore more dynamic settings, where

power structures and the relations of using different social media platforms are more explicitly addressed – which this study attempts to achieve. In so doing, it aims to add additional theoretical and empirical understanding regarding the developing online learning communities on social media platforms in both formal and informal learning contexts.

1.3. Purpose of the Study

This study aims to address the problems mentioned above. First, it draws on relevant theory, prior literature and my understanding on the meaning of online learning community to suggest a model that theorises social media as a space for creating learning communities with varying attributes of formality and informality. As presented earlier, online learning communities are dynamic and varied in their social and technical structures (Preece & Maloney-Krichmar, 2005). Thus, understanding what makes an online learning community successful is therefore complicated. What is quite clear from the available online learning community models is that online interaction alone does not guarantee a successful online community. Success is determined by social factors as well as communication tools' functionality and usability factors (Apostolou, Belanger & Schaupp, 2017; Lin, 2008; Souza & Preece, 2004). Understanding the impact of software and communication tools on the development of online communities is a vital part of exploiting advances in technology to support networked learning activities (Souza & Preece, 2004). The focus of this study is on how this particular kind of human experience is enabled and affected by social networking technology. This research seeks to examine the emergence of a sense of connectivity in this environment, the factors that lead to its development from three perspectives: individual, interaction and group perspectives. Using ideas derived from self-regulated learning (Zimmerman, 1989), the community of inquiry (Garrison, Anderson

and Archer, 2000), and group identity (Ren et al., 2012) as promising original lenses through which to conceptualise social media and learning community. These lenses can provide a holistic view to investigate the development of online learning communities on social media. This is with a view to fill the gap in the previous online community models, such as such as Community of Inquiry (CoI) (Garrison, Anderson & Archer, 2000), Community of Practice (CoP) (Wenger, 1998) and Fully Online Learning Community Model (FOLC) (Blayone et al.,2017), that focus on the interaction aspect, and to broaden the field to include group and individual perspectives on developing the sense of community.

Second, the current study further aims to add empirical understanding regarding the role of social media in developing online learning communities in formal and informal learning contexts. The application of multiple social media tools to create a community of learning is based on a mix of human elements and technological elements (Souza & Preece, 2004). The former refers to the users of the online learning community, including learners and instructors or group moderators; while the latter refers to communicational means used for learning and interaction purposes. In this study the communicational mean is a mix of social media selected by the participants.

A case-study approach is adopted to investigate the factors and the dynamics of building social-media-based learning communities, which is vital to achieve two main purposes. The first aim is identifying the factors of developing and sustaining online learning communities on social media. This goal stems from the human perspective: It concerns the factors that enable a group of learners to form a community of learning across a number of social media applications, as determined by their choices and needs. The second aim is concerned with the technological aspect of

developing online learning communities on social networking applications, focusing on the role of social media in developing formal and informal learning communities. In this regard, the study tries to shed the light on the process of selecting social networking applications as appropriate tools of learning and interaction among community members and also to focus on the main uses of certain applications (WhatsApp and Twitter) in formal and informal learning activities. In order to achieve these research aims, they have been formulated into researchable questions and the proposed integrated theoretical framework has been used to guide the data collection, data analysis and discussion process.

1.4. The significance of the Study

As presented earlier, the construct of online learning community is multi-faced and the role of social media in developing this kind of learning environments is still not yet fully understood in the literature. This leaves a significant theoretical gap in the meaning of online learning community as a perception of the community members, and also there is a practical gap in identifying the role of using multiple social networking applications to develop a virtual learning community. Understanding the process and the dynamic of online learning communities can facilitate solutions to increasingly complex challenges of e-learning such as isolation, time management, learners satisfaction, lack or shortage of learner's participation (Rovai, 2002a; Ryman et al., 2009; Richardson et al., 2017; Souza & Preece, 2004). Investigating the right environment to develop and sustain online communities is a complex task that has implications for designers, facilitators and participants (Apostolou, Belanger & Schaupp, 2017). Moreover, understanding how to foster intellectual conflict within a community to develop productive controversy is crucial in the knowledge era (Ryman et al., 2009). Thus, the significance of this study is grounded in identifying factors of

the creation of what participants see as a welcoming community in which authentic learning can occur, prompting learners to interact and self-regulate their learning within a community. Identifying the significant factors of formal and informal online learning communities from participants' viewpoints can provide useful information for designing and evaluating online platforms or to create online learning community environments. Alongside what makes a good or supportive online learning community, the role of communication tools is another important dimension to consider in terms of developing an online learning community, especially with the development of new social networking applications (Abdelsadek et al., 2018; Christensen et al., 2017). This study aims to shed light on the main benefits of Twitter and WhatsApp as educational tools when used by a group of learners. This can offer an understanding of how these tools can be used in formal and informal learning practices to make and maintain connections with other community members or other people with similar learning interests. Understanding the factors of developing online learning communities and the uses of social media tools can lead to suggesting useful hints for future researchers, teachers, community developers and learners.

The significance of this study also lies in the construction of a new framework to investigate the development of online learning communities from three main perspectives: the individual perspective, including how users can present themselves to other group members and how they can regulate their own learning; the interactional perspective, including the role of the teacher or group leader in facilitating and sustaining interaction and cognitive presence in the group's discussion, and finally the group perspective, including the final form or identity of the group that is created over social media and the structure or topology of this group. As mentioned previously, this three-level view of online communities (individual, interaction and group) may

add new perspectives to the Col model by Garrison, Anderson and Archer, (2000), which only focuses on the interaction dimension and the role of social, cognitive and teaching presence in developing online communities of inquiry. The two additional dimensions proposed by this study's framework are individual factors, which drive and control members to learn within a community, and group formation, focusing on the final product of online interactions, including group identity and describing the structure or topology of the group. Thus, this framework explains the ways in which the Col model, self-regulated learning approaches, and group identity theories converge and diverge as frameworks for analysing learning through social networking technology. It can be argued that the relationship between these three ideas is surprisingly underdeveloped and deserves attention: an individual, interactional, and group tri-level framework could not only help to explain individual learners' behaviours, but also serve to reconstruct the identity of the collective community of learners.

1.5. Research Questions

Two primary research questions have been formulated from the purpose of the study and used as the basis for data collection; however, there are some additional, related questions that were raised during data analysis and are presented in the findings chapter as sub-questions after each primary question. The structure of the research questions is as follows:

Q1: What are the main factors that could enhance the sense of an online learning community from the participants' viewpoints?

Emerging questions:

Q1.1. How do learning needs influence (or determine) other aspects of an online learning community?

Q1.2. What are the factors that contribute to facilitating online communication between group members?

Q1.3. What are the key features of convenient communication tools from participants' viewpoints?

Q2: What is the role of social media in developing an online learning community?

Emerging questions:

Q2.1. What are the main uses of Twitter as an educational tool in formal and informal learning communities?

Q2.1. What are the main uses of WhatsApp as an educational tool in formal and informal learning communities?

1.6. Research Research Context

This research has been conducted in the context of Saudi Arabia (SA). Therefore, detailed information about formal learning in the Saudi higher education system, the informal learning movement in SA and an overview of the use of social media by adults in SA are now given, focusing on key aspects that are related to this research.

1.6.1. Higher education in Saudi Arabia.

Higher education in SA is managed by the Ministry of Education in the Kingdom of Saudi Arabia and includes three tracks: study in public universities, such as King Saud University (KSU), which offers free tuition for students; studying in private universities, which requires tuition fees from students, and supervision of studying abroad for students enrolled in the King Abdullah programme for external scholarship, through which many Saudis study outside the Kingdom. The duration of undergraduate study in public and private universities and colleges varies from four to five years according to the specialisation. The Saudi public and private universities and

colleges cover the humanities and all scientific disciplines. The disciplines available depend on the academic programmes offered by each university, according to its mission, available resources and the needs of the labour market and scientific research (Ministry of Education, 2018).

Undergraduate students in SA are 18 years of age and older. In addition, most Saudi universities offer postgraduate programmes for qualifications such as masters and PhD degrees. The universities of Saudi Arabia are often scheduled as two four-month semesters in one academic year, which begins at the end of September and ends in August of the following year. Universities and colleges operating in SA offer university education to all residents and visitors. Saudi universities generally aim for at least 5% enrolment of foreign students in their courses.

One of the oldest universities in SA (and the Middle East overall) is KSU. It was the first Saudi university to be established in Riyadh, in 1957, and it focuses on high-quality education and scientific research. King Saud University has 9 colleges covering disciplines within the fields of science, the humanities and medicine. It is attended by around 62,000 students. Based on the segregated educational system in SA, there are two separated centres at KSU (a men's campus and a women's campus). The formal learning case in this study was applied to a module taught by a friend of the researcher with the Department of Instructional Technology. This department was one of the first of its kind to open in the Arab world, having initially been established under the name of Educational Means and Technology in 1973. Throughout its history, it has supported the educational process by offering general modules and a master's programme, developed in 1990, in its specialisation, with the support of the Technical College of Education. The department has worked on developing a new methodology to keep abreast of the latest developments in the field. In 2008, it

began to provide a rich technical and educational environment for the development of human resources in education and e-training skills and attitudes in educational systems.

However, Saudi Arabian higher education institutions have been facing a growing demand for enrolment, as the growth-rate capacity of existing Saudi universities does not match the current growth rate in enrolment demand. Currently, SA's population is estimated at 32.5 million, with approximately 49% of that number under the age of 30 (General Authority for Statistics SA, 2018). These figures are projected to rise by 2.52% every year. The high birth rate is already having significant implications for the education system, including the effect on its accessibility. This has resulted in overcrowded classrooms, with a consequent reduction in the quality of learning. Furthermore, it could address other problems, such as the shortage of instructors, remotely located schools and the educational needs of populations in remote areas (Hamdan, 2013).

Based on these issues, an interest in e-learning and distance learning is becoming increasingly apparent. Most public Saudi universities now provide distance-learning opportunities using the most advanced learning systems, such as Blackboard. In addition, an e-university was established in 2010 as the first Saudi virtual university offering higher education and lifelong learning, and as a complement to the system of educational institutions under the umbrella of the formal higher education system. The e-University includes a Faculty of Administrative and Financial Sciences, a College of Computing and Informatics, a College of Health Sciences and a Faculty of Science and Theoretical Studies. It offers undergraduate and postgraduate degrees, as well as courses based on the idea of lifelong learning. It offers a dis-

tance-learning or blended learning approach. Its key objectives are to provide a flexible, high-quality learning model that supports self-regulated learning, the seeking of information and acquisition of computer skills in a virtual environment; to provide higher education based on the best models of education and application, and the transfer and resettlement of original knowledge in collaboration with universities and international bodies and faculty members. Additionally, it aims to gather educational content from several international sources for localisation appropriate to Saudi society and to support the principles of e-learning and lifelong learning for all members of the Arab world (Saudi Electronic University, 2018).

1.6.2. Informal learning in Saudi Arabia.

While informal learning was originally defined in contrast to formal learning practices, which occur in educational institutions (Dewey, 1966, as cited in Ebner et al., 2010), more and more principles are now becoming necessary to explain informal learning in different environments (e.g. the workplace, school, during voluntary work, online). Informal learning is related mainly to the development of skills, knowledge and attitudes through everyday experience and over social networks (Weigel, James, & Gardner, 2009); therefore, it is perceived as an essential component of new learning environments (Greenhow & Lewin, 2016; Weigel, James, & Gardner, 2009). Gee (2004) reasoned that differences in age, class, race and experience level become narrowed because learners are sustained by shared endeavours, and because individuals can join in formal learning activities in various ways according to their skills and preferences, participating in peer-to-peer instruction so that the participant feels like an expert while also tapping the expertise of others.

Therefore, states have made efforts to develop opportunities for this type of learning and have worked to activate partnerships with local communities and educational institutions by funding and supporting informal learning initiatives (Alqasem & Alnuwaysir, 2018). Several reasons have emerged that call for such partnerships, such as limited resources and funding crises faced by governments. In addition, these schemes aim to achieve efficiency by providing adequate income to raise the quality of services and the competitiveness among institutions, and to meet the needs of the knowledge economy and the competitive market of globalisation.

SA universities have recently realised the importance of this area of development, and have adopted certain policies of partnership in terms of participation of local communities in planning and support informal learning programmes, such as life-long learning systems and training programmes. From this perspective, public Saudi universities have started to offer informal learning services as part of their community partnerships, such as offering free online lectures, public seminars, awareness workshops, foreign-language courses and educational summer programmes for school students. In spite of this, the involvement of local communities is still weak, and there is a need to develop the current partnerships to fit the policies of universities along with the needs of society and its institutions (Alqasem & Alnuwaysir, 2018).

There is another significant initiative in SA to support informal learning, which is the establishment of the first Arab platform for informal learning in 2017: 'Rwaq'. Rwaq is a joint venture between two friends, Fouad Al-Farhan and Sami Al-Hussain, based on their own direct investment. They believe that the Arab world deserves its own educational platform in which Arab speakers can encounter scientific and practical skills taught directly in the Arabic language without the need for translation. The

platform started with four subjects in three disciplines (computer science, arts, creativity, the sciences), and it aims to cover other fields (such as management and business [marketing, entrepreneurship, etc.], technology, social sciences, materials), ultimately seeking to cover all disciplines and cognitive areas in the future. All materials and lectures on the platform are free and will remain so. There are two types of certificates offered by Rwaq: an unofficial certificate, which serves as proof of completion of a course of study, and an official certificate of the learner's success in studying the material. Official certificates of credibility must be issued by an academically accredited authority; however, in the meantime, it is still in the first steps towards receiving official acknowledgement of these types of certificates (Alfarhan & Alhussain, 2017).

1.6.3. Overview of using social media in Saudi Arabia.

Social media is beginning to play an important role in the lives of the Saudi people, and its usage has expanded quickly. From an initial role as solely a networking platform, social media has transformed into an effective force for social change in Saudi society. Like other places in the world, social media has served to enhance the commercial aspect and traditional values of Saudi society by opening Saudi minds to new ideas and concepts (Radcliffe & Lam, 2018). Many Saudis use social media to stay updated on what is going on in the world around them, to keep in touch with friends and family, to share their opinions and to share or find entertaining content. The Saudi government has also been effective in using social media to engage with citizens and to measure public perception. Key members of Saudi royalty have been taking to their Twitter accounts to campaign for reforms across the Kingdom. Members of the ruling government and most of the Kingdom's ministers are now using their Twitter accounts as formal platforms to disseminate information about government policies and initiatives.

There are many driving factors behind this jump in social media usage in SA. It is primarily due to the low average age of the Kingdom's population, as it is widely held that younger people are the most likely to get involved in social media (Dimitrios & Alali, 2014). It could also be a result of the changes in Saudi society; it is becoming more accepting of new ideas and becoming more wide-ranging in its outlook. These changes promote an important role of social media channels in the country's progress towards modernity and social transformation. The Kingdom's high rates of internet access and smartphone ownership also serve as a significant factor in the expanding usage of social media. Eighty-four per cent of Saudi residents live in cities (Dimitrios & Alali, 2014), where the adoption of mobile technologies has been much faster than across the rest of the country. Cities also offer easy access to fast internet connections as the average mobile internet connection speed in the Kingdom has almost doubled in the last year.

A recent statistic from 2018 highlighted key developments and data related to the usage of social media in SA, revealing information about the most popular social media platforms in the country. YouTube shows 23.62 million active Saudi users, while Facebook (FB) comes in second with 21.95 million users. Instagram is third, with 17.96 million users, and Twitter fourth, with 17.29 million users. Messaging platforms have also sustained their remarkable growth in SA. WhatsApp emerges as the most used chat platform, with 24.27 million users. WhatsApp's market presence in SA has expanded to 73%. FB Messenger is ranked as the second most popular chat application, with 13.3 million users in SA, and Snapchat is the third most popular with 12.97 million users but shows faster growth than FB Messenger. Skype is fourth on the list, with just under eight million users ('Saudi Arabia Social Media Statistics

2018—Official GMI Blog', 2018). Despite the high volume of active social media users in SA reflected by these statistics, it seems that there is a large section of the population that is still not connected to any social media platform, particularly in rural areas. However, the number of people who do not use social media is expected to decline in the coming years, especially with the rapid advancement of the internet.

1.7. The Scope of the Study

This section explains the extent of the study, including the data collection period, the number of participants in each case and the social media applications used by the participants for their online learning communities. Most of these factors will be discussed in more detail in the Methodology Chapter (Chapter 3).

1.7.1. Data collection period.

Data collection lasted for three months (12 weeks), as this is the normal length of one academic term in higher education in Saudi Arabia. At the end of each week, I extracted the WhatsApp group conversation transcripts as text files, and conducted social network analysis and content analysis of these conversations. After the participants had worked together for three months (i.e. 12 weeks after the WhatsApp groups were created), I started conducting interviews with the students/learners. Interviews were conducted at this stage to allow time beforehand for interactions to happen between members and for them to get to know each other and develop a sense of online community learning. The teacher and group leader, however, were interviewed face-to-face in the fifth week to ask them about their plans and how they were managing their groups.

1.7.2. Cases of the study.

The study is based on two cases that were purposefully chosen: the first case is a formal learning group (n=21), consisting of a teacher and 20 students enrolled in an academic model focusing on 'design and use of educational technologies', and it is a basic requirement for all graduate students in the College of Education at King Saud University. The number of group members was determined by the number of students enrolled in that module, who were taught by my colleague (Rania).

The second case was an informal learning group (n=20), consisting of a group leader and 19 learners, who took part in a WhatsApp group for learning and practising English as a second language. The size of this group was suggested by the group leader as he was the moderator of this learning group and he stated that he could best manage a WhatsApp learning group of 10 to 15 members.

1.7.3. Social media adopted in the study.

In recent times, there has been a significant increase in the number and range of tools available for creating and supporting online communities. Generally, a range of social applications such as Wikis, blogs, microblogs and instant-messaging and social-network sites have been used for various activities that an online community can engage with, such as discussions, information sharing and collaborative writing. However, this study focuses on microblogging and instant messaging (IM) as the two main tools used by the participants based on their choice and preference. The following section briefly presents some details of WhatsApp as an instant messaging tool and Twitter as the world's most common microblogging tool.

Instant messaging tool (WhatsApp) Communication in instant messages or chats generally involves exchanging short, typed texts anywhere across the globe,

synchronously or asynchronously. IM tools, such as WhatsApp, are mainly used for one-to-one interaction, but there is an increasing trend towards using them for one-to-many (Kear, 2011) or group discussions. The main feature of WhatsApp is that the user must create a list of contacts through phone numbers in order to make contact with them. WhatsApp conversations, like many other forms of IM, are text-based interactions characterised by the use of a keyboard to write the messages and a screen on which to read them, in addition to the use of online interaction via text and other signs such as emojis and pictures; however, other online communication takes place by means of IM, i.e. audio and video messages. Researchers have shown considerable interest in how students use instant messaging tools (De Bakker, Sloep, & Jochems, 2007; So, 2016) and how such tools can be integrated into their social and academic lives (Bouhnik & Deshen, 2014).

Microblogging tool (Twitter) Microblogging is a blend of blogging and social networking, where the blog is relatively short. Each user's posts are read by their followers and each user follows a set of other users or 'bloggers' to read their posts. These two sets of users are not the same; however, there may be an overlap between them. Currently, Twitter is considered to be the dominant microblogging application globally. It can be accessed through mobile devices, computers and hosted websites. This flexibility of access gives Twitter the feeling of an IM platform, with many users remaining connected a significant amount of the time. Its social networking aspects make it useful for finding new friends, sharing information and developing online communities based on similar interests (Carpenter, Cook, Morrison, & Sams, 2017). Previous studies have shown that microblogging platforms have become sites of self-directed professional learning and networking for some educators and students (Carpenter & Green, 2018).

1.8. Overview of the thesis

- Chapter One is an introduction to the research, identifying the research problem, purposes, significance.
- Chapter Two is a review of literature that focuses on learning through social media and the development of learning communities, and presents the proposed theoretical framework for studying online learning communities on social media.
- Chapter Three is an extended explanation of the research design, data collection and data analysis procedures.
- Chapter Four is a presentation of the research findings.
- Chapter Five is a discussion of the research findings in relation to the literature review and the theoretical framework underpinning the study.
- Chapter Six is the conclusion of the study, including some suggestions for researchers and practitioners and acknowledgement of the research limitations.

1.9. Summary of the Chapter

This chapter has demonstrated that there is uncertainty regarding the concept of online learning communities, and there is a lack of literature regarding the role of using multiple social networking applications to develop such communities. Therefore, the significance of the current study is based on two points: first, developing a theoretical framework to guide an investigation of online learning community creation on social media; second, examining the emergence of online communities by investigating the factors that lead to the formation of online learning communities on social media, as well as the role of social media tools in this process.

This study has been conducted in the Saudi Arabian context. Detailed information about formal learning in the Saudi higher education system and the informal

learning movement in SA, as well as an overview of the use of social media by adults in SA, has been discussed to demonstrate the context of the study. Then, the scope of the study was clarified by identifying the data collection period, the size of the sample for each case study, and the social media applications used by the participants as online learning community platforms. Finally, an overview of the chapters of the thesis was provided.

1.10. Summary of the chapter

This chapter has demonstrated that there is an uncertain view on the concept of developing online learning communities, and there is a lack of literature regarding the role of using multiple social networking applications to develop such communities. Therefore, the significance of the current study is based on two points: first, developing a theoretical framework to guide investigation of creating online learning communities on social media; second, examining the emergence of online communities through investigating the factors that lead to the formation of online learning communities on social media, as well as the role of social media tools in this process.

This study has been conducted in the Saudi Arabian context. Detailed information about formal learning in Saudi higher educational system and the informal learning movement in SA, as well as an overview of the use of social media by adults in SA, has been discussed to demonstrate the context of the study. Then, the scope of the study was clarified through identifying the data collection period, the size of the sample for each case study, and the social media applications used by the participants as online learning community platforms. Finally, an overview of the chapters of the thesis was provided.

2. Literature Review

2.1. Introduction

This chapter provides a background for studying online learning communities on social networking platforms. I have thematically reviewed a range of views and theories, within which this study is situated. This thematic review of the literature is divided into four main sections. The first concerns theories regarding social media as a place for learning: this section provides an overview of learning theories that support the use of social media as an educational environment, referring to socio-constructivist, connectivist, and knowledge-building theoretical concepts. This is followed by an extended discussion of current learning approaches that promote the use of social networking as a learning tool, including situated learning, dialogic learning, and personal learning environment. The second section addresses the educational uses of social media. It presents the current situation regarding the use of social media in formal higher education contexts and also in informal learning contexts, considering the features of applications, the design of the course, and the roles of the instructors. The third section discusses developing online learning communities on social media: it reviews the frameworks that have been used most widely in educational research for studying the development of learning communities, followed by a reflection on these frameworks. This leads to the identification of a research gap in terms of studying the concept of an online learning community from a holistic viewpoint that includes individual, interactional and group perspectives. The fourth section presents a tri-theoretical framework, which is proposed as a guide for the design of this study and to aid in the interpretation of data.

2.2. Theorising social media as a space for learning

Social constructivism and connectivism are promising initial lenses through which to conceptualise social media and learning with varying attributes of formality and informality (Greenhow & Lewin, 2016). Current approaches to learning underline creative and communicative approaches, such as social constructivism (Vygotsky, 1978), knowledge creation (Paavola & Hakkarainen, 2005), situated learning (Lave & Wenger, 1991), discourse and dialogue (Holquist, 1990, Wegerif, 2007), and personal learning environments (Johnson et al., 2006; Milligan, et al,2006). Such orientations are considered as important bases for the social nature of learning; as they may challenge individually-oriented learning, because this requires a social environment to construct or convey knowledge. These concerns could affect technology-mediated learning. Information media has been challenged and improved with “communication media”, which make connections extending from human-computer communication to social interaction or online dialogues (Enyedy & Hoadley, 2006).

The socio-cultural theory of learning stresses the fundamental role of social interaction in the development of cognition (McLeod, 2014). It assumed that the communicative environment of students, including their surroundings, for example: family and peer relationships, plays a crucial role in building understanding and knowledge. Vygotsky (1978) believed strongly that community plays a central role in the process of "making meaning", and the development of the learner's cognitive processes depends on the presence of mediators in the learner's interaction with the environment (Vygotsky, 1978). From his theories, two concepts emerged as essential agents for learning: mediation and psychological tools. The concept of mediation underlines the role played by mediators: humans and symbols placed between the learner and the material to be learned. Psychological tools refer to symbolic systems specific for a

given culture that when internalised by individual learners become their inner cognitive tools (Kozulin et al.,2003). Particularly Vygotsky (1978) considered that symbolic tools–mediators adopted by the learners in the context of particular sociocultural activities play a crucial role in building understanding and knowledge. Then students of Vygotsky researched two additional types of mediation: – mediation through another human being and mediation in a form of organised learning activity (Kozulin et al., 2003). Thus, the concepts of mediation and psychological tools have an important application in learning, serving as a theoretical source for a number of applied programs offering new techniques for the enhancement of students’ cognitive process, metacognition development, and integration of cognitive elements into instructional practice (Kozulin et al.,2003)

The socio-cultural theory of learning assumes that learning accrues through the interaction between a learner's environment and the mental processes that are enhanced by mediating objects. As a consequence, the acquisition model of learning became altered into a mediation model. “Some mediational concepts such as scaffolding (see Wood, 1999) or apprenticeship (Rogoff, 1990) appeared as a result of the adaptation of Vygotskian ideas; others such as Feuerstein’s (1990) mediated learning experience have been developed independently and only later acquired new meaning in the context of sociocultural theory” (Kozulin et al. 2003, p.17). This explanation leads us to consider the next emerging trend in theories about human learning and cognition, which emphasises knowledge creation as a new metaphor for learning (Paavola & Hakkarainen, 2005). This metaphor is an extension of Anna Sfard’s work, which differentiates between acquisition and participation metaphors of learning (Sfard, 1998). The acquisition metaphor is a traditional style of learning that might be perceived to embody a “monological” view of human understanding and cognition

based on acquisition theory of learning as per Piaget. Piaget believes individuals can acquire complex skills easily once simpler prerequisite skills have been learned. Some have noted that he ignored social and cultural factors in this theory of learning (Blake & Pope, 2008; Croker, 2003). Thus, On the other hand, the participation view seems to represent social participatory theory as per Vygotsky. social participatory theory stresses the fundamental role of social interaction in the development of cognition (McLeod, 2014). It assumed that the communication with culture, the surrounding material, and the environment of students plays a crucial role in building understanding and knowledge. However, Piaget and Vygotsky are both considered constructivists. Constructivism is a theory of learning based on the idea that cognition is developed through mental construction (Blake & Pope, 2008). This suggests that People can learn through actively construct or create their own understanding by operating and linking together their prior knowledge (DeVries, 2000). Hakkarainen's knowledge-creation metaphor (Paavola & Hakkarainen, 2005) represents a "triological" approach to learning that emphasis on the constructivism nature of learning and in the same time it combines both Piaget's and Vygotsky's views of learning: acquisition and participation. The knowledge creation metaphor was first established and developed in the context of computer-supported collaborative learning (CSCL), a model that combines both collaborative practices and individualistically oriented conceptualisations of learning through the use of technology. Consequently, it is mostly acknowledged in CSCL literature (Cress, Stahl, Ludvigsen & Law, 2015; Kardan & Sadeghi, 2014).

Drawing on the work of Vygotsky's socio-cultural theory of learning and Hakkarainen's knowledge-creation metaphor (Paavola & Hakkarainen, 2005), which

recommends engaging learners in social practice, using tools as “mediating artefacts” is a way to prospectively build knowledge. These theories have found more acceptance with the introduction of social media in classrooms and of online learning groups (Churcher, Downs & Tewksbury, 2014). Several learning theories have emerged as forms of knowledge-creation approach to learning, such as situated learning, dialogic learning and personal learning environment. The following sections discuss them in relation to the use of social media in learning and teaching practices.

2.3. Learning approaches supported by social media

2.3.1. Situated learning.

The social nature of learning is perhaps best explained by “situated learning” theory (Lave & Wenger, 1991), which describes learning as a social process situated in a specific context and embedded within a particular environment. Lave and Wenger (1991) claim that “engagement in social practice is the fundamental principle by which we learn and so become who we are” (Wenger, 1998, p.45). To understand this approach more clearly, they situate learning within a broader conceptual term – the “community of practice” (CoP) – which “provides a suitable context for learning to take place” (p.46). The concept of CoP comes from an apprenticeship as a learning model. According to Wenger (1998), studies of apprenticeship reveal a more complex set of social interactions through which learning takes place, mostly with learners and more advanced apprentices. However, learning in a CoP is not limited to novices. The practice of a community is dynamic and involves learning on the part of every member of the community.

As suggested by Wenger (1998) in his discussion of situated learning as learning in a CoP, three elements constitute a community of practice: shared domain,

shared engagement, and shared practice. By developing these three elements in parallel, such a community can be cultivated. A “shared domain” refers to the common interests and collective goals shared by a community or a group of people. Membership, therefore, implies a pledge to the domain, and consequently a shared proficiency that distinguishes the group’s members from other people. Shared engagement is the second fundamental characteristic of a community of practice, referring to the members building relationships that enable them to learn from each other. Enrolling in the same institute or having the same job does not create a CoP unless members interact, exchange and learn together; however, mutual support and interpersonal allegiance cannot always be expected. Disagreement, challenge and negotiation can often be typical forms of engagement within a community of practice. Wenger (1998) suggests that “as a form of participation, rebellion often reveals a greater commitment than does passive conformity” (p.77). The third element of a CoP is “shared practice”, in which members develop a shared repertoire of resources. Such resources could include experiences, narratives, tools, and points of reference for addressing recurring problems. This takes time and sustained interaction, and as a result of the continued preservation and development of a shared repertoire, Wenger (1998) suggests that the members are given a sense of identity, shared membership, and belonging within a community.

Mayes and de Freitas (2007) present situated learning as a fundamental standpoint to advance our understanding of learning in social networking environments, hence suggest that social interactions and learning in situ are key components of situated learning. Using social networking tools enables learners to interact and articulate their shared repertoire (Firpo & Ractham, 2011; Mills, 2011). Li and Bernoff (2008) classify the trend in which people apply different kinds of social media

applications to acquire information imports from one another, rather than from a recognised entity (such as a company or classroom), as a phenomenon called “The Groundswell”. This phenomenon displays two important powers of social networking tools: as platforms for content creation and sharing, and for interacting with people with similar interests. Facebook is a good example of this phenomenon: in the light of situated learning theory, Mills (2011) presents how a Facebook project implemented in an intermediate-level French course allowed the participating students to gain information about French cultural products and make connections to course content. The participants in the project consisted of 17 college students enrolled in a third-semester French course. Inductive coding techniques were adopted to explore the discovery of patterns and themes within the participants’ online Facebook interactions and postings. The students were asked to develop Facebook profiles and interact three times weekly within the Facebook community. They were also asked to complete a post-project survey at the end of the semester, which was used as a source of triangulation with the online Facebook interactions and postings. The three elements that frame a CoP within situated learning theory were examined within this Facebook learning community: joint enterprise, mutual engagement, and a shared repertoire. For this particular French learning community, the joint enterprise was participation, engagement, and mutual accountability in a global simulation context focused on Parisian life. Mills (2011) perceived this self-directed learning project as a complement to the classroom environment that established an interactive community where various resources and choices were readily available for the students. He also found that learners’ mutual engagement, such as problem-solving, requests for information and assistance, and collaboration, allowed the learners to foster relationships with

fellow community members and highlight their characters' identities. Shared resources were the third element of developing this learning community, as he stated that membership within the Parisian or French community was emphasised through the exchange of sharing cultural products and artefacts such as photos, music videos, newspaper articles, television shows, and paintings.

2.3.2. Dialogic learning.

Dialogic learning in its most basic explanation is learning that takes place through dialogue, it stimulates a learner to practice beyond the level of “knowledge telling” (Flecha, 2000). The questions that the other participants ask to stimulate further thinking and add other perspectives to the debate. Dialogue within a community stimulates further thinking as Fosnot and Perry (1996) suggested that classroom need to be perceived as “a community of discourse engaged in an activity, reflection, and conversation” (p.28). Dialogic learning is applied with powerful tools in e-learning and blended learning systems: it harnesses communications technology to facilitate more debate both outside and inside the classroom, this kind of debate gives instructors the ability to assess learner knowledge. It also encourages learners to engage in deep thinking, thoughtful exploration, and questioning of their insights, instead of just accepting the ideas that are offered to them. Thus, in-depth questioning and discussions stimulate collaborative thinking and generate ideas (Golding, 2011; Pogrow, 1990).

Many learning theories and classical scholars have focused on the importance of interaction and questioning as a means of learning and promoting thinking, including Bakhtin, Buber and Vygotsky. Vygotsky (1978, p.72) argues “that language is the main tool that promotes thinking, develops reasoning, and supports cultural activities

like reading and writing”. Thus, students’ learning needs can be met through promoting discussion, which plays a significant role in the development of understanding and knowledge construction. “Knowledge construction occurs within a social context that includes learner-learner interaction and expert-learner collaboration on real-world problems or tasks that build on each person's language, skills, and experience shaped by each individual's culture” (Vygotsky, 1978, p.102). From the perspective of developing learning and teaching strategies in online learning environments, Wegerif (2013) claims that dialogic learning is the logical practice for learning in the internet age. He argues that the internet is a disruptive technology for formal education, and that it cannot simply be incorporated into existing classical education systems without changing them. He justifies this based on the differing logic of the internet and the education system; as we know, most classical education systems are built based on the logic of print, while the internet has a different inner logic that is “intrinsically participatory”. He goes on to state that, “Like print, the Internet can be used in many ways but unlike print, it affords dialogic. Dialogic, as opposed to monologic, assumes that there is always more than one voice” (Wegerif, 2013, p.3). Online dialogic learning can occur via social networking environments, especially when the teacher raises questions related to the learning content, whereby students then have to collect certain resources or evidence in order to support their answers (DiGiuseppe, Childs, Blayone & Barber, 2017). Students may then generate other questions regarding the answers of their peers, which creates collaborative, argumentative and reflective dialogues between learners (Mills, 2011; Williams, 2014). Siemens (2005) argues very powerfully for this dialogic approach to networked learning through identifying a number of principles of the connectivism learning theory: he states that learning and knowledge rest in diversity of opinions, and also argues that learning is a process of

connecting specialised nodes or information sources. Thus, the primary means of learning is taking on board the perception of another person during a discourse, where the dialogue is an end in itself as possibly the most important goal of education (Wegerif, 2007). Wegerif strongly argues for this view, and to “expand the spaces of learning” through new online technologies. He highlights that it is not just the demonstration of clear thought, but the ability to change one’s mind and see things from a new standpoint, that are important to learning. To better understand online dialogic learning, Ravenscroft (2011) determines three related elements that should be considered when an educator wishes to use an effective online dialogue: tools, dialogue forms and learning theory. The “genre” of desirable dialogue processes, and approaches to learning such as problem-solving, collaborative learning or knowledge-building conditions, enables the teacher to select or combine tools that will optimally mediate practices to address student learning and educational requirements, within given contexts.

The point of applying social media as a tool of dialogic learning inside or outside classrooms is the complex implications of social media and its influence upon dialogue and student interactions (Prestridge, 2014; Skowron, Rank, Świdarska, Küster & Kappas, 2014), as social media involves collaborative and open environments that can enable open dialogue and collaborative reflections (Friesen & Lowe, 2012). Four features make social media dialogue different from face-to-face interactions: persistence, where the content posted online is immediately recorded and conveyed; search-ability, whereby users can easily search for and find specific conversation topics in online dialogue; replicability, which refers to online terminologies that can be replicated as a full text or as part of a full text, and scalability, whereby online

discourses are made visible to the public (Boyd, 2010; Fang et al., 2014). Other convincing results were revealed by Maloney, Moss and Ilic (2014), who emphasise that the educational utilisation of social media might improve interaction through discussion and open dialogue, and through increasing the accessibility of resources. They mention four key themes that emerge when social media is used as an educational communication tool: “ Peer collaboration, need for separation between personal and professional realms, complementary learning and enhanced communication” (Maloney, Moss & Ilic, 2014, p.692). Furthermore, students hope to engage in educational conversation via social media. This implies that students can better understand an idea if it is explained by different voices of clarification, as confirmed by a number of studies (Chi, Kang & Yaghmourian, 2017). Current learning theories and learning approaches, such as connectivism, networked learning and mobile learning, do not replace formal education systems, but rather offer a way to extend and support learning outside schools through applying conversational learning opportunities. This form of learning is based on using network technology to create continuous and interactive means of communication between students and teachers, as well as among students.

2.3.3. Personal learning environment (PLE).

PLE is a learner-centric and networked learning model, which aims to foster self-regulated, peer-based, and lifelong learning (Leone, 2013; Tsang & Tsui, 2017). One of the key aspects of applying PLE is the use of network technology, particularly Web 2.0 tools, which allow learners to develop their personal learning networks. According to Harmelen (2006), PLE is a model of an e-learning system premised on integrating social networking tools into the learning process. Martindale and Dowdy

(2010) indicate that PLEs are an outcome of the interactions that social media has provided for learners, enabling them to create, organise and share learning content. PLEs are built on externally hosted “in-the-cloud” social networking tools and services designed to help students aggregate and share learning resources, participate in online learning activities, and manage their own learning (Martindale & Dowdy, 2010).

Accordingly, the only thing most models of PLE seemed to agree on is that it is not a particular site or software that contains all the applications and provides access to learners, but it is a more general approach to using technologies for personal learning. Thus, PLEs might be developed through the aggregation of different services, such as chat and messaging tools (e.g. WhatsApp), groupware and community tools (e.g. Elgg), calendar and time management tools (e.g. iCal), news aggregation tools (e.g. Shrook), weblogging and personal publishing tools (e.g. WordPress, Blogger), social software (e.g. Facebook, Twitter), authoring and collaboration tools (e.g. WriteBoard, OpenOffice), and integration tools (e.g. Netvibes) (Wilson, 2008).

To provide guidance on developing PLEs, Torres, Edirisingha and Mobbs (2008) suggest a conceptual framework that can be used by learners to help them build their PLEs, incorporating social networking tools and services chosen by students for collecting and processing information, connecting people and creating knowledge. According to Milligan et al (2006), the first step of building a PLE is to choose an application as a “hub”, or the central component for the PLE. This makes it easier for students to access their collection of tools and services, and also eases the management of different logins to the tools, such as chat tools, gallery, bookmarks and so on. In this regard, Torres et al. (2008) identify four different approaches to building a PLE with Web 2.0 tools according to the choice of hub: wiki-based PLE

(e.g. Google sites); social network-based PLE (e.g. Facebook); social aggregator-based PLE (e.g. Netvibes), and browser-based PLE (e.g. Flock).

It has already been proposed that social networking applications, such as Facebook and LinkedIn, could be used as the hub for a PLE, to which a number of applications can be connected. The diversity and renewal in the learning resources offered by such social networking applications can lead to the creation of an effective PLE that functions as a virtual learning environment (VLE) (Severance et al., 2008; Martindale & Dowdy, 2010). Torres et al. (2008) promote adopting social networking tools to develop PLEs in two different styles: Social network-based and social aggregator-based PLE. In the first approach, a social networking application such as Facebook, Twitter or LinkedIn could be used as a hub for a PLE. These applications provide affordances that can be connected to other Web 2.0 tools to access, for example, Twitter, YouTube, Wikis, SlideShare, and email. Thus, the outcome of the interactions on these tools enabled the learner to create, organise and share learning content and therefore the learner can develop a personal space for self-regulated learning (Martindale & Dowdy, 2010).

In social aggregator-based PLEs, however, social networking applications can be aggregated in one site and these applications are used as tools, not as a hub. EyeOS, SuprGlu and Netvibes are examples of aggregator sites that allow students to collect a variety of social networking tools and access them through one-stop access. Social aggregator sites have a wider range of tools than Google sites. In this kind of PLE, students are required to create an account and set up a starting “home” page as a hub for their PLE, adding the needed widgets to create connectivity with their selected social networking tools.

A PLE is therefore entirely constructed and controlled by the student, and is changed according to the student's needs and current learning interest (Väljataga & Fiedler, 2011). Väljataga, Pata and Tammets (2011) conducted an experimental study to examine college students' perceptions of the pedagogical affordances of social media in supporting the development of PLEs. They focused on evaluating a course design that was heavily supported by social media tools selected by participants. Tools and services included a course blog, social bookmarking tool, slide repository, wiki, synchronous communication tools, and an aggregator. The study involved 24 master's degree students and two facilitators. The course lasted for eight weeks and included three face-to-face meetings. It was started with a course blog to organise learning materials and assignments, which was maintained by the two facilitators. Students were encouraged to use their existing tools and mark course-specific postings with appropriate tags in the course blog. The study revealed that the students' perceptions of the affordances of PLEs dynamically changed as they navigated the course landscape of social media tools to construct and perform learning activities. It was also found that students altered or extended their PLEs by replacing the tools of a given environment or by complementing them with additional ones. This led the researchers to recommend that students should be encouraged to develop skills and confidence in the selection, application, and use of social media tools for personalised learning, and also that new pedagogical models and approaches are needed to develop students' abilities to organise and customise their own PLEs and advance their self-direction in online learning.

Another study conducted by Luo, Sickel and Cheng (2017) on the use of Twitter as a personal learning network to promote community building and collaborative learning. The study focused on 46 undergraduate students enrolled in two sections of

a course on educational technology. Each section was considered as a case in this study. The course is designed to offer students with a variety of free, web-based technologies and develop approaches for instructional integration within their content area online in a closed wiki. The course was delivered online through wikis and Twitter live chats also the participants met face-to-face three times throughout a semester (15 weeks). The study has detailed students' positive learning experience implemented in multiple iterations of a university course for undergraduate pre-service teachers and identified key factors that impact students' perceptions of usefulness and intent to persist with future Twitter live chat participation. Also it highlighted that Twitter live-chats afford the participants a place for engagement with education professionals around the world. Thus, the study concluded that the most advantage of introducing pre-service teachers to Twitter live chats is to help them develop a personal learning network (PLN), in which they are connecting with a wide range of professionals in their field. From another point of view, Leone (2013) characterised of a personal learning environment as a lifelong learning tool, through his design-based research, the SSW4LL system has been built on Moodle 2.0 integrated with adaptation (conditional activities) and Semantic MediaWiki, Diigo and Google+ as Social networking tools. The SSW4LL system has been implemented and evaluated with respect to its efficiency in supporting adult lifelong learners and making the characterisation of their PLEs easier for them. the results obtained from using SSW4LL system as a personal learning environment come to support the effectiveness of the integration of social software into formal learning environments that can make a qualitative difference to giving adult lifelong learners a sense of ownership and regulation over their own learning and profession planning, and can support them to be more self-directed learners.

Tsang and Tsui (2017) produced a Conceptual design and a learning model developed in support of peer-based social and lifelong learning in higher education. Also they conducted an empirical study of a personal learning environment and network (PLE&N) adopted in 12 subjects taught by teachers in a university in Hong Kong. Over the course of 20 months, a total of 632 students and a teacher participated in their study. Then they evaluated their design of personal learning environment, the evaluation of personal learning environment and network design was based on eLearning assessment criteria in previous studies done by Chang (2001) and Shee and Wang (2008). The evaluation of (PLE&N) is presented as descriptive data analysis results including five main themes: the usage of tools, user-friendliness, content relevancy and usefulness, and overall opinions/remarks about the system. The study revealed that PLE&N promotes learning behaviours like initiative, independence, liveliness, inquisitive mind, self-regulated study and learning anywhere at any time. It seems that all these learning skills are typically expected main requirements in lifelong learning. As a result, students have developed a skill set for learning with peers of different ages or profiles, which is even applicable in life after leaving their educational institutions, as Tsang et al (2017) found that the learning received and practices of peer-based social learning on a PLE&N platform by students are lifelong learning activity in its nature, in which they can use a re-use beneficially not only in their university but also in other circumstances after graduation. Also they highlighted that the personal learning platform they have constructed during the course can be extended with ease in the virtual world as regularly as and as rich in contents as the students' desire (Tsang et al, 2017).

According to these results, developing a PLE is based on a student's ability to select appropriate social technology to enhance their networked learning, which is in

agreement with connectivism learning theory that confirmed that the ability to activate known knowledge at the point of a request is the most important aspect of the learning process. Siemens states that for the current generation: “When knowledge, however, is needed, but not known, the ability to plug into sources to meet the requirements becomes a vital skill” (Siemens, 2005, p.6). As knowledge continues to grow and develop, and the development of technology enables students to create and organise their learning resources, they are able to access needed knowledge, which is more important than their possessed knowledge.

2.4. Educational uses of social media

As higher proportions of university students became interested in using social media as personal learning tools, an increasing number of publications have begun to explore the implementation of these applications inside and outside schools, and the motivators for this. This section presents recent empirical studies that discuss the academic uses of social media, in order to demonstrate the main topics related to the use of social media in formal and informal educational contexts.

When considering empirical studies for inclusion in this literature review, the following criteria were observed: 1) the studies must have been conducted after 2005, as work started on this chapter in 2015; 2) they must involve one or more of the following populations – university students, informal learners, online learning groups, communities of inquiry, or communities of practice; and 3) they must take the form of doctoral theses or articles published in peer-reviewed journals.

2.4.1. Formal learning context

The reviewed literature on using social media as educational tools in higher education show that universities tend to adopt social media tools to plan academic

and social events, to keep graduates connected with their universities, or even to make social links with others at academic institutions, which enhances students' socialisation. Several studies that have investigated social media usage in higher education systems have also found that it improves certain aspects of formal learning and teaching. For example, a study conducted by Magogwe, Ntereke and Phetlhe (2015) provides an understanding of how Facebook could be integrated into teaching, and how it could be used to facilitate discussion and interaction amongst students. They used socio-constructivist (Vygotsky, 1978) and engagement theories (Kearsley & Shneiderman, 1998) for their theoretical framework, as both of these emphasise social learning and collaboration amongst learners. The researchers tried to explore the extent of Facebook's pedagogical potential for facilitating collaborative learning and group discussion in an advanced oral communication skills course. Regarding the use of Facebook as a collaborative educational tool, the results were positive, as Facebook facilitated student discussion and enabled teachers to observe the learners' levels of participation during the collaborative work. However, the findings of this study concur with the previous other studies such as (Carpenter et al., 2017; Manca & Ranieri, 2017); as they reveal certain challenges that should not be overlooked when a decision is made to integrate social networking applications into learning and teaching practices. These challenges include: technical problems such as the requirement to have an internet connection; privacy and security issues, institutional issues such as pedagogical assessments, discouraging faculty staff from embracing social platforms and adopting more participatory approaches.

Other scholars see social media and its affordances as powerful elements that could change the conceptualisation of scholarship in terms of social interactions and

sharing of the recourse. Greenhow and Gleason (2014) suggest a critical examination of the practice and policy consequences of reviewing scholarship in light of social media's affordance of a conceptualisation of social scholarship. They use Boyer's (1990) framework of four dimensions as a starting point for reviewing contemporary educational practices. This framework has been used to develop knowledge, and it addresses societal needs, the scholarship of discovery, integration, teaching, and application as a starting point for reviewing contemporary educational practices. Greenhow and Gleason's study presents a conceptualisation that focuses on the socio-technical features of social media that enhance certain forms of social interaction and constrain others, rather than on the kinds of technologies that are considered as individual educational tools, such as educational programmes and online academic systems. The study looks across the four dimensions of scholarship in order to determine the relationships between them. They argue that conducting scholarship in the era of social media permits an interdependence between professors' work and the culture of traditions, as predicted by Boyer a few decades ago. Although the basic research process, including the factor of discovery via traditional methods, still dominates scholars' lives at most universities, there is some suggestion that the academic world, and society in general, is becoming more willing to share information, with a "democratization of expertise, and alternative models of peer review and reputation management" (Greenhow & Gleason, 2014, p.400). Examples of this notion can be seen on a daily basis. Scientists reporting real-time perceptions of any social, medical or even natural phenomenon, such as an earthquake, are working alongside public Twitter feeds from the general public, who are in the field, experiencing the event. The same issue has been explored by Park, Cha, Lim and Jung (2014) to understand the relation between social media use, social acceptance, and attitudes towards the

educational environment. Moreover, their study focuses on how social media affects student learning: as with other previous studies, the social learning theory is used as the baseline theory for understanding social media educational use. They found that social media participation has significant effects on both social acceptance and attitude. This has led researchers to claim that educational social participation has an indirect influence on student learning outcomes, via social acceptance and attitudes towards their educational environment. Finally, the study recommends that university teachers should prepare effective instructional strategies in order to increase social media activities and that universities should construct new learning management systems for student data related to the social learning context.

In summary, reviewing the use of social media tools in formal educational contexts provides a perspective on the multiple communication and distribution channels offered by social media in a formal learning environment, which can lead to increased opportunities for peer and teacher interaction, facilitating more effective dialogue and sharing of learning and teaching ideas. It has been suggested that social media can extend the opportunities of the educational process to outside the classroom. Several studies have also reported positive affordances for teaching and learning (Ellison, Steinfield & Lampe, 2007; Evans, 2014; Fang, Mishna, Zhang, Van Wert & Bogo, 2014; Prestridge 2014), underlining that an increased use of social media in higher education would lead to reconnecting academic institutions with the new generations of students (Karvounidis, Chimos, Bersimis & Douligeris, 2014). The highlighted theme provided by the literature in this regard is the crucial role of the teacher to enhance online interaction among students, and the main recommendation is the need for effective preparation of online learning activities.

2.4.2. Informal learning context

Informal learning can happen in two distinct forms: 1) non-school public settings (i.e., school trips), and 2) learning that occurs as daily activities (i.e., reading, chatting, Google searches) (Conlon, 2004). Using social media applications as online forums to make contact with different people occupies an interesting middle ground in relation to these forms. While forums are typically used by learners to seek information or assistance with problems that arise in daily life, the forum itself represents a public setting that is organised to support learning. Learning in this form is not a result of instruction, but an extension of active involvement in authentic activities (Machles, 2003). This involvement allows learners to make sense of their surroundings and construct knowledge that can be transferred to other situations. It is estimated that this type of informal learning accounts for approximately 90% of learning that occurs over a person's lifetime (Conlon, 2004; Williams, 2014). Informal learning activities on social networking occurred when the user to set goals, select acceptable levels of participation and create a PLE that meets their immediate or long-term needs (Conlon, 2004). A number of studies have therefore focused on the informal learning taking place within social media applications, focusing on how these applications can be used to facilitate such informal learning and to develop PLEs and online learning communities.

One example of building a community of practice as an informal learning case is the "icollab" project developed by Cochranea et al. (2013) to explore the distributed cooperation of a group of teachers interested in the potential of mobile social media for transforming pedagogy. The community started by designing an online platform and inviting teachers from four countries (UK, New Zealand, Spain, Germany) who had an interest in collaborating. The main goal of this community was to develop

teaching practices through discussion and exchanging their unique experiences in educational transformation. These discussions included the key topics of using a mobile social learning approach, such as: international collaboration; mobile student-generated media; serendipitous learning, and designing mobile learning courses. Each of the teachers chose one of their student classes to join in implementing the icollab project, and this project continued for three years. The study identified a four-stage framework for the development of the icollab CoP. Stage 1: Establishing a core CoP through creating collaboration channels using mobile social-media tools, such as Google Plus and Twitter, and identifying the group goal. Stage 2: Brokering participation, which involves the exchange of practices and experiences within the CoP, “and an individual acting as a broker should be a member of both the CoPs between which they are brokering” (Cochrane et al., 2013, p.4). Stage 3: Nurturing participation, which reflects the real and explicit inclusive participation of the teacher and their representative students and creates a global team of students to develop and share their projects. Stage 4: Brokering practice, which indicates the practice of using social media tools for collaborative reflection as well as the process of assessing pedagogical change and its influence on students’ learning communities over time.

Another informal learning community was studied by Williams (2014) to explore the dynamics of teaching and learning in the context of an informal online discussion forum. The researcher used selected dimensions of the Community of Inquiry (CoI) model to analyse the conversations in a forum for beginner users of the software tool Adobe Photoshop. The overall Photoshop community, also known as the “Photoshop General Discussion”, encompasses eight sub-communities, one of which was the Photoshop for Beginners Forum (PfBF). The analysis of the data shows that the PfBF is composed of a group of users who assume roles as teachers

and learners in order to foster the distribution of and/or create additional knowledge in regard to the use of Adobe Photoshop. The study collected four days of discussion post data, comprising 62 discussion threads, for a total of 202 discussion posts. The research divided these discussion threads into posts created by members who were considered to be acting as teachers, and posts written by members acting as learners. The study utilised the Col elements of Teaching Presence and Social Presence along, with the Learning Presence scheme constructed by the researcher. There were three main findings. Firstly, the participants did indeed exhibit behaviours of Teaching Presence as described by Garrison and Archer's (2000) Teaching Presence indicators. Secondly, Direct Instruction was the most prevalent category of behaviours revealed, over and above Facilitating Discussion and Design and Organisation. Thirdly, Teaching Presence and Social Presence are intricately intertwined. The researcher comments on this finding, stating that PfBF seems to be an "interactive knowledge management system in which the teaching and learning transaction that occurs between members provides "just-in-time" solutions to learners' questions and problems" (p.169). However, the study revealed a number of issues in regard to using the Col as an analysis tool for PfBF as an informal learning community. These issues include overlapping indicators found within the Teaching and Social Presence coding scheme, the need to add learning presence to analyse learner posts, unclear indicator definitions in Social Presence and Teaching Presence, and the need to add or remove indicators that did not apply to the informal learning environment.

Overall, the reviewed literature on using social network applications in informal learning contexts focuses heavily on building online communities bound together with common interests or activities (Attwell, 2007; Mills, 2011; Williams, 2014), as social networking provides learners with features that help to amplify similar interests

among people. Some studies, such as Sun and Gao (2017) and Williams (2014), also highlight the use of forum discussion, provided as a Web 2.0 tool or encompassed in social networking applications, such as Facebook and Twitter, which is used for informal learning conversations to meet users' learning needs and to build informal learning networks, study groups, or CoPs. However, some literature reports negative aspects of building an informal learning community on social networking, such as: fragmentation of community voice resulting from having no centralised source of knowledge; lack of institutional control, and the difficulty of addressing teaching and cognitive presence (Carpenter et al., 2017; Bowers, 2018). It seems that the CoP framework is more suitable and relevant to explain informal learning practices developed on social media platforms. This is because CoP emphasises a shared domain that refers to the common interests and collective goals that a community or a group of people possess, as well as the shared resources that are produced from continuous interaction among community members.

2.5. Developing online learning communities in social networking

Developing online learning communities can be seen as the practice of expanding knowledge by making connections with individuals of similar interests (Gunawardena et al., 2009, p.4). The concept of establishing online learning communities on social networking platforms is commonly linked to and supported by applications that are designed for social interaction and information exchange (e.g. Wikis, Twitter, Facebook, and YouTube). Such applications offer social tools, including membership features, personal expression and connection (Leonardi & Vaast, 2017). This section considers how social media could be an ideal environment to stimulate and develop online learning communities and promote learning as a group.

The literature on online learning highlights many approaches to help distance students build a sense of community. Much of the research on the online learning community relates the role of teacher to developing and sustaining it (Shea, Swan & Pickett, 2005) and on analysing interactions (De Laat, Lally, Lipponen & Simons, 2007) or applied learning activities (Harrison, Lawson & Wortley, 2005). The focus here is on the role of social media tools or Web 2.0 technologies in building and developing online learning communities. The affordances of social media enable students to establish open communication and emotional expression, which are the main elements defined by Garrison et al. (2000) as contributing to the increase of social presence among students. This is achieved through using a variety of communication forms, such as marking others' posts as "favourite" or adding a "like" mark to others' comments. Razak and Saeed (2015) explored different perspectives of students regarding using different tools of social media to develop student communities (i.e., Twitter, Google Docs, Skype, blogs and Wikis). Their study found that Twitter, blogs and wikis are perceived as powerful tools to develop a sense of community among students, because they enable them to share their ideas and receive feedback from other students. Skype was not seen as appropriate to develop a sense of community because many students did not need to use it. They shared their files through Google Docs and conversed with each other via the Twitter comments feature.

In another investigation, conducted by Dougherty and Andercheck (2014), to explore the capacity of Facebook to build a sense of community in an introductory course, the students volunteered to join a Facebook group to discuss and share topics related to the course. Although there were some students who did not post any comments or answer any questions in the online forum, many of them indicated that

they felt more confident in identifying some related terms. Also, it was revealed that the Facebook group was a beneficial curricular tool when it came to writing assignments because students brainstormed with each other to choose the topics of their assignments and they received comments and reflections from other participants. This finding agrees with Hanewald (2013), who focused on two cases of CoP from an Australian university, using the online social networking platforms Ning and Edmodo. The first case failed because of technical, social and administrative limitations, including a lack of skills in using the applications and absence of face-to-face interactions to support online discussions and team goals. However, the other case was highly successful because the students were able to build personal relationships through face-to-face interaction at the beginning of the project and then transferred these interactions to the online platforms, which enabled them to share pre-existing and newly generated knowledge. From another point of view, Radda (2012) suggests that the most important elements to initiate successful learning communities are: (1) provide opportunities to develop effective online interaction through enhancing the dialogue that stems from informal discussions outside the classrooms, and (2) formulate students' roles in larger academic community structures through presenting their projects or publishing research. Lewis, McVay-Dyche, Chen and Seto (2015) examined the sense of community by adopting Rovai's (2002) "Classroom Community Survey" and online interviews to explore students' understanding of their sense of community. This survey is a bi-factor structure that intends to measure two sub-factors: student connectedness and student perception of learning. These sub-factors contribute to measuring the primary factor – classroom community. In the researchers' view, the sense of community came from student perspectives only, which differs from other studies that have focused on both teachers and students as dominant

members in online learning groups (Lewis et al., 2015). Lewis et al.'s study investigated the influence of several demographic factors, such as gender, age, the area of practice, native language and course type, on the sense of community. It did not find any factors that might negatively affect building a sense of community in an online environment, but the interviews revealed that the students saw teacher presence as a very important element of developing their interactions and learning.

From another perspective, De Laat (2006) suggests that a learning community is developed in several phases and some students need more time to become familiar with their online groups. In studying the patterns of interaction between online learning group members over three phases of a learning task (beginning, middle and end phases), he found that group density was relatively stable, only decreasing slightly at the end of their collaborative activity. He interprets this as a positive finding for group cohesion because it indicates that the levels of connectivity and engagement in this community were equally distributed, though the in- and out-degree measures showed that some students were more dominant than others. A significant finding from De Laat's study is that both teachers and students develop strategies to sustain the interaction and to learn together as a community.

It seems that the success of online communities rests on how socially connected learners are and how they perceive the value of such social bonds in their online group. The literature also shows that learning communities can be developed through several phases and that there are dominant factors affecting the community. The next section discusses the frameworks that have been used extensively in the literature as analytical models to study and explore the development of online communities. This will give the reader an overview of the main aspects of developing learning communities on social networking applications. I will then present my own

theoretical framework based on my understanding of the concept of learning communities in formal and informal learning contexts.

2.5.1. Studying online communities on social media

Today, the educational ideal is a community of learners who are entirely involved in collaborative critical enquiry for constructing and confirming knowledge (Garrison & Kanuka, 2008). Many researchers have studied different factors affecting the structure of online learning communities, such as instructor immediacy (Shea, Fredericksen, Pickett & Pelz, 2005), student engagement (Zhao & Kuh, 2004), course duration (Akyol, Vaughan & Garrison, 2011), teaching presence (Anderson, Rourke, Garrison & Archer, 2001; Moore, 2014), collaborative activities (De Laat & Lally, 2003), and social and cognitive aspects (Garrison, Anderson, and Archer, 2001; Henri, 1992). In this section, frameworks that have been used to describe and make sense of creating online learning communities are presented, followed by reflection on these frameworks to show to what extent they can be applied in the current study.

The community of inquiry (Col). The analytical model developed by Henri (1992) focuses on five dimensions of the learning process – participation, interaction, social, cognitive and metacognition. The study of these dimensions can provide educators with a deeper understanding of the interaction of distance students and how these interactions can be improved through analysing the content of messages in distance learning contexts. This model inspired Garrison, Anderson and Archer (2000) to develop an inclusive framework of Col as an online learning research tool.

Col is a widely applied framework that theorises three main elements as influencing the connectedness of online learning communities: social, teaching and cognitive presence. The model also provides classifications and indicators to explain each of these three presences and to inform the coding of the interaction content. The authors identify social presence as the ability to present oneself and create personal and purposeful relationships based on three crucial elements: affective expression, open communication and group cohesion. Affective communication appears in the form of the presentation of emotions, feelings, humour and self-disclosure. Open communication is about encouraging participation and interaction in a trusting and secure environment. Group cohesion can be observed through cohesive responses such as addressing participants by their name, acknowledging them, and using inclusive pronouns such as “we” and “our” (Garrison & Anderson, 2003). A sense of community is grounded upon common determinations and inquiry that lead the members to work collaboratively and benefit from each other’s perspectives, which reflects the meaning of social presence in this type of learning activity. The main point here is that, when the social presence and cognitive presence are integrated in online interactions, students will recognise that they are not there for purely social purposes. This leads to a focus on the next element, which is the cognitive presence (CP). Garrison & Anderson (2003) operationally identified CP through the Practical Inquiry Model, which involves four stages: triggering event, exploration, integration and resolution. The triggering event is the introduction of the enquiry through a problem or dilemma. The exploration stage involves understanding the nature of a problem and determining relevant evidence and potential descriptions. In the integration stage, the participants construct meanings. The final stage is the resolution of a problem by creating a meaningful framework or exploring particular solutions. In online learning

communities, a sense of puzzlement, information exchange, connecting ideas and applying new concepts can be indicators of CP. It can be seen that CP is related to socio-constructivism, where students explore, construct, resolve and confirm their understanding through collaborative and reflective activities. However, the progression of students' cognition requires a guidance, which leads Garrison et al (2000) to consider teaching presence as another significant element in the online learning community.

According to Garrison & Archer (2003), teacher presence can be a significant determinant of student motivation and a sense of community and cohesion. Garrison et al. (1999) identify three main categories in teaching presence: design, facilitation and direct instruction. In the design phase, teachers create the structure of online interaction. They then have to manage and guide this interaction through facilitating and shaping the structure of communication. The third category is direct instruction, which is related to more particular content, such as identifying misunderstandings, presenting knowledge from different sources, or summarising conversations (Garrison & Archer, 2003). This framework provides a comprehensive tool for understanding and analysing online interaction; it suggests that teaching presence is a dominant factor that influences interaction through integrating it with cognitive and social presence.

Frameworks of networked learning. Conole, Galley and Culver (2011) use four frameworks of networked learning as indicators of students' interaction, networking and community development in a social networking site: Community of Inquiry (CoI), Community of Practice (CoP), Activity Theory (AT) and Actor-Network Theory (ANT). The CoI model, developed by Garrison, Anderson and Archer (2000), has

been widely used to generate code and to analyse online conversations. This framework focuses on the community of the learning groups, including teachers and students. As outlined above, it is mainly based on three persistent fundamentals: cognitive presence, teaching presence and social presence.

CoP differs from Col in that it focuses on the formation and development of communities rather than describing and examining existing communities that have formed based on different types of presence. In addition, unlike Col, CoP does not provide indications that can be used as a coding scheme, but can produce valuable lenses through which to understand and describe online interactions observed in networking environments. Similar to the two previous frameworks, activity theory provides a descriptive background for understanding online interactions. Conole et al. (2011, p.123) illustrate activity theory as a triangular diagram, showing a subject-object nexus of Mediating Artefacts (MAs) intended to achieve an outcome, involving rules and regulations, divisions of labour, and community. Both the broader contextualisation that activity theory enables and the foregrounding of MAs are useful in terms of understanding interactions in online environments. The MAs help to identify and develop the role of the networking tools in the practice. The fourth framework that contributes to explaining online interaction is ANT, which focuses on nodes and connections between actors who carry out work within a particular networked context. This framework emphasises developing a dynamic actors' network, with actors including both human and nonhuman objects. The presence of nonhuman actors in this framework is one of the most important features that enable the use of ANT in networked learning settings, as it allows researchers to focus on "technological mediating artefacts" and to understand their interactions with other actors within networked learning environments.

The Fully Online Learning Community Model (FOLC). This model originated as a modification of the Col model (Garrison, Anderson, & Archer, 2000) by Oostveen, DiGiuseppe, Barber, Blayone & Childs (2016). Like Col, FOLC is based on the constructivist approach that emphasises that knowledge is something that is created, rather than discovered (Johnson, 2002). It also involves the idea that communities are dynamic and “co-creation”. FOLC does, however, deviate on several points. Firstly, although Col theorises Social Presence (SP), Cognitive Presence (CP), and Teaching Presence (TP) as three main elements of a Col, FOLC incorporates SP and CP only, subsuming TP fully within the two other presences. This change is embedded in a democratised approach to learning, which places greater emphasis on the community and the development of learner empowerment and social interactions. Secondly, FOLC introduces the “digital space” as a dynamic, negotiated, contextual space constructed by the community members with the potential to extend the scope and amplify the richness of SP and CP. Thirdly, FOLC is inclusive and incorporates several subsidiary models, which address additional “layers” of learning practices (e.g. learning activities and goals, digital devices and competencies, responsibility and control, community formation and assessment).

FOLC suggests that successful collaborative learning takes place at the intersection of two dimensions, SP and CP, occurring principally within a digital space consisting of community-selected asynchronous and synchronous tools. In this space, the learners develop their sense of community, and essential digital skills are applied to support critical enquiry and cognitive development. It also acknowledges that not all aspects of SP and CP are digitally mediated, even in fully online courses; for example, FOLC may be adapted to a blended learning environment by strategically restructuring the digital space in relation to SP and CP. Thus, FOLC offers well-

established practices for the selection and use of digital affordances to foster fully online community learning in different contexts.

2.5.2. Reflection on online learning community models

The development of communities on social media is highly variable and multi-faceted because it depends on the participants' ideas and their interactions. The availability of social networking tools, the variety of resources and the flexibility of time and space can also contribute to creating complicated online communities in social networking environments (Apostolou, Belanger & Schaupp, 2017; Lin, 2008). By using social media tools available on mobile devices, a personalised, collaborative and situated learning opportunity can be created for learners. However, early models view the online community as one constructed object based on the analysis of members' interactions, not paying attention to the individual entities (the participants themselves) who form the community. It seems that there are many unresolved issues, including why the learner decides to join the community, how the learner can manage their learning activity within the community, manage their time, evaluate progress and manage their social networks. All the models confirm that the ultimate target is the development of the learner's cognition, and it seems that key learner-centred aspects are not addressed in models such as Col and FOLC. According to Shea, Hayes and Vickers (2010), student discourse that occurs in certain collaborative activities cannot be reliably coded as teaching, social, or cognitive presence, as activities that are core to learner-centered approaches to online learning. Therefore, it is essential to integrate the student's efforts as an individual member to developing the community of learning through addressing their own self-regulating learning strategies and social presence activities, such as open communication, use of affective language and so on.

Garrison and Vaughn (2008) define an educational community as a “formally constituted group of individuals whose connection is that of academic purpose and interest who work collaboratively toward intended learning goals and outcomes” (p.17). The ideal educational community, upon which the Col and other models rest, is based upon teaching presence and cognitive presence. However, social media tools offer the opportunity for narrowing the divide between producers and consumers. Consumers become producers themselves, through creating and sharing. One implication is the potential for a new ecology of open learning resources and learning content, through learners themselves becoming producers of learning materials. This has also led to a “fragmentation of voice” – there is no longer one definitive source of knowledge, no one “expert”. The community members need to develop strategies for finding and validating appropriate resources (Attwell, 2007; Downes, 2010). Learners and teachers have the same range and opportunity of digital tools to use to communicate and construct their knowledge. That means that teaching presence and cognitive presence, or at least a number of their indications may be loose or not precisely exist in each community of learning on social media. From another point, many formal institutions are now experimenting with the use of social networks in a more restricted environment as part of their curricula, such as Warwick University and Brighton University in the UK (Attwell, 2007). One interesting concern is the extent to which “communities” continue after the end of a particular academic module. This also raises questions about what responsibilities institutions and teachers or moderators have for supporting such learning outside scheduled teaching times (Attwell, 2007). Therefore, it seems that it is essential to integrate other group dimensions into addressing the development and sustainability of online learning communities in social media, such as group structure and group identity. Such constructs provide the

members with essential information about the community, its vision and determinations, and their roles within the community.

The final issue is that new interactive networking forms require new methodological and theoretical considerations. The literature shows that, with increasing use of social media tools in learning and teaching practices, new theoretical and methodological insights have emerged, including new ideas around the nature of learning in these spaces, most particularly connectivism (Siemens, 2005) and networked learning (Steeple & Jones, 2002). The presented models were all developed to apply to one learning space, such as learning management systems (LMS) or text-based interaction software. However, the emergence of recent social media and participatory tools has led to a diverse mix of interactions and interplay between groups, networks and collectives. Dron and Anderson (2007) argue that, in addition to groups learning contexts, interactions in new social mediating tools lead to a network category and a collective category. In their work, groups are defined as relatively tightly formed with shared interests and intentions; networks are a more fluid form of social entity that members join, create, and remove themselves from through informal and semiformal connections. Dron and Anderson claim that most people use a mixture of all three in their practice, and the affordances of different tools may lend themselves better to being used in a group, network, or collective context. Their classification provides useful guidelines and strategies for how to use social media tools most effectively to suit the needs of the three different types of learning contexts. It seems that there is a need to develop a framework to examine the creation of online learning communities on a blend of social networking tools, selected by the community and facilitated through synchronous and asynchronous interactions.

According to these limitations or the irrelevant uses of these pre-established modes of online learning communities to the purposes and design of the current study, it seemed that there is a need to develop a theoretical framework to study the formation of online learning communities on social media in formal and informal learning contexts. This required searching for additional theoretical grounding to attempt to understand and present my perception of online learning communities as a researcher. I used concepts from a variety of sources (Short et al., 1979; Garrison, Anderson & Archer, 2000; Ren et al., 2007; Zimmerman, 1989; 2008) that relate to the formation of online learning communities. The next section presents my proposed theoretical framework, used as a guide for data collection and data analysis in this research, and for discussing the findings.

2.6. A proposed theoretical framework to study online learning communities

According to social constructivism and connectivism learning theories, the starting point of learning and knowledge creation is the individuals involved. In connectivism, personal knowledge is comprised of a network, which feeds into organisations and institutions, which in turn feed back into the network, and then continue to provide learning to the individual. This cycle of knowledge development (personal, to network, to organisation) allows learners to remain current in their field through the connections they have formed (Siemens, 2005, p.6). Based on this, it seems that the concept of a learning community consists of three main components: the users (members of a community), the interaction among users and the constructed group. Thus, to fully describe a community of learners, we should consider it in terms of three main levels. The individual level, to describe each member as an individual en-

tity; the connections between members, to describe the process of developing the relationships and therefore the community, and the group level, to describe the group as one comprehensive object focusing on shared rules, structure and identity. Consequently, there is a need to introduce this as a proposed theoretical framework that enables studying online community through focusing on three issues: Identify the community members, study their interaction and categorise the online group and how it was constructed over a number of social networking tools.

This section presents a proposed framework to examine the development of online communities on social networking applications as summarised in the following figure. Figure (1) shows a diagram that summarises the three perspectives as levels of studying a learning community. These perspectives can offer a unique contribution to the study and analysis of the development of online learning communities bounded in the context of social networking mediated learning, with wider implications for understanding matters of self-regulated learning, self-representation, interaction and community building in formal and informal education.

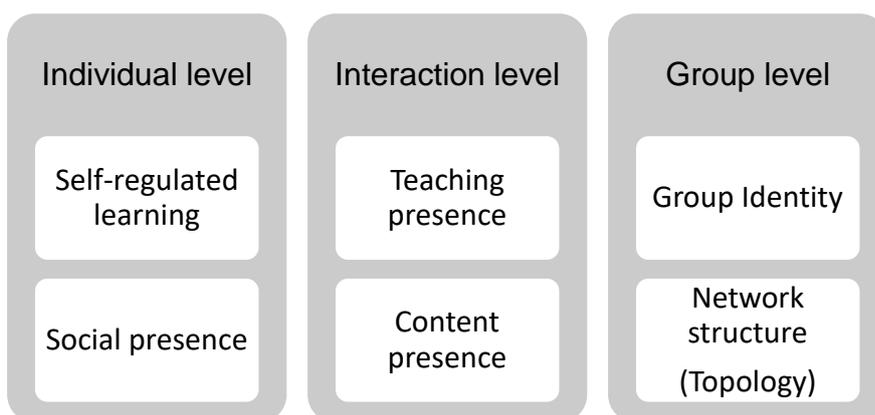


Figure 1: Proposed theoretical framework of online learning community

The theoretical links between these three levels can be clarified based on Vygotsky's socio-cultural theory of learning and Hakkarainen's knowledge-creation

metaphor (Paavola & Hakkarainen, 2005), which recommends engaging learners in social practice, using tools as “mediating artefacts” is a way to prospectively build knowledge. These theories have found more acceptance with the introduction of social media in classrooms and of online learning groups (Churcher, Downs & Tewksbury, 2014). Some general principles of learning derived from social-constructivism may be helpful to design and reform educational practices. As it considers learning as social activity leads to learner cognitive development, learning requires interaction within a learning community and self-organisation on the part of the learner. Therefore “teachers need to allow learners to raise their own questions, generate their own hypotheses and models as possibilities, test them out for viability, and defend and discuss them in communities of discourse and practice” (Fosnot & Perry, 1996.

P.34). Social media such as Facebook, Twitter and YouTube provide learners with the tools to see different perspectives, experiment, and build their own knowledge, all at their own speed and based on their individual needs (individual level). With the use of the social networks, this style of individual learning practice has shifted to the social construction of meaning and knowledge. The learner can now conduct research based on online surveys, interact with varied populations, share and discuss ideas, and work on group projects online (interaction level). The assessment tool in social-constructivist approach is not a test, and there is no right or wrong answer; rather, it is the product of the community of learning (group level), and it focuses on the use of materials and information, as well as communication with others, to construct new knowledge.

2.6.1. Individual level

This framework suggests that the starting point for examining an online learning community is identifying or describing community members as individual entities. In the individual level of community development, more responsibility and independence are provided for each member participating in an online learning community on social media. That means that each member has responsibility for his own learning and progress, and that each member is independent and has a distinct personality that needs to be presented to other members through online interactions. Thus, two main aspects should be focused on at the individual level: how the student controls and monitors his learning process within the community of learning (Shea et al.,2012), and how the student presents himself to the online learning group, which corresponds to the social presence in Col.

Learner self-regulation and self- representation are key constructs in addressing learning within a community. According to Shea & Bidjerano (2010), the analysis of online interactions in online courses resulted in the identification of learner discourse, such as metacognition and setting plans for learning, which could not be reliably coded as indicators of teaching, social, or cognitive presence. We cannot assume that every member in an online community of learning has the same ability to regulate their learning and to present themselves to the group. Therefore, there is a need to examine these aspects on an individual level to examine some learner-centred practices, such as setting a learning goal, monitoring learning and, from another perspective, projecting one's learning interests and real personality to the online community. Thus, this level of the framework is based on self-regulated theories, and social presence theory as a base to examine the individual level of the development of learning communities on social media.

2.6.1.1. Self-regulated learning. In online learning communities, learners are expected to be autonomous and manage their knowledge by making their own social and cognitive connections to meet their own learning needs. Recent research has identified self-regulation – the processes of goal setting, planning, monitoring, and reflecting (Pintrich, 2000; Zimmerman, 2000) – as a requirement for student success in online learning environments. In particular, there is growing evidence that links a sense of community or belonging to indicators of students' effort, engagement, and determination (Cho, Kim, & Choi, 2017; Shea & Bidjerano, 2010; Won, Wolters & Mueller, 2018), which are in turn clearly linked with Self-Regulated Learning (SRL). SRL refers to “an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate and control their cognition, intentions and behaviour, guided and constrained by their goals and the contextual features of the environment” (Pintrich, 2000, p.453). In a recent empirical study by Won et al. (2018) to examine the link between sense of belonging and self-regulated learning on college students, the findings show that students who indicated that they were more connected to their college and to their peer groups tended to report greater use of strategies associated with SLR. These findings are also in line with previous studies indicating that sense of belonging is correlated with students' effort, persistence, and engagement (Furrer & Skinner, 2003; Hausmann et al., 2007). Similarly, a survey study by Sun and Rueda (2012) on graduate students enrolled in online modules indicates a strong positive correlation between higher levels of self-regulation and higher levels of engagement. Also, the results show that students who highly self-regulate their online learning activities engage in the learning process behaviourally, emotionally, and cognitively; thus, they perform well in their academic tasks. Shea

and Bidjerano (2010) strongly recommend including a new construct within the Col framework called learning presence (LP). This construct was developed as a result of a number of empirical studies (Shea & Bidjerano, 2010; Shea et al., 2012) that draw attention to the gaps in Col with regard to self- and co-regulation of learning. Based on the works of Bandura (1986) and Zimmerman (2000), Shea et al. (2014) define LP as “the phases of forethought, performance, and reflection associated with self-regulated learning, but with emphasis on the goals and activities of online learners specifically” (p.10). The forethought phase comprises planning, coordinating, and assigning tasks to oneself and others at the beginning of an online learning activity. The performance phase involves monitoring and strategy use. The monitoring component of this phase involves checking of understanding for oneself and others, then monitoring this during the performance of the online activity and taking corrective action if necessary. Finally, the reflective phase includes articulation of changes in thinking and causal attribution of results to individual or group performance in the online activity. Shea et al. (2012) assert that the entire LP construct is altogether self- and co-directing in nature, as they argue that it is based not only on individual efforts, but also on group dynamics within online interactions. However, the current study views self-regulated learning as individual effort rather than a co-regularity for different reasons. First, the definition of SRL emphasises that identifying learning goals, planning a learning process, monitoring learning and evaluating achievement of learning goals, and such activities or decisions are done individually, not in groups. Second, according to the literature on online courses, there is variance in the level of use of SRL strategies among students (Cho, Kim, & Choi, 2017; Shea et al., 2012), which means that SRL is an individual component because it is influenced by personal experiences and background. For example, some students are unprepared for student-centred

learning, others struggle to manage their time efficiently, and some are slow to understand how to participate effectively in online collaborative learning.

Given the electronic, social, and self-directed nature of networked learning (Downes, 2010), it seems vital that online community members are expected to develop a certain level of autonomy. That level of autonomy can be examined through addressing learner self-regulation activities in online environments (Shea et al., 2012), as self-regulated learning and metacognition approaches aim to help the learner manage and reflect on their own learning more clearly, mainly through identifying learning goals, planning a learning process, monitoring learning and evaluating achievement of learning goals. Several SRL models with different elements have been developed by researchers (e.g. Butler & Winne, 1995; Pintrich, 2000; Veldhuis-Diermanse et al., 2006; Zimmerman and Martinez-Pons, 1986). Pintrich (2000) developed a model classifying phases that other SRL models shared in common (e.g. Zimmerman, 2000) and areas for SRL. This model explains different aspects of SRL according to four phases: forethought, planning and activation; monitoring; control and reaction, and reflection (Lee, Watson & Watson, 2019).

Self-regulated learning consists of three essential dimensions: cognition, metacognition, and motivation (Boekaerts, 1996). The cognition dimension deals with the mental aspect of learning, involving processes of constructing and managing information such as reading, memorising and understanding. The metacognition dimension, often known as “learning to learn”, captures a student’s ability to focus on their learning goals, improve their self-awareness and control of their thoughts, and to choose an appropriate and helpful strategy for achieving their task or learning goal. The motivational dimension is related to the student’s willingness to engage their

metacognitive and cognitive skills in their learning process (Schraw, Crippen & Hartley, 2006). The motivational dimension of learning can be operationalised through the constructs of learning goals, essential values, self-efficacy and a range of motivational strategies (Mih & Mih, 2010).

This framework is based on strategies of SRL: as identified by Zimmerman and Pons (1986), the main three activities that each student must carry out to self-regulate their learning are: 1) setting a learning plan, 2) monitoring the plan and 3) controlling their own learning activities. In networked learning, Veldhuis-Diermanse et al. (2006, p.45) suggest analysing metacognitive activity based on three main categories: planning, in which the learner defines a plan for how to execute a task; preserving clarity, referring to messages written in order to keep the structure and the content of the online discourse clear, and monitoring, which refers to activities aimed at monitoring the planning, aims, or schedule. I have used these categories as indicators for the metacognition categories in my coding scheme. Therefore, metacognition categories are focused on the three main indicators of Veldhuis-Diermanse et al.'s model (2006): 1) setting a plan, which corresponds to planning for learning; 2) monitoring, the same as Veldhuis-Diermanse et al.'s second category, and 3) Guiding direction of dialogue, which corresponds to preserving clarity. For simplicity, the codes of each sub-theme were shortened to meet the content analysis needs of this study.

2.6.1.2. Social presence. Social presence is one of the most fundamental elements in examining online communities (Garrison, 2007) and online interactions (Richardson, Maeda, & Caskurlu, 2017). The proposed framework for the current study follows the theory of social presence, developed by Short, Williams and Christie (1976),

which claims that participants who take part in online discussions are able to project their personalities to other participants through their text, which allows them to develop their social presence in online learning environments. Social presence theory emphasises the role of both the medium's attributes and the participants' perceptions of presence in a sequence of online interactions. Thus, it can be argued that using different combinations of social networking tools, such as Twitter and WhatsApp, in the learning process could enhance the development of social presence of the learning community members. According to Attwell (2007), social networking has already led to the widespread adoption of portfolios for learners, bringing together learning from different backgrounds and sources and providing an ongoing record of life-long learning, capable of expression in different forms. The benefits of social networking include the formation of community and reinforcement of social connectedness, which are linked directly with the social presence (Lim & Richardson, 2016).

This framework suggests that the role of social media in developing online learning communities can be examined on the basis of social presence theory (Short et al., 1976), as a group of distance learners can convey social and emotional meanings through their posts or their profiles on social networks. For example, Garrison, Anderson and Archer (2000) suggest that nonverbal messages can be transmitted in text-based communication through three indicators, which they call social presence categories: affective response, open communication and cohesive response. The current proposed framework uses the social presence coding scheme developed by Rourke et al. (1999), presented as part of the widely referenced theoretical Col model. According to Rourke et al. (1999), social messages, such as jokes, compliments, and greetings, do occur frequently in online asynchronous discussions. This seems to be important to encourage the sense of community among members. As

mentioned above, the social presence analysis model developed by Rourke et al. (1999) consists of three main categories: affective responses, open communication and cohesive responses. I adapted this model into a form that is simpler and could fit with my research purpose to use it for social presence indicators. The affective response category, as per Rourke et al., encompasses the following features: expression of emotions, use of humour and self-disclosure. Open communication and cohesive categories seem to represent something different from my focus in this part of the coding scheme. According to Rourke et al. (1999), the open communication category is about relevant and constructive responses to the questions and contributions of others, such as referring to other messages or expressing agreement. Cohesive responses refer to the phrases used by participants that could build and reflect their group cohesiveness, such as “we” and “our”. The three main categories were used to guide data collection and data analysis of this study. I refer to these categories when I discuss the design of the interview schedule and of the WhatsApp conversation coding scheme in the methodology chapter, as well as when analysing the data and discussing the findings of the study.

2.6.2. Interaction level

The common conception of the community of inquiry is that it is a virtual active learning environment in which students are likely to learn as much from one another as from course materials or lectures. When learners interact with each other, they interpret information based on their current knowledge structure, which leads to changes in their understanding of concepts. Therefore, the fundamental agents in the interaction process are the new information and the learners’ existing knowledge structure. From this perspective, Mayes (2006) identifies three kinds of interaction:

with concepts, with tasks and with people. These categories correspond to the three stages of learning discussed in the framework for understanding courseware developed by Mayes and Fowler (1999). The first stage is conceptualisation, which corresponds to interacting with concepts. In this stage, students interact with other people's concepts. This interaction occurs between the learners' current knowledge and their framework of understanding and new clarifications. The most important element in this kind of interaction, which leads to building a new understanding, is the feedback given to the learners on their use of the concept.

The next stage is construction, which corresponds to interacting with tasks. In this stage of learning, the learners build their own framework of understanding and interact with tasks or applications to test their understanding. These interactions could be individual or collaborative. Activity theory plays an important role in this stage, as it can inform the design of learning tasks and settings.

The third stage is the dialogue stage of learning, when peers interact to create or reflect on a new conceptualisation. The dialogue seems to involve both conceptualisation and construction. Although learners can construct new knowledge without discussion with other people, dialogue supports deep understanding and enables reflective thinking on new knowledge. Most online learning environments have now adopted conversational tools that enable the instructor and learners to have an active learning dialogue. This dialogue can be integrated into learning tasks or can be carried out as a reflection on what they have learned.

To develop successful online dialogue, Salmon (2013) identifies a five-stage model to motivate online learners to interact, learn and develop. Firstly, the online learning system is introduced to the learners, who are taught to access the tools effectively. Secondly, learners have to establish their online profiles, which reflect their

identities, and find other participants to interact with. The third stage is initiating conversation for the learners to become familiar with the environment and to support others' goals. In the fourth stage, the conversation will be more collaborative and more related to the course. Finally, reflection and personal development will occur in the fifth stage.

Following this brief discussion about online interaction in a community of online learning based on the Col model, it seems that the teacher and the learning content, such as online learning activities, are the dominant factors that could identify the nature of online learning interaction in a community. This part of the framework deals with learning-related interaction because it is the main purpose of creating and participating in an online learning group. Two main theoretical aspects are used to guide the analysis of learning-related conversations. First is the role of the teacher in enhancing and controlling the interaction amongst community members, which is known as teaching presence in the Col model. The second aspect is the cognitive presence, examining the extent to which a group of learners can construct meaning, share their understandings, evaluate them, and propose a solution to a given question or problem. The next two sections discuss teaching presences and cognitive presence, as outlined by Col in Garrison, Anderson & Archer's (2000) and underlined by further empirical studies.

2.6.2.1. Teaching presence. This framework refers to Anderson et al.'s (2001) view of the function of the teacher as consisting of three major roles: first, as designer of the educational experience, including planning and administering instruction as well as evaluating and certifying competence; second, as facilitator and co-creator of a

social environment conducive to active and successful learning, and finally, as a subject matter expert who knows a great deal more than most learners and is thus in a position to scaffold learning experiences by providing “direct instruction” (2001, p.2).

These three teaching presence categories – instructional design and organisation, facilitating discourse, and direct instruction (Anderson et al., 2001) – seem to be remarkably consistent across the literature about online learning contexts, and are commonly used as a basis for assessing teaching presence in online learning communities. A study conducted by Balaji and Chakrabarti (2010) strongly suggests that the teacher’s role in facilitating dialogue affects students’ interactions in an online discussion forum (ODF). It examines seven constructs that affect the interactions: facilitating discourse; personality traits; internet efficacy; reflective thinking; personalisation; assessment and feedback, and learning community. Facilitating discourse is defined as a practice that encourages students to engage in online conversations. This requires teachers to be active and to provide their students with comments and directions that sustain their interactions. The most significant finding is that the teacher’s practice of facilitating discourse has a strong positive effect on the students’ interactions and learning. From another point of view, Goodyear and Dudley (2015) discuss some instructional strategies that support the teacher’s role as a facilitator in their interactions with students. The most important one is questioning, or “Socratic conversation”. In this strategy, instead of providing solutions and justifications for students’ questions, the teacher returns the questions to them using different phrases and clues that encourage students to think, discuss and question. The questioning strategy could be combined with what they refer to as “mediated behaviours”, which include prompts, particular direction, tentative suggestions, evaluations, directing students’ attention to the learning task and encouraging students to read and reply to

each other's comments. Goodyear and Dudley (2015) further add that the teacher's role in interaction involves much more than questioning. It also includes: (1) encouraging students' initiatives; (2) helping students with their learning; (3) facilitating communication among students; (4) providing feedback on task performance, and (5) praising individual student efforts (Goodyear & Dudley, 2015, p.281).

Moving on from reciprocal dialogue to a more complex view of the teacher's role in developing interaction in online courses, Maor (2003) uses the simple metaphor of the "four hats" of pedagogical, social, managerial and technical actions as a framework to explain and analyse data regarding teachers' actions in terms of developing students' online interactions. The pedagogical role involves activities that enable teachers to create a move from individual to cooperative learning, to promote reflection and to encourage students to engage in collaborative thinking and discussion. Meanwhile, the social role aims to ensure a social element in online discussions. Maor suggests some specific techniques, such as teachers introducing themselves informally to the students and sharing some of their experience on the study topic. This informal conversation supports the creation of a group community and increases the learner's satisfaction with the learning environment. The teacher's managerial role involves coordinating the content during the term to sustain the momentum of the discussion and frequently contacting students to encourage their participation. This agrees with Moore's study (2014) that revealed that students show more interaction when the teacher creates an active dialogue. He also noted that undisciplined students need more teacher communication to participate in online courses than self-disciplined students do. This is because undisciplined students have a difficult time in asynchronous learning environments where they have to control their own learning and timetables, whereas self-disciplined students are able to dynamically participate

and learn in online courses even if teacher interactions are insignificant. Moore recommends that the quality of comments (students' comments in online conversations and instructors' comments on student tasks) should receive more attention and investigation.

This discussion of teaching presence has highlighted the significant role of the teacher in developing an online learning community through sustaining the interaction among group members. It also emphasises the need for teachers to design and manage online activities that make the learning interactions constant and active. Thus, the framework for the current study suggests examining the role of the teacher or group leader in order to investigate the interaction level of developing online learning communities on social networking applications.

2.6.2.2. Cognitive presence. Col model emphasises the development of products of value beyond the assessment or grading of community members, so greater value is placed on student-created content. In such a knowledge constructing community, members are managers, or “curators”, of the community’s knowledge artefacts (McLoughlin & Lee, 2010). The cognitive aspect is a fundamental requirement of any learning practice, as a learner’s understanding must develop for learning to occur. Cognitive presence explores how the learner’s mind is adapting, integrating, thinking about and sometimes struggling with ideas (Garrison and Anderson, 2003). It is a presence that requires learners to observe their own learning practices and how they establish and confirm their understanding (Garrison, 2007; Garrison & Anderson, 2003). It is a complex concept comprised of many dimensions and approaches, including critical thinking, creative thinking, collaborative learning and metacognition. Cognitive presence in Col explains the extent to which a community can construct

meaning, from the initial practical enquiry to the eventual problem resolution. For the purposes of simplifying this concept, Garrison and Archer (2000) define a practical inquiry model to address cognitive presences in the online community of inquiry. The practical inquiry model identifies four phases that could be used to assess cognitive presence: triggering event; exploration; integration, and resolution. A number of studies have assumed that the design of networked activities provides teachers with opportunities to engage students in interaction, which includes the presentation of knowledge and reflection on the knowledge created. De Laat (2006) found that the trust, the content of the interaction and the connections among the group when they engage in collective activities are more crucial than the teacher role. He developed a multi-method research framework to study networked learning processes by applying three main data analysis strategies: (1) social network analysis to examine the connections between group members; (2) content analysis through identifying learning activities as a method to find out what the group members are talking about, and (3) context analysis, which focuses on the practices of the participants to determine why they are communicating. Evans (2013) suggests engaging students in online activity by designing and producing online video “mini lectures”, which are posted and discussed on a social media site. He argues that this kind of online interaction not only allows an improved “sense of affinity and belonging within the module cohort” (p.44) but also develops synchronised feedback that may be supported with evidence in the form of different types of media: pictures, audio or texts. Simonds and Brock (2014) found differences in online activity preferences according to the age of students. They discovered that older students (aged 30 and over) found asynchronous methods of learning, such as posting recorded video lectures, to be useful learning activities. Younger students (aged 21–30) preferred interactive learning activities such as

synchronous talks and cooperative group projects. Another study, conducted by Matsuba, Suzuki, Kubota and Miyazaki (2015), developed an online collaborative learning activity to improve students' writing skills through peer reviewing. They tested the effectiveness of the implementation by focusing on the group's and individual students' perceptions regarding this collaborative activity. They found that learning activities seemed to affect the performance of the students when they worked in groups. They also discovered that the interaction between groups/pairs in this online collaborative activity was more effective than interaction in face-to-face settings. This brief review of cognitive presence in relation to community development suggests that the selection of learning content and the design of the online activity affects the interactions between community members. Therefore, the interaction level of this framework emphasises exploring the impact of the teacher and learning activities on the dialogue and development of online communities on social networking applications. This investigation will give insight into how the quality of student and teacher interactions contributes to building a community of learning.

2.6.3. Group level

The group level is the third perspective suggested by this theoretical framework to investigate the development of online learning community. The basis of this level was provided by group identity theory (Rourke et al., 1999) and group structure. As presented before, the concept of group cohesiveness and connectedness was proposed by Rourke et al. (1999) as one of three indicators of social presence. However, other authors, such as Preece and Maloney-Krichmar (2005) and Ren et al.

(2012), claim that group cohesiveness can be developed through enriching the attachment bond between members as well as between each member and the whole group (Ren et al., 2012).

According to Garrison (2007), one of the most significant issues with applying Col to online interactions is the shifting of social presence from effective communication and developing social bonds to a focus on group cohesion, which means that the development of social presence in an online learning community must move beyond personal perspective to a group perspective. He adds that group cohesion requires intellectual focus and respect (i.e., open and purposeful communication). That means that social presence in a community of learning must create personal but purposeful relationships. Nevertheless, personal relationships are difficult to examine and take time to develop especially in virtual space. Thus, we should be focusing on the quality of the interactions to find out some indications of developing personal relationships through examining open communication factors, and purposeful relationships by examining learning objectives of the group. A clear understanding is therefore required of how social presence as a personal module shifts to support the formation of the community of enquiry as a group of learners, including its identity and its structure.

From another point of view, the conception of the community has been shifted from physical or geographic entity to being conceptualised in psychological or social terms, where the culture and the participants' ideas and interests are the main components in defining online or virtual community identity. Willson (2006) defines a virtual community as a social group of people who have the same psychological and cultural values, while Jensen (1990, p.71) defines a community as "shared, close and intimate". These connections do not have to exist between every group member, but

at least the majority of the members should have these feelings towards some of the other members. Thus, it seems that there is a need to examine the development of online learning communities from an all-inclusive perspective, in which the researcher studies the community as one object. Therefore, this framework includes the group level to examine the development of an online community through the development of shared principles, such as the group's identity and its structure or topology.

2.6.3.1. Group identity. Three phases of building an online community were identified by Andrews (2002): creating the online community; facilitating people joining the community and early interactions, and developing a self-sustaining interactive environment. In the phase of starting an online community, it is recommended to create an identity for the community through establishing consistent attributes such as group name, purpose, and an online space that enables people with specific interests to interact. Secondly, to encourage early interaction by members, privacy assurances and clear content topics are very important. The third phase can then be achieved through maintaining members' attachment to the community, as Andrews (2002) indicates that effective online communities tend to be able to function self-sufficiently. Empirical research suggests that online communities with clear topics and easy access tend to be the most effective (Preece and Maloney-Krichmar, 2005; Ren et al., 2007). Therefore, to ensure community success, Ren et al. (2012) recommend enhancing members' attachment to the community through fostering two types of attachments: the group's identity-based attachment and bond-based attachments. The difference between these attachments refers to members' different reasons for being

in a group; that is, because they like the group as a whole (identity-based attachment), or because they like individuals in the group (bond-based attachment) (Ren, Kraut & Kiesler, 2007). The aspect relevant to the current study is applying identity-based attachment to developing group identity on a set of social networking tools.

Theories of attachments and group identity claim that one community feature that can build attachment is to focus on members' interests on a group topic. It is argued that the more a group is identified and highlighted by its features and familiarity to its members, the more attached the members will feel to the group. It is also assumed that attachment leads to strong motivational and behavioural outcomes, such as the desire to maintain physical closeness and the willingness to defend and optimise cognitive and financial resources in the attachment object (Ren et al., 2012). Establishing an online identity for an online group or community involves members feeling a commitment to that community's purpose or topic. When group members feel an identity-based attachment to a group, they tend to perceive others in the group as substitutable (Turner, 2010). One consequence of this insight is that group identity can remain stable in the face of turnover in membership.

Ren et al. (2012) identify five theoretical antecedents that can develop group identity: group categorisation; providing information about the group; highlighting group homogeneity; intergroup competition, and facilitating familiarity with the group. The first theoretical antecedent is group categorisation, which refers to representing the group's identity by defining its characteristics, such as its name, logo, ethnicity, interests, and political values or choices. Tajfel and his colleagues (1971) proved experimentally that merely assigning research participants a random label activated a sense of group identity, even when they did not know others in their group (cited in Ren, Kraut & Kiesler, 2007). Ren et al. (2012) argue that, if members of an online

community are assigned to a group within the community, and if this categorisation into a group is made explicit through group name, image and so on, members should feel identified with the group. The second antecedent is providing information, which assumes that group identity can be enhanced by giving people information about the group and representing the individual members as one group. This also involves moderating their personal attributes in a process called “depersonalisation” that seeks to develop a group profile instead of individual profiles. The third theoretical antecedent claims that group homogeneity can increase group identity. Pickett and Brewer (2001) argue that a feeling of being connected to an in-group occurs “to the extent that one is similar to the group prototype and all the group members are perceived as similar to each other” (p.342). That was confirmed with other literature such as Mikulincer & Shaver’s (2001) and Ren et al.’s (2012) who emphasise that enhancing in-group homogeneity results in reinforcing group identity and therefore increases attachment to the group. Intergroup competition is based on identification by highlighting group boundaries and emphasising the existence of out-groups. Postmes, Tanis and Boudewijn (2001) argue that identifying the presence of an out-group and an element of competition with the out-group strongly enhances identity-based attachment. Facilitating familiarity with the group is the fifth theoretical antecedent to developing a group identity. It suggests that making members familiar with their online community can be achieved through making the community and its activities consistently visible to members. This should increase member attachment to the community through constantly reminding them about the community’s visions, goals and achievements. Many successful online communities on social media platforms such as Facebook provide a constant stream of updated information about the community and groups within it (Ren et al.2012).

The framework for the current study suggests using these five theoretical antecedents as a basis for examining the development of online learning groups' identities on a combination of social media platforms such as Twitter and WhatsApp. As these five-theoretical-antecedents provide a holistic view of the factors that could develop an online identity for a group of users, nevertheless the type or number of communication tools or software they are used to communicate.

2.6.3.2. Group structure. Group structure refers to the quality and patterns of relationships existing among group members (Rulke & Galaskiewicz, 2000). Dee Lat (2006) recommends that the study of students' interaction should not only be based on the content of the interaction but also on the pattern of connection, the activities of the interaction and the content. As a consequence, to identify online learning group structure, two elements need to be addressed – the division of tasks among group members and the pattern of the connections between members. An effective structure exists when the group reaches agreement about the division of tasks, roles and responsibilities to carry out the work assigned. A set of roles can be distributed to the group members, such as introducing the task, data collection, analysing, giving examples, clarifying, synthesising and summarising, timekeeping, and so on. In learning groups, the roles will change according to the nature of the task or the stage of the argument (Jaques, 2000; Knight & Pye, 2005), minding that the most dominant member for one role may not be so for another. In some learning groups, where there is no appointed leader, as in groups lacking a tutor, the control may move between different members of the group. This leads us to discuss the second element of group structure, which is connection design, or network topology (Wittie, 1981). A topology is the layout of a network or mapping out of the nodes and links in a network. The literature in computer networks identified five basic types of topologies –

Star, Mesh, Bus, Ring, and Tree (Pandya,2013). In star network, a central user or device is used to connect all other devices or members. The devices do not necessarily link to each other. A star network can be perceived on Twitter, as all the followers (learners) can interact and comment on the tweets posted on the teacher or group leader Twitter account and they are not necessarily following each other. Mesh network provide point to point links between each user in the network. It allows for direct and continuous connections among the members. WhatsApp is a good example of Mesh network as the group members can send directed messages to a specific member in the group or as a privet message.

Group structure relates to the roles that members play in the social community in which they participate (Boyd & Ellison, 2007). Online group members differ in their capabilities, knowledge, and the information that they bring to the group (Preece & Maloney-Krichmar, 2005). Some members will be fairly passive and have a restricted personal network. Others will be active posters of information, and build up intricate networks of friends. Others will play an even greater role in actively promoting and developing the SNS as a whole, by setting up groups and communities and posting publicly available information to encourage interaction. Previous studies have found that the variety of prior information possessed by group members and how data and information resources are distributed within the group, affect group performance (Stasser, 1992). However, group performance depends on not only on the richness and variety of information resources provided by group members, but also on the methods or structures the group uses to exchange and utilise these resources (Rulke & Galaskiewicz, 2000). Thus, a well-defined structure for an online group means clear roles for members and organised information resources, which can lead to improved group performance (Knight & Pye, 2005; Rulke & Galaskiewicz, 2000). This

part of the framework focuses on the importance of investigating online group structure in examining and understanding the development of an online learning community on social media.

Studying group structure involves descriptive tasks to identify the online learning community, its tools and task division among group members, and a visualisation task to lay out the connections between community members (group topology). This framework suggests examining the groups' structures by addressing these two elements. Firstly, community descriptions can be investigated through interviews, by asking the teacher of the formal learning group and the leader of the informal learning group about how they divided tasks between group members and what their strategies were for controlling and monitoring the learning groups. Secondly, the layout of connections between group members (network typology) is most effectively studied through social network analysis (Abdelsadek, Chelghoum, Herrmann, Kacem & Otjacques, 2018; De Laat, Lally, Lipponen & Simons, 2007), in which the number and directions of connections between members are explicitly illustrated and visualisation techniques are applied for understanding such complex networks. Although the process of constructing network models and performing exploratory analysis remains difficult and time-consuming (Stepanyan, Mather & Dalrymple, 2014), the literature on social network analysis indicates that there are many software programs, such as Orion, that can be used to conduct such dense and complicated analysis and provide visualisations of network data imported directly from social media platforms (Heer & Perer, 2014).

2.7. Summary of the chapter

This chapter undertook a thematic literature review that provided an extensive view on the current situation regarding the use of social media in formal higher

educational context and also in informal learning contexts. In the first section, changing ideas about educational practices, such as socio-constructivist, connectivism and knowledge-building, were explained, as well as how these current learning orientations support the use of social media as learning tools. The next section presented situated learning, dialogic learning and personal learning environment as the three main current learning approaches that theorise the use of social media as learning environments. Some studies were then presented to give a broad background of the contemporary issues related to the educational uses of social media in formal and informal learning practices. This presentation showed that the value of social media is generally recognised for both formal and informal learning due to its potential to encourage member participation in groups of people with similar interests, in which they can build virtual professional or learning communities without geographical ties; however, sustaining the communities may present potential obstacles. The concept of an online learning community was then discussed and the models that have been widely used in the literature to examine online learning communities were presented. Reflection on these models raised some issues related to applying them to online learning communities on social media, such as the need to consider the individual efforts of students in building the community, and the role of using multiple social networking tools as communication means for a community. This led to propose a theoretical framework for studying online learning communities based on three perspectives, individual, interaction, and group. This three-perspective theoretical framework can offer a unique contribution to the study and analysis of the development of online learning communities bounded in the context of social network-mediated learning, with

wider implications for understanding matters of self-regulated learning, self-representation (social presence), interaction and community building in formal and informal education.

3. Methodology

3.1. Introduction

The purpose of this chapter is to develop an inclusive view of the study's methods and procedures through the following sections: statement of research aim and research questions; research paradigmatic stance; research design and rationale; case selection and participants; data collection procedures and rationale; data analysis techniques and addressing the trustworthiness of the study.

3.2. Research aim and research questions

This study aims to investigate the role of social media in building an online learning community from the participants' perspective. It tries to introduce an understanding of how the use of social media could contribute to developing an online classroom community in a formal learning case and developing an online learning community in an informal learning case. This is done through investigating the main elements of constructing an online learning group on a combination of social media tools: WhatsApp and Twitter. In addition, it investigates the adoption of these tools by students and relates these educational uses to their sense of learning community.

This study intends to answer the following main questions:

- Q1: What are the main factors that could enhance the sense of an online learning community from the participants' viewpoint?
- Q2: What is the role of social media in developing an online learning community?

3.3. Paradigmatic stance

A research paradigm can be defined as a framework derived from a worldview or belief system of the nature of reality that orients the way in which knowledge is studied and interpreted. Paradigms are used by scientific researchers, guiding how

they act with regard to the enquiry (Mackenzie & Knipe, 2006; Mertens, 2005). Some authors identify a paradigm as the philosophical assumption for undertaking a study (Cohen & Manion 1994, p. 38). Some literature refers to epistemology, ontology, and research methodologies (Neuman, 2000), rather than referring to paradigms. A number of research paradigms are considered in various literature, such as: positivist (and postpositivist); constructivist; interpretivist; transformative; emancipatory; critical; pragmatist, and deconstructivist (Mackenzie & Knipe, 2006), however, the most common paradigms considered in educational research literature are post-positivism, constructivism/interpretivism, and critical theory. According to Mackenzie & Knipe (2006), without identifying a paradigm as the first step, there is no basis for subsequent decisions regarding data collection methods, literature or research design, as they suggest that the research paradigm sets the intent and expectations of the study. In the next section, a brief introduction of the interpretivist/constructivist paradigm and its main characteristics will be presented. I will then present how the constructivist paradigm was applied to guide this research based on the ontological, epistemological and methodological assumptions of the current study.

3.3.1. The Interpretivist/constructivist paradigm

Fundamentally, constructivists hold that reality is constructed in the mind of the individual, rather than it being an externally singular object (Hansen, 2004). The constructivist position adopts a hermeneutical approach, which maintains that meaning is out of sight and must be brought to the surface and explained through deep reflection on participants' behaviour or interactions. Thus, a unique characteristic of constructivism is the importance of the interaction between the researcher and the objects of enquiry (participants). Only through this interaction can a deeper meaning

be constructed and presented, as the investigator and the participants co-construct findings from their interactive dialogue and interpretation (Ponterotto, 2005). According to Crotty (1998), knowledge and meaningful reality are constructed in and out of communication between individuals and their world and are developed and transmitted in a social context.

As shown by the research aim and questions in section (3.2) in this chapter, this study intends to understand the role of using social media tools in developing online learning communities, without any intervention or control by the researcher in terms of the teaching or learning practices. Therefore, this study provides explanations and interpretations about the real uses of social media in two main contexts: formal and informal learning systems. This stance would call for an interpretivist paradigm. According to Chilisa and Kawulich (2012), selection of an appropriate paradigm is determined based on the research questions and aims; for instance, if you want to understand a phenomenon from the perspectives of those who have experienced it, this would be appropriately addressed within a constructivist/interpretivist paradigm.

According to Guba (1990), paradigms are characterised by three main elements: ontology, epistemology, and methodology. These elements outline the nature of the knowledge, how the researchers see themselves in relation to this knowledge, and which methodological approaches they use to discover the knowledge. Every paradigm is based upon its own ontological and epistemological assumptions and uses certain methodologies to guide data collection and analysis for answering the research questions. The next sections justify the use of the constructivist paradigm with respect to the philosophical anchors of ontology, epistemology, and methodology of the current study.

The ontological assumption of this study is that the reality of the phenomenon is relative and subjective; it is relative to the context and participants, as we can assume the findings could be different if we were to apply this study to different learning groups, based on their specialisms, the structures of the groups and their demographic data, or even due to using different kinds of social networking applications. The reality is also subjective in that it is constructed by the researcher's inferences from and interpretation of the data collected from dynamic interaction with and between participants – these meanings could be constructed in different ways by different investigators. Therefore, this research is based on the ontological assumption of multifaceted reality, which means that there is no one single truth because the reality is individually constructed; there are as many realities as individuals trying to construct an understanding of them. Constructivists advocate a transactional and subjectivist stance that maintains that reality is socially constructed; therefore, the dynamic interaction between researcher and participant is central to capturing and describing the “lived experience” to generate a pattern or theory about studying a phenomenon.

Epistemology is concerned with the relationship between researcher and knowledge. Constructivists emphasise that individuals construct their own social realities in relation to one another (Cohen et al., 2007), thus constructed knowledge is subjective and experiential and strongly related to the context (Lincoln, Lynham & Guba, 2011; Mackenzie & Knipe, 2006). This approach is compatible with the epistemological assumptions of this study, as the knowledge is based on social construction by human actors: the students and teachers as participants and myself as a researcher. All of these are parts of the studied phenomena and together they construct the findings of this research. My particular construction of reality might be shared with many other people, but other people could construct the same reality in

quite different ways. Thus the findings of current study may be idiosyncratic, rather than generalisable, simply because the main goal of constructivist research is not to confirm or disconfirm earlier findings, but rather to contribute to a process of continuous revision and improvement of understanding of the experience of the phenomenon being studied.

The third element of characterising the study's paradigm is research methodology, which guides data collection and analysis to answer the research questions. Constructivist research questions are firmly grounded in particulars such as specific historic time, geographic place and social context, as well as particular types of people, because constructivism aims to reveal hidden social forces and structures (Cohen et al., 2007). The constructivist methodology is directed at understanding a phenomenon from the participant's perspective and investigating interaction among participants and the historical and cultural contexts in which people live (Creswell, 2007). Examples of the methodology include case studies that seek to conduct in-depth investigation of events or processes over a prolonged specific time in a particular place or context. Both Stake (2005) and Yin (2003) base their approaches to the case study on a constructivist paradigm. As presented in the research problem and aims, the study is inductive in its nature, trying to find answers emerging from the participants' views, and shaped by the researcher's experience in collecting and analysing the data. I deal with two cases to construct social knowledge about the participants' experiences and perceptions of developing online learning communities through using social media as educational tools. Therefore, knowledge is created by the researcher through observing and analysing the participants' online interactions. There were many different resources for collecting data and analysing them in order to construct an understanding about the meaning of online learning communities in

formal and informal learning contexts, as well as the role of social media such as Twitter and WhatsApp in building learning communities. Next sections present in detail the case study approach as the current research design.

3.4. Research design

The research design is a systematic procedure used to solve a research problem. It refers to the techniques by which researchers go about their work of exploring, explaining and predicting studied phenomena. As presented earlier, the constructivist methodology is directed at understanding a phenomenon from the participant's perspective, investigating interaction among participants as well as the historical and cultural contexts in which people live (Creswell, 2007). One common example of an interpretive/constructive methodology is in terms of case studies that seek to conduct in-depth investigation of events or processes over a prolonged specific time in a particular place or context. The next section presents basic information about the case study approach and the rationales behind adopting it as the current research design. Following this, the case selection and case descriptions will be presented.

3.4.1. Case study approach

As mentioned above, one of the most common research methodologies of the interpretive paradigm is the case study, in which the researcher carries out a detailed investigation of a subject of study – “the case” – as well as its related contextual conditions (Stake, 2005), or of a “bounded system”, such as social context or environment (Creswell, 2007, p. 73). Stake (2005) suggests that the case study procedure is not a methodology but rather a choice of the case that will be studied within a

bounded system. Yin (2003) explains it as an empirical study that investigates a contemporary phenomenon within its real-life context that relies on multiple sources of data collection.

According to Runeson and Höst (2009), conducting studies on social and real-world contexts requires a balance between the level of control and a degree of realism. They claim that the realistic condition is often complex and non-deterministic, which obstructs clarification and interpretation of what is happening, especially for research with an explanatory purpose. From the opposing view, increasing the level of control by the researcher decreases the degree of realism, sometimes leading to significant factors being set outside the scope of the research. However, case studies are by definition conducted in real-world situations, and thus have a high degree of realism, mostly at the cost of the level of control. To achieve a balance between the degree of realism and the level of control in conducting case studies, it is strongly recommended that the nature of the research objective should be clearly determined by the researcher. This means that the researcher can indicate the case selection procedures and identify cases from the real world that are consistent with the research objectives and therefore can answer the research questions by studying and interpreting of these cases without a requirement for intervention or control by the researcher.

Stake (2005) explains three forms of case studies in terms of their objectives. Intrinsic case studies are undertaken to understand the specific case in a research question. Instrumental case studies aim to gain more understanding into an issue, rather than investigating the case itself. In instrumental case study research, the focus of the study is more likely to be known in advance and designed around an estab-

lished theory or conceptual framework. The third form of case studies involves collective or multiple case studies, which involve the exploration of multiple instrumental case studies being studied to gain a fuller representation of the phenomena in question. From another point of view, Yin (2003) identifies three types of case study procedures in terms of their products. Exploratory studies can be applied as a pilot study to generate research questions. Descriptive studies provide a narrative interpretation of the studied case. Explanatory studies develop conceptual categories or theories that can be used to understand and deal with similar cases.

As presented previously, the current study aims to add a conceptual meaning to the online learning community developed by using a combination of social networking tools (e.g. WhatsApp and Twitter in these cases). An instrumental case study is therefore adopted to accomplish the research objectives. The instrumental case has been selected carefully and purposefully to ensure that the cases yield productive findings relating to the research question. Qualitative research methods are most suitably associated with the philosophical underpinnings of the instrumental case, as described by Stake (2005), as the researcher, participants, and readers all play key roles in reconstructing the meaning of the results. Stake notes that, in qualitative case study, triangulation (i.e., drawing upon multiple perceptions/sources of data) is a common means through which researchers increase the trustworthiness of their representation of the case. Data analysis relies upon careful coding with a focus on aggregate instances in the case report. The instrumental case report focuses less on the complexity of the case, as in an intrinsic case study, and more on specifics related to the research question and the predefined theoretical framework. Instrumental case studies, as with any interpretive research, do not permit generalisation in a statistical sense. However, this approach does try to identify patterns and themes and

may compare these with other cases. In this way, the researcher uses the instrumental case to explore a particular phenomenon in depth, so that the reader can see the transferability of the case results. Accordingly, this study will be conducted in the form of multiple instrumental case studies, as the aim of the research is to obtain a deep understanding and explanation for the use of social media to develop online learning communities in two different contexts: blended learning within a formal higher education context, and within an informal learning context.

3.4.2. Rationales for adopting a case study

Using case study as the research design enables researchers to explore phenomena from multiple points of view. Case studies use naturalistic data gathering, as the evidence is collected from real-life situations. The present study is based on two main situations: formal and informal learning contexts. To gain a deeper understanding of how formal students use social media in their learning activity and how these applications affect their sense of connectedness, I must deal with those students who took part in this experience without any interventions. I will collect their stories, observe their interactions and try to understand and interpret their behaviour as communities of learning. According to Yin (2003), there are four situations in which a case study method should be considered: (a) when the intention of the study is to understand a phenomenon and its related aspects or causes, so the researcher seeks to answer “how” or “why” questions; (b) when the researcher has to deal with phenomena as they are in real situations and cannot control the behaviour of the participants involved; (c) when the research intends to cover contextual settings because they must be relevant to the phenomenon being studied in one way or another; and (d) when the boundaries between the studied phenomenon and its context are unclear. The present study has used case studies as its research design for two main

reasons. Firstly, the aim of the study is to gain a deeper understanding about using social media in real learning contexts, as it tries to answer why in some circumstances there is a high level of connectedness between learning group members. Secondly, this investigation is based on a predefined theoretical framework that requires selecting purposeful cases in order to answer the research questions.

The first rationale for adopting case studies in this research is the important role of the learning context to this investigation, as has been discussed previously. Online social networks are increasingly being used as informal learning tools. Alongside this, there are many successful examples of adopting social media applications in formal learning settings. We know that there are significant differences between these two contexts, which influence the roles of learners and instructors, their relationships and interactions, and how online communities are created and developed (Dabbagh & Kitsantas, 2012). All these factors are essential and related to the research problem; therefore, we cannot separate the context of learning (formal or informal) from the formation and development of online learning communities through networked learning practices. Such situations require more efforts from the researcher to examine case studies to understand the processes, and to gather different sources of evidence, such as information about student and teacher perceptions and examples of their online interactions. According to (Yin, 2003), one of the considerations for case study methodology is the ambiguity of boundaries between the studied phenomenon and its context. For this study, we do not know whether the sense of connectedness among learning members is enhanced by their real interaction inside the classroom or whether the use of WhatsApp and Twitter outside the class could influence this feeling. The studied phenomenon is the development of

online learning communities and the contexts are formal learning settings and informal learning settings. If the students meet each other face to face or know each other well in the real world, they could communicate in different ways than if they do not know anything about each other's real lives, as in the informal learning case. It must be considered whether this influences the level of interaction and the sense of online connectedness. There are no clearly established margins between in-person teacher-student relationships in higher education contexts and those relationships that could be influenced by using social media as educational tools, as there is some kind of social relationship between them regardless of whether or not they use social media. To understand the role of social media in the student-teacher and student-student relationships that form a sense of an online learning community, it is necessary to study particular groups of teachers and students in real learning contexts to identify and explain the factors that could influence these relationships and the development of the online community. Therefore, an instrumental case study procedure was applied to this research to enable selecting two groups of learners who had used two or more social media applications as educational tools, to capture the meanings that are contributed to developing an online learning community through using social media in formal and informal learning contexts. However, this study is not intended to make a comparison between these learning groups, but to try to understand how the use of WhatsApp and Twitter as learning tools can develop a sense of community among learners in terms of the purposes for which the learners use these social media tools, as well as whether these uses can affect their relationships as a community of learners.

Secondly, an instrumental case study approach was adopted in this research because this study is based on a pre-identified theoretical framework, and thus there

is a need to purposefully select the cases that fit in with the research focus. As presented in the literature review in section (2.5), the concept of developing an online learning community is broad and there are a number of models that have tried to examine it and identify its elements, such as CoI (Garrison, Anderson and Archer, 2000), CoP (Wenger, 1999) and TAM (Davis, 1986, 1989, 1993) and FOLC (Blayone et al., 2017). Moreover, there are a number of learning approaches that can be used to develop the sense of online learning community among students, such as Situated Learning (Lave and Wenger, 1991), Mobile learning (Sharples, Taylor & Vavoula, 2005), Networked Learning (Dirckinck-Holmfeld et al., 2009) and personal learning environments (Harmelen, 2006). This can lead to vagueness in understanding the principles of developing online learning communities as a phenomenon and whether they are related to formal learning contexts or informal settings, and how this development could take place using social networking tools. I started by constructing a theoretical framework that outlined a path for studying the concept of developing online learning communities on social media in the two learning contexts. The study's theoretical framework is exploited for indications of both the range of settings and the categories of people who might have experienced them. It was therefore assumed that I needed to find at least two cases of groups from different learning contexts (formal and informal), in which a combination of at least two social networking applications had been used as educational tools. Taking these considerations into account, it became clear that investigating a multi-dimensional phenomenon such as developing online learning communities and pre-identifying the features of learning groups (cases) to which the theoretical framework could be applied would be best achieved through an instrumental case study design. This is because, as mentioned above, instrumental case studies aim to gain an understanding of a phenomenon, rather than

just investigating the case itself, in which the focus is stated in advance and designed around an established theory or conceptual framework.

3.4.3. Case selection

Two groups of learning were purposively selected as cases for this study (a formal learning group and an informal learning one). Purposive sampling was employed, as has been done by other researchers (e.g., Parks & Floyd, 1995; Preece & Ghozati, 1998; Ridings, Ridings & Gefen, 2004). This procedure is based on a logical reason dictated by the nature of the research questions (Patton, 2002). In order to explain and justify the case selection procedure, I need to explain the research boundaries. The boundaries indicate what will and will not be studied in the scope of the research project. The establishment of boundaries in a qualitative case study design is similar to the development of inclusion and exclusion criteria for sample selection in a quantitative study. The difference is that these boundaries also indicate the breadth and depth of the study and not simply the sample to be included. According to the research questions, this study aims to investigate the role of social media in developing online learning communities in formal and informal learning contexts. Therefore, this study needed to select groups of learners who have used social networking tools for learning in two different contexts. To develop the sense of online learning community over social media, this study suggests using more than one application or social network tool. As presented in the literature review section (2.4), social networking provides a range of different features to communicate and develop an online learning community. Therefore we must investigate the development of learning communities across more than one social networking application to see how a combination of these tools have been used in formal and informal learning groups. Accordingly, this

study purposely selected two groups who had used the same combination of social media tools, a case from each context (formal and informal learning). The purposive sampling is a nonrandom, deliberate choice of a participant due to the qualities the participant possesses. Thus it does not need underlying theories or a set number of participants. Simply put, the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience (Patton, 2002; Zhi, 2014).

Bearing in mind the importance of participants' availability and willingness to participate, and the ability to express their experiences and opinions in an articulate, expressive, and reflective manner. This study has tried to explore the main factors that help to develop an online learning community from the participants' perspectives, and then to investigate for which purposes they used the two tools (WhatsApp and Twitter). This study does not include aspects such as gender, the topic of the groups' learning, or the achievement influence. This study also does not intend to make a comparison between the two cases, because the main focus is to illuminate the factors that develop a sense of online learning community on a combination of social networking tools, and the main uses of these tools in formal and informal learning systems. Both cases (online learning groups) were selected based on previous connections with the group leaders. The formal learning group teacher had been a friend of the researcher (myself) for four years and she was happy to participate with her group of formal students in my research, and the informal learning group leader was also my friend. He was interested in providing and sharing short lessons on his Twitter account, then his informal teaching practice developed into creating an informal learning WhatsApp group based on his followers' requests.

I was concerned about the possibility that the selected cases may not work out well, and was aware that I needed to conduct some early assessment of progress to see if either of the cases should be dropped and another selected. Therefore, I joined both WhatsApp groups after they had been established for a period of time: in the formal learning group, my friend added me a week after creating the group, as all the students had joined and started interacting after the first lecture, while in the informal group the leader added me after two months, as the number of participants had reached 19, and he was confident that the group was active with a lot of learning content and discussions happening between members of the group.

3.5. Participants and context

Case 1: Formal learning group

The first case is a formal learning group, consisting of a teacher and 20 students enrolled in an academic model. The module focuses on 'design and use of educational technologies'. It is a basic requirement for all graduate students in the college of education at King Saud University. The teacher of this module uses Twitter and WhatsApp with her students to share online learning resources and discussions about lecture-related questions each week.

After obtaining the consent of my colleague to participate in this research and King Saud University's ethical form template for collecting data, I administrated an online Google form to collect initial consent from the students (see Appendix A). The form was also used to collect demographic data for the case description, as this was an easy way to gather information and extract it as a spreadsheet. This was used for case description and not relevant to the research findings, they were not required fields – the participants could skip them and just answer the first three questions,

which measured their willingness to participate in this research and to provide their contact information if they were happy to do so.

Appendix B shows the student demographic data for the formal learning group members. This shows that the students belong to the age range of 20 to 24 years. All of them are specialising in education but they were related to different departments. In the college of education at King Saud University there are 8 main departments. Each of these departments' students must take the module 'design and use of educational technologies', as it is a compulsory module for all education students. All the students taking part in the module were encouraged to participate online by their teacher every week by posting lecture-related questions or learning activities. The most common activity was the teacher asking questions related to the previous lecture and the students answering and discussing them. All participants, in this case, are female. However, this research does not focus on the role of gender in online interactions but on the use of social media in developing online learning communities in both formal and informal contexts. As presented in the first chapter, the context of formal education in Saudi Arabia is segregated by gender, which means that females and males are separated in all educational sectors and there are two separated campuses for almost all the universities in the Kingdom. However, the two campuses are managed by one central administration. As this research took place in Saudi Arabia and the two cases (formal and informal) were selected from the same state, I had to choose the formal learning case from either the male or the female campus. I chose the females' campus because I could access all the facilities on this campus. For example, I have an office to secure the collected data in, and I could visit the group members in their classrooms and conduct face-to-face interviews with the students

and the teacher within the campus. Such opportunities would have been limited if I had conducted my research on the other campus.

The participants in this case used social media, especially WhatsApp and Twitter, in this module for discussions and presenting their projects. Their participation in online discussions (Twitter or WhatsApp) was considered in the evaluation of their participation in the course discussion, which was worth five points out of a total of 100 points available in the module assessment. The points for participation were counted by the teacher every two weeks during the ten weeks of the academic term and she then recorded the total points. This means that each student was required to participate on WhatsApp or Twitter at least once every two weeks. She suggested that the participation should involve providing answers to questions raised by the teacher after the lecture or raised by any other students in the group. The teacher used this strategy as she did not think there was enough time for all the students to participate during the lectures, so using WhatsApp enabled all the students to take part in lecture discussions. The teacher created a hashtag for this module and she used this when posting information and resources related to the module. She also used it to remind the students about homework or exam dates or locations. There are many students who use this hashtag, even some from previous academic years. Some faculty members in the department of educational technology also share their views using this hashtag. The WhatsApp group was also created to discuss more specific ideas related to the project and the lectures. This group was created by the teacher and she encouraged the students to join in to share knowledge and discuss topics related to the module. After each session, the teacher posted questions related to the lecture or sometimes encouraged the students to think about the next lecture topic.

Case 2: Informal learning group

The second case – the informal learning group – consists of 20 participants who took part in a WhatsApp group for learning and practising English as a second language. These members are also followers of a Twitter account, @English4Ar, which is for learning and teaching English as a foreign language. This account was created by a graduate student interested in learning and teaching the English language, especially informal phrases and grammar. This account currently has more than 1,000 followers, but the active followers, who interact and participate in learning activities, number around 30. Most of the account's other followers only provide likes or retweets.

The notion of establishing an informal learning WhatsApp group was inspired by the followers' learning needs, and the group leader clarified this as the learning aim of the WhatsApp group. He stated that a number of his followers on Twitter had asked him to provide daily discussion in English and provide examples of informal English phrases and where they could be used. They also asked him to correct their participation, so the idea of creating an informal learning group on WhatsApp to teach English as a second language to a small and secure group came to his mind. Choosing WhatsApp to establish this informal group was determined by the participants, as the leader posted a tweet on his Twitter account to inform his followers about the creation of the informal learning group and asked them to nominate one of the following applications to start their online learning group – WhatsApp, Line, Messenger or Facebook. WhatsApp received the highest number of votes. He therefore started a WhatsApp group and shared the link on his Twitter account, inviting people to join the group. 20 participants joined the WhatsApp group. This group formed my

second case study as an informal learning group using WhatsApp and Twitter to learn and practise English language.

As with the first case, a Google form was administrated online through the WhatsApp group to collect the participants' initial consent to participate in my research (see Appendix A). All the members were happy to participate as a WhatsApp learning group, so the group leader added me to the WhatsApp group to observe and analyse their discussion over three months. I introduced myself and mentioned that I would be a silent member in the group just to see their discussions. I exported their WhatsApp chat every week during the three months to conduct social network analysis and content analysis for the most active three weeks, as explained in more detail in the data analysis section. I also used the Google form to collect demographic data about the members of this group, which helped provide additional detail for the case description. As shown by Appendix (C), their ages ranged between 18 and 25. Some of them were in their last year of secondary school, while others were undergraduate students with a variety of specialisms, including science, business, English, art and education. Seven of them were male and the others were female

The group organiser/leader is an undergraduate student specialising in English as a foreign language. He is also interested in reading and writing in English. Every week he presents one or two main topics or lessons, then the group discusses these throughout the week. He also provides some online resources and links. The discussion is open, so it is common to see many posts unrelated to the learning topics in this group, including local news, jokes, and small stories. Some of the members participate in English to practise their English speaking and writing skills, and they may receive feedback from each other and from the group leader.

The most significant feature in this case is the members' anonymity; most of the group members have not met each other before and some of them did not use their real names on the group. However, they could interact with each other on Twitter when commenting on the group leader's tweets. The members of this group were therefore much more anonymous than in the formal learning setting (case 1), where all the students knew each other as they were enrolled in the same module and met each other every week in lectures. They also used their real names online. Therefore, using the Google form was particularly useful for collecting real information about the participants in the second case study. With this in mind, I was concerned that the selected informal learning case may not work out well, and was aware that I needed to do some early assessment of progress to see if the case should be dropped and another selected. I joined this group after it had been established for two months, and after ensuring that the group was active with a lot of learning content and discussions happening between members in this group. The group leader helped me to make the decision of selecting this group as an informal learning case, as he stated that using WhatsApp to collect his active followers from Twitter was efficient to motivate members to participate in cooperative learning as a small group and develop a community of learning. For these reasons, this group was selected to be the second case study for this research.

3.6. Methods

In this section I will present the data collection tools that I applied in this study. In each section, I will present a short introduction about the tool that briefly summarises its definition and its main uses, and then I will explain how I designed the tool and for what purposes it was employed in this study. Finally, the procedures or protocols for applying the data collection tool are clarified at the end of each section.

3.6.1. Interviews

Interpretivists consider that the best way to learn about people's meaning is to listen to them talking about their experiences in their own way and using words that describe and convey their feelings, attitudes and perspectives. This is the main purpose of conducting interviews in interpretive research. In-depth interviews are often used to study the experiences and opinions of participants, as they can tell and express their stories, memories, views and beliefs (Magnusson & Marecek, 2015). Interviews can be structured to a greater or lesser extent. A completely structured interview is affiliated to a questionnaire, in that all questions are pre-set, even though a range of responses may be anticipated, whereas a fully unstructured interview is more like an open conversation, although usually the interviewer approaches it with a particular focus and purpose. Semi-structured interviews sit between these extremes as they involve the researcher asking participants a series of pre-set questions. The researcher has more control over the themes of the interview than in unstructured interviews; however, there is no fixed range of replies to each question as in structured interviews or questionnaires that use closed questions (Blandford, 2013; Magnusson & Marecek, 2015).

Semi-structured interviews are mainly useful in research questions where there is a predefined theoretical model and the relationships among concepts are relatively well understood (Ayres, 2008). Because of the degree of structure in this interview format, the researcher is able to shape the dialogue, directing the discussion towards areas of research interest while paying less attention to areas that are out of the scope, as a number of questions or at least themes have been planned ahead of time. The participant should do most of the talking; however, semi-structured inter-

views enable the researcher to prompt and follow lines of questioning within the interview, to focus on interesting and unexpected ideas that emerge from the participants' responses. Therefore, the resulting transcript is a collaboration between researcher as interview planner and participants as storytellers.

In order to ensure the interpretive validity of semi-structured interviews, the interview plan must be designed to ask open-ended questions and allow for further probing questions. Ayres (2008) recommends that the researcher must avoid leading and direct questions, such as: "what are the factors of...?" or "what is the relation between X and Y?". Indirect questions should be used instead that can reveal participants' personal perspectives or beliefs, such as: "how would you explain that?" or "how would you evaluate your experience of...?". These questions do not lead the participant into providing only one kind of absolute answer; rather, they encourage them to speak about their personal experiences and perceptions. Magnusson and Marecek (2015) emphasise the importance of careful preparation for interviews. One of the key elements is the preparation of an interview schedule or interview guide, to focus on identifying topics to cover rather than a list of questions to ask in the interview. However, it can be valuable to have essential questions prepare – not because these questions should then be asked strictly as written, but because it offers one way of asking about key topics, which is particularly useful if a blank or silent period occurs during the interview (Blandford, 2013).

The next section presents the design of my semi-structured interview schedule in detail.

3.6.1.1. Design of interview schedule.

According to Magnusson and Marecek (2015), the questions in the schedule or interview guide govern the content of the interviews. The responsibilities of the researcher are to prepare these questions and to ensure that the conversation flows smoothly and the participant feels comfortable. Arthur and Nazroo (2003) recommend that the design of an interview schedule should consist of four sections: introduction; opening questions; core in-depth questions, and closure. I designed my interview schedule according to this recommendation. (see Appendices H and I for interview schedules).

In the introduction section, the researcher needs to introduce the study to the participant: this involves ensuring that the participant is aware of the purpose of the research, has given informed consent that they are happy to have the interview recorded and understands their right to withdraw at any time. Appendices D and E show the information sheets and consent forms for the formal learning participants and Appendices F and G are those for the informal learning participants.

The next section is the warm-up phase of the interview session, which involves open questions and the researcher moving on to encourage the participant to engage in a free-ranging discussion around the topic upon which the interview will later focus (Arthur & Nazroo, 2003). During this phase, I directed the discussion in such a way as to obtain general information about how the participants currently use social media. The emphasis was upon a description of current social networking applications they use, and if they used them for learning purposes. Questions 1 – 4 (Appendix H) and questions 1 – 2 (Appendix I) were asked to encourage the participants to start talking about their personal experiences of using social networking for social or learning purposes and building their own online learning communities.

As the interview progresses the participants should begin to engage in core in-depth descriptions (Blandford, 2013). To simulate this, Magnusson and Marecek (2015) recommend the use of open-ended questions that stem from the proposed theoretical framework of the study. As noted in the literature review, the theoretical framework serve useful roles in interpretive research, such as structuring the gathering and/or analysing of data and reporting of findings. It used as a “lens”, providing informative concepts that impose an initial structure on the collected data, helping to shape and focus data gathering. In both of these cases, it is important not simply to accept the theoretical framework suggested in the literature review, but to examine and apply it, looking for evidence that might extend or contradict its theoretical assumptions. Therefore, the interview schedules as presented in Appendices (H and I) were designed based on the research questions and theoretical framework underpinning the study. As presented earlier, the proposed theoretical framework recommends examining the sense of online learning community from three main levels: individual (participants), interaction and group levels.

In the first level of the framework, the sense of online learning community should be examined by investigating each member of the learning group individually. The interview was used mainly to study the individual perspective, thus many questions in the interview schedules focused on personal experiences and uses of WhatsApp and Twitter in learning from the viewpoint of the participants. There are two main aspects that should be considered here: the first is how the student controls and monitors his/her learning process, and the second is how the student presents him/herself to the online learning group. The individual interviews were therefore designed in line with self-regulated theory (Zimmerman and Pons, 1986) and social presence theory (Rourke et al., 1999; Short, Williams & Christie, 1976).

This study uses social presence theory, presented as part of the community of inquiry model (Col), to examine these aspects of the online learning communities. The three categories of social presence identified by (Rourke et al., 1999) were examined through the interviews. The interviews included some questions that examined the use of affective language, open communication and cohesive sense. According to Rourke et al. (1999), affective language has three indicators: expression of emotion, use of humour and self-disclosure. Examples of the questions used to investigate the extent to which the participants expressed their emotions to the online group are presented in Appendix H, questions 10 and 11; use of humour in question 5 and self-disclosure in question 6. The second indicator of social presence according to Col is the ability to conduct open communication among members. Questions 7, 8, 9 were used to investigate open communication. The third indicator of social presence is group cohesiveness, investigated in the section of the interview that asked questions on the group level. This section will be discussed later.

According to the proposed theoretical framework, this study tries to examine the sense of online learning community on the individual level based on social presence and self-regulated learning approaches. I have presented how interview questions were designed in the light of social presence theory. Now I will present how I investigated self-regulated learning strategies that the members used in their learning process when they were participating in online learning communities on social media. I read to the participants a list of statements about the strategies that students use to regulate their learning, summarised from Zimmerman and Pons (1986), and asked them to tell me how often, if at all, they would apply any of the statements to themselves (e.g. always, rarely, never, before the test, when the teacher asked them to do it). I also asked how the online group would influence their strategies (e.g. the group

encourage me to do it, we do it collaboratively, we do it in subgroups, I do it individually, don't do it as a group). The lists given in brackets are examples of answers that the participants could say, I did not ask the participants to pick from a list of answers. However, when the participants did not understand how to answer to these statements, I could give them as choices.

The interaction level was investigated using social network analysis (SNA) to analyse the connections and direction of interactions among group members on WhatsApp. However, some questions in the interview schedule were designed to explore the nature of the interactions between group members and their views regarding their online discussions and how they thought this reflected on their sense of community. According to the proposed theoretical framework, two main theoretical aspects are used to guide the analysis of online interaction. First, there is the role of the teacher in enhancing and developing interactions amongst community members, which is known as “teaching presence” in the Col model. The second aspect is “cognitive presence”, which examines the extent to which a group of learners can construct meaning, share their understandings, evaluate them and propose a solution to a given question or problem.

Garrison, Anderson and Archer (2000) identify three main categories of teaching presence, which seem to be remarkably consistent across the literature on online learning communities. These teaching presence categories are instructional design and organisation, facilitating discourse, and direct instruction. The current study uses Anderson’s teaching presence categories as a basis to examine teaching presence (see questions 16 to 19 in Appendix H). Questions 16 and 17 were used to investi-

gate instructional design and organisation category. The category of facilitating discourse was investigated in question 18, and the direct instruction category was asked in question 19.

As mentioned above, the second aspect of the interaction level according to the theoretical framework is the cognitive presence. The concept of cognitive presence in Col refers to the extent to which a community can construct meaning, from the initial practical enquiry to the eventual problem resolution. Garrison et al. (2000) define a practical inquiry model to address cognitive presences in the online community of inquiry. The practical inquiry model identifies four phases that could be used to assess cognitive presence: triggering event; exploration; integration, and resolution. These four phases of cognitive presence are mainly examined in this case through the content analysis of WhatsApp conversations (as presented in more detail in section (3.7) in this chapter). However, some questions were asked of the participants in the interviews that revealed the cognitive presences in their online learning communities (see questions 13 – 15).

The group level focuses on examining the concept of an online learning community by analysing an online community as one whole object. This requires analysing the characteristics of the group that form its identity and its structure or topology. To gain a deeper understanding of the sense of online learning community from the whole group perspective, I tried to ask the individual participants some questions that would reveal their views as members of the group. These kinds of questions yielded individual perspectives, however, the analysis of these questions helped me to collect important information regarding the community as a whole, such as how the online learning groups were formed on social media; how the groups described

themselves as a whole community of learning; and what the motivations were that encouraged the members to join and participate in their online learning communities.

As proposed in the theoretical framework, the group level focuses on group identity and group structure. Ren et al. (2012) identify five theoretical antecedents that can develop group identity: group categorisation; providing information about the group; highlighting group homogeneity; highlighting intergroup competition and facilitating familiarity with the group. This study used these five elements as a basis for examining to what extent the WhatsApp learning groups' identities were constructed. Group identity was examined through interviews and content analysis of the WhatsApp conversations, which included analysing the groups' names and icons. In the interviews, there were a number of questions that addressed the groups' identities, such as questions 24 – 27.

Group structure refers to the quality and patterns of relationships existing among group members (Rulke & Galaskiewicz, 2000). To identify online learning group structure, two elements need to be addressed – the division of tasks among group members and identification of the connections between members. As noted before, an effective structure exists when the group reaches an agreement about the division of tasks, roles, and responsibilities to carry out the work. A set of roles can be distributed to the group members, such as introducing the task, data collection, analysing, giving examples, clarifying, synthesising and summarising, timekeeping, and so on. In learning groups, the roles will change according to the nature of the task or the stage of argument (Jaques, 2000; Knight & Pye, 2005). Questions 28, 29, 30 were asked in the interview to address the roles and division of work in the online learning group.

3.6.1.2. Purposes of using semi-structured interviews. Semi-structured interviews were applied to explore the experiences of participants and the meanings they attribute to them as members of online learning communities. As presented above, the interview questions were designed to investigate the concept of online learning communities on social media from three main angles: individual, interactional and group perspective. Thus, the questions for the interview were pre-prepared based on these three levels. Semi-structured interviews are the best tool to collect data from individuals regarding their personal experiences as they allow participants the freedom to express their views in their own terms. This approach also allowed me to prepare the questions for the interview schedule to cover all the main topics of investigating online learning communities on social media stemming from the proposed theoretical framework presented in the literature review. Accordingly, the development of rich data from this kind of interview enabled the researcher to develop the thematic map of the findings of this study. Thus, the main purposes of applying semi-structured interviews were to conduct conversations with participants that covered the main aspects that I believe are important to investigate the sense of online learning communities, and then to be able to create a thematic map based on the participants' responses. The development of a thematic map should be based on reading and thematic analysis of rich qualitative data. However, the development of rich, relevant data relies on the interviewer's ability to understand, interpret, and respond to the verbal and nonverbal information provided by the participants (Magnusson and Marecek, 2015). Applying semi-structured interviews enabled me to collect verbal and non-verbal data from the participants that could convey in-depth meanings and enable me to gain a better understanding of their participation in and feelings regarding their online learning group experiences.

Another important purpose of using semi-structured interviews in this study was probing questions in more detail during the interview. The pre-identified interview questions were used mainly as a guide for the conversation and to ensure that we covered all the main topics that I wanted the participants to talk about. However, the main advantage of semi-structured interviewing is that it allows the researcher to probe more into questions that may help to shed light on more details of the participants' stories and their experience of using social media for developing their online learning communities.

3.6.1.3. Procedures. The data collection period lasted for three months. It consisted of observing the online discussions on WhatsApp for each group (formal and informal) and conducting semi-structured interviews with all of the members of each group. Semi-structured interviews were conducted individually (one-to-one) with the teacher/leader and ten members (students/learners) from each group. The rest of the groups' members were interviewed in small groups; more details about the small group interviews will be presented in the focus group method section. Semi-structured interviews were conducted one time for each participant. After the participants had worked together for three months (i.e., 12 weeks after the WhatsApp groups were created), I started conducting the interviews with the students. This was to allow time for interactions to happen between members and for them to get to know each other and develop a sense of online learning community. The teacher and group leader, however, were interviewed face-to-face in the fifth week to ask them about their plans and how they managed the groups. See Appendix (H) for learners' interview schedule and Appendix (I) for teacher/leader interview schedule.

The ten members interviewed individually were chosen from each case by the teacher and group leader. I asked the teacher of the formal learning group and the leader of the informal learning group to nominate ten different members who had shown different levels of participation in the WhatsApp discussions, and were also at different levels of achievement according to the teacher/leader's perception. After the 20 students were nominated (10 from each case), I gained their consent via email to participate in one-to-one interviews. I sent an email to each interviewee to ask them if they would be happy to voluntarily participate in the interview and to arrange a time for the interview. I suggested the location could be my office at King Saud University, or any other quiet place they preferred. For the informal learning group, as they were from different places and different academic institutions only three of them were able to meet me face-to-face, so I interviewed most of them through Skype calls. The interviews lasted about an hour for each student/learner, and about two hours for the teacher and group leader.

My relationship with the participants was formal but friendly; I tried to create a calm and friendly conversation with them. I used notes as an interview guide to follow the pre-prepared questions. As presented in the interview design section, I devised this interview to consist of four main phases. The introduction section started with me introducing myself and presenting my research focus, as well as what I needed from them as participants and the nature of their participation in this research. This involved ensuring that the participants were aware of the purpose of the research, had given informed consent that they were happy to have the interview recorded, and understood their right to withdraw at any time. I then gave them time to read and sign the information sheet and consent form. For the participants interviewed through Skype, I obtained their consent by email – I sent the information and they replied if

they were happy to participate in the interview. Then I asked them some warm-up questions related to their social networking application use and their learning style. This kind of question encouraged the participants to talk about themselves and allowed them to feel more comfortable, building a friendly rapport between the researcher and the participants. In the third section, the core discussion, I encouraged participants to talk about issues pertinent to the use of social media as an educational tool. It seemed that asking open-ended questions in one-to-one interviews enabled them to talk without restrictions, as they had been informed that all the information gathered would be used only for research purposes. They therefore knew they could talk about their experiences without concerns regarding their teacher or their marks in the formal group and knowing that their identities would be secure in the informal group. I also sometimes re-worded, re-ordered or clarified the questions to further investigate topics introduced by the participants. Moreover, questions that came to mind during the interviews enabled me to get in-depth and detailed information from the participants. In the last section, I summarised the main ideas discussed in the interview and listed the key points of the participant's responses. I then asked the participant if they agreed with this summary and gave them time to add anything or ask me any questions. At the end of the interview, I thanked them for their participation and gave them my contact information in case they wanted to contact me further about the study or their participation.

During the interviews I wrote some notes to capture the respondents' main reactions and nonverbal signs, and my current thoughts as analytic memos or prompting questions. That helped me when I started analysing the interviews. All the interviews were recorded on my phone and I later transcribed these recordings. The transcripts of the interviews are saved in digital format in my private Exeter University

drive. I read these transcripts several times in order to generate thematic maps of the study's findings – this process is explained in more detail in the data analysis section. My notes and the transcripts were sent back to the participants by email to review them for accuracy. This provided me with an opportunity to write questions into the notes where additional information was needed. Additionally, this review allowed the participants to edit or correct what I understood from the interview, which could reduce problems later that might be caused by disagreement over the findings.

3.6.2. Focus groups

As mentioned previously, one-to-one semi-structured interviews were conducted with ten students from each group, while the rest of the group members were interviewed in groups of four to five participants there were two focus group interviews in each case study. A focus group is a research method that collects data on a topic determined by the researcher through group interaction (Acocella, 2012). These dynamic group conversations are used to collect information about the participants' feelings, perceptions, and thoughts about a particular incident, experience or service. The method does this very well, because focus groups utilise qualitative data collection methods – just as in the dynamics of real life, the participants are able to interact, influence, and be influenced (Rakow, 2011). Regarding the proper number of participants in each group, Lindlof and Taylor (2017) state that the protocol for focus group interviews has by now become well established, with six to 12 people accepted as the best size. Moderators often begin focus groups by asking wide-ranging questions about the topic of interest, before asking the main questions of the interview. The participants have to answer the moderator's questions individually; however, they are encouraged to talk and discuss with each other (Krueger, 2014). This method is

based on the notion that group interaction encourages participants to explore and illuminate individual and shared insights (Morgan, 1996).

3.6.2.1. Designing the interview schedule. The line of questioning used in the focus groups was based on the semi-structured interview schedules as shown by (Appendices H and I). The same questions asked in the one-to-one semi-structured interviews were asked in the group interviews. As presented earlier, an interview guide is predetermined and follows a logical sequence that is intended to build a rapport, warm up the conversation, maintain the discussion and then summarise and thank the participants. The participants had to answer my questions individually, but I also encouraged them to discuss things with each other and contribute to each other's responses. I was careful to ensure that all participants in the focus group had a voice and contributed as equally as possible. I tried to look at all the members and encourage all of them to participate in the discussion. The protocol of the semi-structured interview enabled me to probe further questions during focus groups and also to encourage dynamic conversation by asking questions such as, 'Does anyone have an addition to or interpretation of the idea of...?', 'Has anyone else experienced this?' and 'Does anyone have a different experience/viewpoint?'

3.6.2.2. Purposes of using Focus Groups. In-depth and semi-structured interviews were applied to explore the experiences of participants and the meanings they attributed to them as individual members joining an online learning community. However, a focus group (FG) is intended to illuminate the perceptions of a group of participants. Krueger (2014) confirmed that one of the main goals of the FG is to reveal the 'public self' (p. 8). The collective and public dimension of opinions is one of the main

targets of this study, which is to examine the sense of the online learning community at the group level. As presented in the theoretical framework, the group level aims to examine the sense of connectedness by investigating group identity and group structure. Interviewing a group of participants can produce rich information about these aspects, as the members can negotiate their answers and comment or add to each other's comments regarding their perception of how they function as an online learning community. This technique is considered useful for providing necessarily detailed information in a short amount of time because FGs can be asked to explore how things happen, or why people feel or act a certain way or even to discuss differences of opinion (Esterberg, 2002). Many authors confirm that the FG is principally suitable for highlighting unpredicted aspects of a social phenomenon, as it focusses more on the frames of reference of the groups being analysed than on those of the researcher (Morgan and Spanish, 1984).

The main advantage of using FGs in this study was to generate productive information and discuss it from different points of view, which can be a result of dynamic interaction and the opportunity to build on one another's thoughts. Acocella (2012) justifies this by stating that, during FG discussions, the conversation among members who are considered 'experts' on the phenomenon being studied, who share a common social background with the other participants who identify as belonging to the same social group, can raise intersubjective representations that reflect the descriptions and beliefs of that social group configured into the FG. Of course, the interpretations given to a social phenomenon will change according to the group, even when that particular phenomenon is mostly shared by each of them, as these changes are connected to the interaction among the FG members in terms of interpreting the relevant experiences.

3.6.2.3. Procedures. The FGs were conducted as semi-structured discussions with groups of people, which aimed to explore a specific set of issues around developing the online learning community. There were four focus groups, two groups from each case study (formal and informal). Each group interview lasted between one hour and 90 minutes. These groups were formed randomly, and all the members were informed about and agreed to the FG by email before taking part in the interview. As mentioned before, the members who were not interviewed individually (about 12 participants from each case) were asked to choose if they wanted to participate in a group interview. There were four to six participants in each FG. Similar procedures to those mentioned above were carried out to obtain their consent and store the collected information. In addition, I mentioned via email that they would be interviewed with other members from their WhatsApp learning groups, and I informed them of the other group members' names and the time and place of the meetings. Accordingly, the participants were fully informed about the members of the interview and they had the right to attend this interview or withdraw without disadvantage to them. I interviewed the informal learning group on Skype via group video calls. After selecting the participants for the FG and adding them to a chat, I clicked the 'call' button to begin the group video call. I waited for everyone to answer my call before starting the interview; however, the group video call could start even if some participants failed to answer the call. There were two members missing from each FG in the informal learning case, as they did not answer the call. The interview guide used for the one-to-one semi-structured interviews was applied to the group interviews; however, dynamic conversation was also encouraged in the group discussions. I started each FG by introducing myself and presenting a brief about my research topic and purposes, then asked each member to introduce themselves. After this, I followed the interview

guide, asking broad questions before asking the focal questions. Although participants individually answered the questions, they were encouraged to talk and interact with each other. After all of the members had answered a question, I gave them about five minutes to discuss the question with each other; I encouraged these discussions by summarising the main points raised in the conversation and asking them to comment on or add to them. This technique encouraged the participants to explore and clarify individual and shared views through group discussion.

3.6.3. Online forum discussions

Online forum discussions are one of the most commonly used qualitative internet research methods (Lombard, Snyder-Duch & Bracken, 2002). Online forums are spaces or applications that are used for text-based discussion, where participants can post messages on specific topics and discuss them with others (Holtz et al., 2012). The current study used the WhatsApp application to collect various data types, including media, voice, video, text, and then used a content analysis procedure to classify this data based on a coding scheme for analysing WhatsApp conversations across the formal and informal learning contexts.

In this study, members of two WhatsApp groups were observed for three months. During the three months of data collection, 2,494 messages were sent in the formal learning WhatsApp group and 8,546 in the informal learning group. Content analysis was conducted on the most active and highly connected of the three weeks' conversations: these weeks were the fourth, sixth and tenth weeks for the formal learning group (a total of 854 messages sent), and the second, third and sixth weeks for the informal group (2,373 messages). Thus, content analysis was applied to a total of 3,227 WhatsApp messages. A coding scheme was specially developed to analyse the content of the WhatsApp messages. Also, throughout the three months of

the data collection, the participants in the formal learning group posted 1,729 tweets under eight different hashtags created by the teacher based on the topics of the lectures. The informal learning group posted 3,029 tweets under 12 hashtags created by the leader of the group based on their learning topics or social topics. These tweets were observed but their content was not analysed due to ethical and methodological concerns; however, these posts gave the participants a way to explain their answers, using examples, to some of the interview questions (e.g. How did using Twitter in your learning enable you to receive direct instruction from other users? How can you express your agreement or disagreement with others' posts on Twitter?), followed by encouragement for sharing examples from their tweets. Thus, the participants reflected on their tweets during the interviews, but the content has not been used as a main data source in this study.

3.6.3.1. Purposes of using online discussions. Online forums can yield an abundance of useful 'natural' discursive data for social scientific research. A key point is that online discussions are polysemic and that content analysis of these discussions helps to provide another source of evidence to understand the learning process on social media applications. It offers useful information about the development of online learning communities by analysing the interaction among group members. In a sense, online forum discussions create a kind of unmoderated 'virtual focus group' (Moloney, Dietrich, Strickland, & Myerburg, 2003) in which members of a community discuss topics without a researcher interfering and probably influencing the expression of their thoughts. Hence, material from online forum discussions can be considered as relatively authentic or 'natural data'. This kind of natural data in a virtual social setting also produces a reliable source of data that can be triangulated with the thematic analysis and the social network analysis of this study. Also, content analysis

of a group conversation can provide an overall picture of the meaning of group interactions as a community of learning in which the meaning would have been produced collectively (Holtz et al., 2012). Contributions by one member can stimulate new and often more detailed responses from other members, which can help to understand and clarify the development of the sense of online learning communities (Im & Chee, 2006).

The WhatsApp discussion transcript analysis was conducted on a selected sample based on the most interactive and connected conversations happening across a three-week period. In the data analysis section, I have explained in more detail how the samples of the content analysis were selected based on the findings of the social network analysis. Analysing conversations from the most active weeks can provide important information on the depth and the proportions of individual, interactional and group factors that occurred in each group; this is necessary to understand the nature of their learning process within an online community. The next section presents the design of the coding scheme in the light of the theoretical framework.

3.6.3.2. Design of coding scheme. As mentioned earlier, the proposed theoretical framework used to guide this study, including data gathering, suggests studying the sense of online learning community on three levels: the individual level, to examine how each participant present themselves to the group and how they self-regulate their learning within the group; the interactional level, which focuses on the participants' interaction with the learning to develop their cognition and the role of the teacher in stimulating these online interactions; and the group level, which refers to the group's identity and the structure of the group. An extensive literature search for methods to analyse online discussions in a social networking learning context did not

return a method that met the conditions suggested by the theoretical framework underpinning the study. Therefore, the current coding scheme was designed according to the proposed theoretical framework, with a number of coding schemes related in previous studies, including Garrison et al. (2001), Rourke et al. (1999), Anderson et al. (2001) and Veldhuis-Diermanse et al. (2006), used to guide the design. This was done by modifying some of their categories to make them suitable for my research purposes. Rourke and Anderson (2003) advised that, instead of developing new coding schemes, researchers should modify existing instruments or use schemes that have been developed and used in previous research. After designing the first version of this coding scheme, I developed it using the findings of the thematic analysis of the interviews, as there were some categories that needed to be modified, added or removed based on the main themes that emerged. The second version was applied to a pilot sample to ensure that all the categories and codes of the scheme were defined clearly and specifically.

The coding scheme distinguishes eight basic categories of WhatsApp conversations: initiating conversation; responding (engaging in discussion); discussion; reflection; metacognition; affective language; unrelated topics and WhatsApp affordances. The definitions of the coding categories and examples from the participants' WhatsApp conversation scripts are summarised in Appendix (J). The following discussion briefly describes each category. Table 1 summarises the features of my theoretical framework and the corresponding coding scheme categories.

Table 1: Coding scheme based on the theoretical framework of the study

Theoretical framework		Coding scheme Categories
Individual level	Self-regulated learning approach	Metacognition (setting plan, monitoring and guiding the discussion)
	Social presence	Affective language (greeting, expressing emotions)
		Unrelated (personal stories and social topics)
Interaction level	Cognitive presence	Initiate conversation (question, activity, sharing resources)
		Response (direct answer, ask another question, provide evidence)
		Discussion (add more information, agree, disagree)
		Reflection (connect ideas, summarise)
Group level	Teaching presence	*Teacher posts (facilitate, design activity, direct instruction)
	Group identity	WhatsApp affordances (direct replies, group's name and icon)
	Group structure	**SNA

Metacognition means understanding, analysis and control of one's cognitive processes, especially when engaged in learning. This category encompasses the subcategories of setting a plan, monitoring and guiding the discussion. This code captures messages such as those dividing tasks or work among participants and those related to time. The monitoring aspect includes monitoring the schedule, achieving a goal or planning learning. Guiding the direction of the discussion includes keeping the conversation focused on the main topic, ending the discussion or raising a new topic to direct the conversation to another idea or learning activity.

Affective language is concerned with posts that convey or arouse feelings or emotions, this encompasses messages by the group members greeting each other and describe feelings using words or symbols.

Unrelated topics capture posts that are unrelated to the learning topic. Typically, these posts could be about personal stories or experiences, social news or events shared by the participants.

Initiating conversation refers to messages that were sent after a period of silence lasting a day (24 hours) or more. This category contains codes for starting a discussion or debate. To initiate a conversation, the participants tended to post three types of messages: asking a question; proposing an action or inquiry activity; or sharing a resource, such as a website link, video or picture.

Response indicates the answers to questions, which means that the participant has started to engage in the discussion. This category encompasses codes that capture messages demonstrating direct answers, furthering detailed questions or providing resources that show the answer to a question.

Discussion indicates comments on other posts. This category reflects a high level of interaction with other members and the cognitive presence of the participants. The participants discuss other posts by agreeing with them, disagreeing or adding more information to the original point.

Reflection captures messages that were sent as a reflection on the whole conversation. These messages could be connecting ideas with each other or with a wider context, or could summarise the conversation.

WhatsApp affordances capture the uses of WhatsApp features that enable the participants to interact with each other directly, such as replying to a specific message or tagging a specific member in a post. Another feature is demonstrating group identity through the group's name and icon. This category also includes asking for technical help, which reflects the level of familiarity and ease of usability.

To guide the process of designing the coding scheme, I referred to the theoretical framework to identify the main aspects that should be examined in the online discussion transcripts. This theoretical framework as presented in section (2.6), was

provided by several theories and models, including self-regulated learning and the community of inquiry model, which involves social presence, cognitive presence and teaching presence (Garrison, Anderson and Archer, 2000), group identity and group structure (Ren et al., 2012). The reviewed schemes provided me with many ideas that I could use to develop a new, more suitable method for analysing WhatsApp conversations. The eight categories of the current coding scheme were identified because they pertain to the three levels of investigating online learning community suggested by my theoretical framework and because of their connection with the work of developing online learning communities and describing the interactions in an online community of inquiry by Garrison, Anderson and Archer (2000). Additionally, these categories emerged as main or sub-themes in the interview findings, so I needed to include them in the coding scheme to enable me to triangulate the findings from each method. Therefore, the analysis of the online discussions appears capable of examining the sense of online learning community based on the three necessary levels: individual, interaction and group.

As shown in Table 1, the individual level analysis is provided by social presence theory and the self-regulated learning approach. Thus, to design a coding scheme that captures the indicators of these two aspects of individual level, I followed the guidelines of Rourke et al. (1999) indicators for developing social presence categories. I also used the guidelines of Veldhuis-Diermanse et al. (2006) for codes to include in the metacognitive learning activities. According to Rourke et al. (1999), social messages, such as jokes, compliments, and greetings, do occur frequently in online asynchronous discussions. It seems to be important to provoke the sense of community among members. The social presence analysis model, developed by Rourke et al. (1999), consists of three main categories: affective responses, open

communication and cohesive responses. I adapted this model into a form that is simpler and could fit with my research purpose to use it for social presence indicators. The affective response category, as per Rourke et al., encompasses the following features: expression of emotions, use of humour and self-disclosure. Open communication and cohesive categories seem to represent something different from my interest in this part of the coding scheme. According to Rourke et al. (1999), the open communication category is about relevant and constructive responses to the questions and contributions of others, such as referring to other messages or expressing agreement. Cohesive responses refer to the phrases used by participants that could build and reflect their group cohesiveness, such as “we” and “our”. The three main categories selected to address social presence in my coding scheme are: affective language; unrelated topics (such as personal stories, social events). Affective language corresponds to the expression of emotions code in Rourke et al.’s (1999) affective responses category, while unrelated topics such as personal stories and social events correspond to the self-disclosure code within the affective responses category in Rourke et al.’s model. The other categories proposed by Rourke et al. (1999). seem to be more related to the interaction and group levels of investigating the sense of online learning community, so I did not select them as indicators for social presence at the individual level. However I will discuss them later in the group level of investigating a sense of online learning.

As shown in Table 1, the second theoretical assumption on the individual level is the ability of an individual to self-regulate his/her learning, As presented in the interview method section, I asked the participants how they managed their own learning within their online learning community by asking them about the main strategies of self-regulated learning, as identified by Zimmerman and Pons (1986). I based the

development of my coding scheme on Zimmerman and Pons' strategies as well as the coding scheme for analysing metacognitive learning activities developed by Veldhuis-Diermanse et al. (2006) as part of *Analysing Learning Processes and Quality of Knowledge Construction in Networked Learning*. Based on these two references, the main three activities that students must carry out to self-regulate their learning are setting a learning plan, monitoring the plan and controlling their learning activities. In networked learning, Veldhuis-Diermanse et al. (2006) suggests to analyse metacognitive activity based on three main categories: planning, in which the learner defines a plan for how to execute a task; preserving clarity, referring to messages written in order to keep the structure and the content of the online discourse clear, and monitoring, which refers to activities aimed at monitoring the learning plan, aims, or time. I used these categories as indicators for the metacognition categories in my coding scheme. Therefore, metacognition categories focused on the three main indicators: 1) setting a plan which corresponded to planning for learning; 2) monitoring same as the second category of Veldhuis-Diermanse et al. (2006); and 3) Guiding direction of dialogue correspond Preserving clarity in Veldhuis-Diermanse et al. (2006). For simplicity, the codes of each sub-theme were shortened to meet the content analysis needs of this study.

As presented in the proposed theoretical framework and summarised by Table 1, the interaction level focuses on the interaction among community members and is concerned with learning content-related discussion and the role of the teacher in this kind of discussion. To examine these two components in the online conversation, I referred to the cognitive presence and teaching presence, which are two of the three elements of the Col model. Cognitive presence in Col explains the extent to which a community can construct meaning, from the initial practical inquiry to the eventual

problem resolution. Garrison and Archer (2000) define a practical inquiry model to address cognitive presences in an online community of enquiry. As presented in the literature review in section (2.6.2), the practical inquiry model (Garrison et al., 2001) operationalises cognitive presence through the practical inquiry process, which comprises four phases: triggering event; exploration; integration, and resolution.

According to Garrison et al. (2001), it is important to note that the practical inquiry model indicators should “not be seen as immutable” (p. 9), meaning that other researchers using the practical inquiry model may have to refine or revise its criteria to meet their specific analysis needs. I used the four phases of the practical inquiry model as guidelines to develop cognitive presence indicators that would suit and meet my analysis needs. Therefore, to address cognitive presence, my coding scheme involves the following categories: triggering event, which corresponds to the initiating a conversation category, such as asking a question; exploration, which is examined through the response and discussion categories; integration, which is addressed by the reflection category in my coding scheme, and lastly, the resolution phase, which falls under the metacognition category in my coding scheme, as it seems that it is more related to metacognitive processes, especially when the participants try to guide the direction of a dialogue . Therefore, the resolution phase is addressed in my coding scheme using two codes: (G2), which relates to finishing the discussion by providing a summary, and (G3), finishing the conversation by introducing a new topic or question. These kinds of messages encourage learners to move on to different or more complex ideas or topics.

Analysis of teaching presence was conducted on messages sent by the teacher of the formal group and the leader of the informal learning group. Garrison and Anderson (2003, p. 66) emphasise that “teaching presence is what the teacher

does to create a community of inquiry, and that includes cognitive and social presence". On this basis, this study investigated the indications of the teaching presence categories through content analysis of the teacher's/leader's WhatsApp messages. In this regard, I refer to Anderson et al.'s view of the function of the teacher as consisting of three major roles: "first, as designer of the educational experience, including planning and administering instruction as well as evaluating and certifying competence; second, as facilitator and co-creator of a social environment conducive to active and successful learning; and finally, as a subject matter expert who knows a great deal more than most learners and thus he is in a position to scaffold learning experiences by providing direct instruction." (2001, p. 2).

These three roles are the basis for their approach to assessing teaching presence. I found that it would be complicated to create a new coding scheme to analyse teacher/leader posts, as they play different roles and they are participating in different learning contexts – formal learning and informal learning. Therefore, I used the same coding scheme for analysing student/learner messages to analyse the teacher/leader's messages. However, in my findings, I consider the three main indicators of teaching presence, as provided by Anderson et al. (2001), to be: 1) the instructional design role of the teacher or group leader addressed through metacognition category, which consists of planning, monitoring and controlling the online discussions, 2) The role of the teacher as facilitator and co-creator of a social environment is addressed through three categories in my coding scheme: initiating a conversation, such as asking a question or sharing an interesting learning resource to encourage the students to interact; affective language, such as greeting students and engaging their emotions by encouraging them and setting a climate for learning. The latter combines several codes from Anderson et al.'s "facilitating discourse" category,

and 3) Direct instruction is addressed through three categories in my coding scheme: response (direct answer, ask another question, and provide evidence); discussion (add more information, agree, disagree), and reflection (connect ideas, and summarise). These categories cover several codes from Anderson et al.'s direct instruction indicator, such as present content or question, inject knowledge from diverse sources and confirm understanding through assessment and explanatory feedback (Garrison et al., 2003, p. 71).

Group level is the third level suggested by the theoretical framework to investigate the sense of online learning community. Information for this level was provided by group identity theory (Rourke et al., 1999) and group structure. The concept of group cohesiveness and connectedness was proposed by Rourke et al. (1999) as one of three indicators of social presence. However, other authors, such as Preece and Maloney-Krichmar (2005) and Ren et al. (2012), claim that group cohesiveness can be developed through enriching the attachment bond between members as well as between each member and the whole group (Ren et al., 2012). Therefore, I address this component in my coding scheme through analysing direct interaction between members and the development of each group's identity through its name and picture.

As discussed before, this coding scheme is designed based on the theoretical framework and then developed using the findings from the thematic analysis of the interviews. As we will see in the findings chapter, the application's features were one of the main themes that emerged from participants' interviews, as they confirmed that they were one of the main elements that could enhance the development of their online learning community on social media application. Therefore, I introduced WhatsApp affordances as a main category in the coding scheme to represent the

main features of WhatsApp that support group cohesiveness, such as direct replies between group members using “tag” or “mention” features (W1) and expressing group identity through group’s name and icon (W2). There is also another code under WhatsApp affordances, which is technical help (W3). This code was used to assess the extent of familiarity and ease of use of the tool among members, as fewer messages coded as technical help would mean more familiarity with and ease of use of the tool. This code was used to triangulate the findings of the interview thematic analysis.

3.6.3.3. Unit of analysis. The unit of analysis determines the segmentation of the transcripts in the online discussion that need to be classified based on the predefined codes. The choice of unit of analysis affects the accuracy of the coding and the extent to which the data reflect the true content of the original discourse. Three main units of analysis have been reported in the literature of online discussion content analysis: themes, the whole message or the sentence (Hearnshaw, 2000).

As part of designing the coding scheme and to address its reliability, the unit of analysis should be carefully determined. The choice of a unit of analysis is dependent on the context and should be carefully considered, because changes to the size of this unit will affect coding decisions and comparability of outcome between different codes (Cook & Ralston, 2003). To identify the most appropriate unit of analysis for this study I referred to the aims of conducting content analysis in this study and the nature of WhatsApp conversations. This study used content analysis of WhatsApp conversations to triangulate these findings with the interview findings, and the final version of the coding scheme was developed based on the themes that emerged from the interview findings. Therefore, using “theme” or “unit of meaning” as

a unit of content analysis seemed more appropriate and fitted better with the interview thematic analysis. Also, WhatsApp as a communication tool enables the user to write long messages – the limit for a WhatsApp message is more than 65,000 words, which is more than enough for expressing a large number of meanings. Therefore, we cannot consider the message as a unit of analysis for WhatsApp conversation scripts. Using theme or unit of meaning as a unit of content analysis could overcome the problem of identifying precise segments of the discussion as a unit that would be presented by using sentences as a unit of analysis (Rourke et al., 2001). In the Arabic language, punctuation marks are not used to separate sentences as in English – they can be used to separate information, ideas or paragraphs (Khasawneh et al., 2013). The users therefore do not clearly separate their sentences using marks such as full stops or commas; instead, they tend to link many sentences together in one message to convey one idea. As a result of the possibility of more than one meaning per message, some messages or sentences could be coded under more than one code. Therefore, the use of meaning as a unit of analysis was identified as the most suitable and accurate procedure for this study.

3.6.3.4. Coding Scheme Reliability. After finishing designing the coding scheme and identifying the unit of analysis, I translated them into Arabic and sent them to my colleague (the teacher of the formal learning group) to read. We then allocated about three hours, one hour per day, to train my colleague to apply this coding scheme on a pilot sample of the formal learning WhatsApp conversations. On the first day, I introduced the instrument and its purposes and explain how to identify the ideas within the messages as we used the unit of meaning to code the conversation transcripts. I then explained each category and code and presented an example of coding ten WhatsApp messages. On the second day, we applied the scheme to a sample of 50

WhatsApp messages together as co-operative work. The third session was applying the scheme individually to another 50 messages and then discuss our judgments. After this discussion, it seemed that my colleague did not face any ambiguity in applying this coding scheme and that she understood each category and the codes within them.

The reliability sample was selected randomly based on the week number. It was week number two, so all chats that happened in the two groups in the second week (out of 12 weeks of data) were exported and analysed by the two coders – myself and my colleague. This sample formed about 20% of the total messages of the sample of content analysis from each group. The total number of messages analysed by the two coders was 645 (133 from the formal learning group and 512 from the informal group). To be sure that the data represented the two coders' judgments on the same units of analysis, we identified the units of meaning in each message together. The total number of units of analysis in this sample was 661 units. Next, each coder applied the coding scheme individually to these 661 units.

To calculate inter-coder reliability, I used ReCal2, which is a Reliability Calculator for 2 coders; it is an online utility that computes inter-coder/inter-rater reliability coefficients for nominal data. This tool can calculate four of the most popular reliability indexes or coefficients for nominal data: per cent agreement; Scott's Pi; Cohen's Kappa, and Krippendorff's Alpha. Table 2 shows the results of the reliability coefficients:

Table 2: Inter-rater reliability coefficients

Per cent Agreement	Scott's Pi	Cohen's Kappa	Krippendorff's Alpha (nominal)	N Agreements	N Disagreements	N Cases	N Decisions
80.8%	0.792	0.792	0.793	534	127	661	1322

There is no general agreement on what indexes should be used to report the reliability between coders (Rodriguez, 2014). Per cent agreement is the outcome of the ratio between the number of units coded agreed upon ($n= 534$) and the total number of units (661). It is the simplest and most popular reliability index. However, its major weakness is that it fails to account for agreement by chance (Lombard et al., 2002). The other three indices – Scott's Pi, Cohen's Kappa and Krippendorff's Alpha – do account for chance agreement, and they are considered more restrictive than per cent agreement (Lombard et al., 2002; Rourke et al., 2001). Therefore, it is recommended to calculate and report on both indices. In this way, more information is given to the readers of research studies to allow them to judge reliability.

As presented by Table 2, the per cent agreement was more than 80%, while chance correcting measures value is 0.79. There is no standard available to judge the per cent agreement of inter-rater reliability; however, it is often stated that a value of 70% can be considered as reliable. For chance correcting measures, coefficients of .80 or greater would be excellent and values above 0.75 are indicative of an acceptable agreement beyond chance, while values below 0.70 mean that there exists great disagreement between the coders (Lombard et al., 2002; Rourke et al., 2001). Based on this, it seems that the inter-coder reliability of this coding scheme is acceptable.

3.6.3.5. Procedures of applying the coding scheme. After gaining the participants' consent to take part as the online learning groups for my research, I joined the two WhatsApp groups. I sent a greeting and introduced myself and my research, informing them that I would be a silent member just to observe and analyse their conversations. Data collection lasted for three months (12 weeks), as this is the normal length

of one academic term in higher education in SA. At the end of each week, I extracted the WhatsApp group conversation transcripts as text files, and I conducted social network analysis to measure group density and member connectivity. At the end of the data collection period, I selected the three most interactive weeks for each group, in which the participants posted the most messages (group density) as well as demonstrating the most connections between each other (in- and out-degrees). I then started applying the coding scheme on the sample of content analysis (the three active weeks' conversations) for each group. The analysing process consisted of two steps: 1) dividing students' posts into meaningful units, and 2) assigning a code to each unit. Then, two methods of quantitative measurement were conducted: the total frequency of a code and the percentage of the code in relation to the total number of coded messages. Quantitative measurements of the frequencies and the percentages were reported for the two groups' conversations and used as additional source for the findings.

3.7. Data Analysis

The findings of this research are based on the application of two phases of data analysis:

- Inductive phase, including thematic analysis applied to the interviews to generate a theoretical map from the data, and to redefine the coding scheme for analyse online discussions.
- Deductive phase, including content analysis and social network analysis to triangulate the emergent findings developed in the inductive analysis phase.

Figure 2 shows the links between the three data analysis procedures used within the inductive and deductive phases.

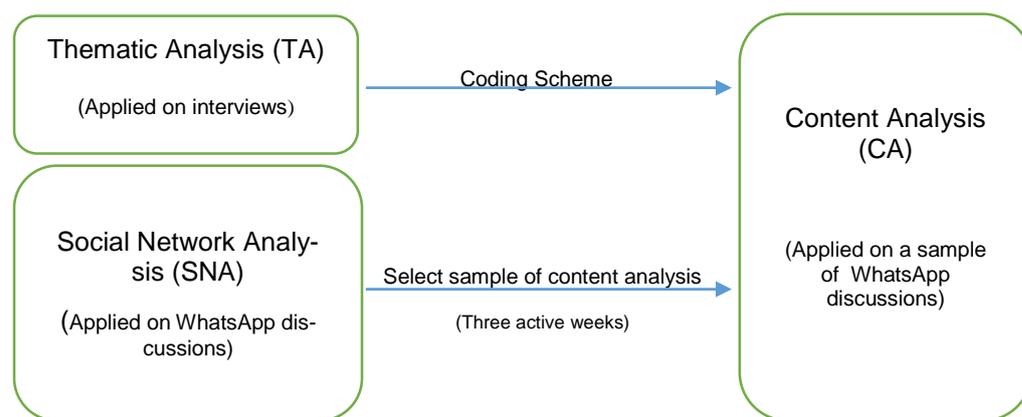


Figure 2: Data Analysis procedures

3.7.1. Inductive phase

Two main outcomes were taken from the thematic analysis: 1) generating the thematic map, which would lead to answering the research questions, and 2) redefining the coding scheme, that was generated based on the theoretical framework, to analyse the WhatsApp discussions. At the start of my thematic analysis, I transcribed all the interview recordings. I then read through these texts, trying to establish any codes that could be gathered to generate common patterns or “themes”. The term

“theme” used in this study, refer to the number of codes or “sub-themes” that capture important evidence drawn from the raw data. All of the themes are related directly to the research questions.

The interviews were conducted to gain an understanding of how participants perceived the role of WhatsApp and Twitter in developing their sense of learning communities. Thematic analysis was applied to analyse the interview transcripts. I applied Braun and Clarke’s (2006) six phases plan to conduct this inductive thematic analysis: 1) transcribing the interviews, reading them several times and making notes of my initial ideas about the data; 2) generating initial codes to capture interesting features of the data in a systematic way across the entire sample, gathering data relevant to each code; 3) sorting codes into potential themes, gathering all data relevant to each theme; 4) reviewing themes to check if they work in relation to relevant codes and with the entire data set, then generating a thematic “map” of the analysis; 5) creating clear definitions and names for each theme, improving the specifics of each theme and the overall story told by the analysis, and 6) writing the report of the findings and supporting it with selected extracts of data.

Generate a thematic map. Inductive data analysis assisted me in elaborating the meaning of the main themes related to the research questions and identifying the link between these themes and the sub-themes that emerged from the data. At the same time, I was attempting to write my analytic memo, which describes my thoughts and hypotheses about the themes and the relationships between them. Each main theme was developed using a propositional statement; I then compared these propositional statements in order to establish possible relationships and thereby answer the research questions. During this process, I sorted and compiled a set of memos

related to each theme. I treated this sorting tentatively, hoping to create the best potential balance between the collected data, the emerging codes and my hypothetical statements about them.

I then checked my own thoughts and perceptions about the main themes and sub-themes against the transcripts; to ensure that my perceptions are supported by reliable material. I re-read the data to collect further evidence to confirm my first draft until the themes were saturated (that is, when gathering new data no longer generated any further new ideas or thematic properties). The final thematic map is presented and discussed in the Findings chapter.

3.7.2. Deductive phase

3.7.2.1. Content analysis. Content analysis “is a research technique for making replicable and valid inferences from texts to the contexts of their use” (Krippendorff, 2012, p. 24). The main purpose of applying content analysis to the WhatsApp discussions was to gain insight into how the participants interacted on WhatsApp for formal and informal learning purposes and into the role of WhatsApp as a synchronised and unsynchronised communication tool in developing their sense of online learning communities. The main factors were inducted from the thematic analysis, so the content analysis is used here to confirm and test these deduced factors through analysing the discussion of the members in each group during the most active and connected three weeks. Because this study focuses on the factors that enhance the sense of online learning communities, the content analysis was conducted to examine discussions from the three weeks when the members of each group were most active and connected. The samples were chosen based on the findings of the social network analysis. I will discuss in the next section how I applied social network analysis (SNA)

to examine the connectedness among the groups' members, and then how the sample for content analysis was selected based on the result of SNA.

According to Saldaña (2015), content analysis is not a helpful way to build new theory as it assumes that the researcher knows what the main categories before starting their analysis. In this study, content analysis begins with the predefined coding scheme, which is developed from the initial theoretical framework driving the study and confirmed by the findings of the thematic analysis. Holsti (1969) categorises fifteen uses of content analysis studies, placing them into three basic classifications: those that interpret the antecedents of a communication; those that describe and interpret the characteristics of a communication, and those that make inferences about what influences affect a communication. This study's approach falls under the second classification, as I use content analysis to elaborate the characteristics of the learners' interactions through WhatsApp and use this information to explain the development of the sense of learning communities on social media. Within this classification, Holsti identifies three main elements that need to be studied in communication analysis: the channel, the message and the recipient. In the content analysis of the messages, a number of studies were conducted in order to answer three key questions related to the content of the communication. These studies either describe the trends in communication content, relate the recognised characteristics of sources to the messages, or try to produce and compare the communication content with the criteria. The latter type is the most relevant to this study, as I use content analysis as a means to compare online interactions with the seven online learning discussion criteria developed in the coding scheme.

Sampling. In order to give readers an overview of the procedures for conducting content analysis in this study population, sampling and defining the units of analysis are necessary information that needs to be reported (Rodriguez, 2014).

As mentioned before, content analysis is a process to systematically examine the quality of the WhatsApp discussions in order to define the factors that could enhance the sense of the online learning community. The population of the content analysis here is the sum of all the discussions that happened in the two WhatsApp groups (formal and informal) during the three months (12 weeks) of data collection.

The sample for content analysis was chosen based on the results of SNA, which uses measures such as group density and centrality (In- and Out-degrees). The content analysis was applied on a sample of three weeks' data that contained the most active and connected discussions for each group. In this study I used the term "most active three weeks" to refer to the three weeks that were chosen based on SNA, in which the participants showed a higher level of interaction (group density) and connection to each other (high In- and Out-degrees for each member) than in other weeks. The procedure of selecting these active weeks is discussed in more detail in the next section.

3.7.2.2. Social network analysis (SNA). In order to establish a comprehensive view of group cohesion, another data analysis technique was used in this study: social network analysis (SNA). In this process, I focused on the interaction between the participants in each group. According to De Laat et al. (2007), SNA can be used to study the connectedness of a group and it is based on measurements such as density and centrality.

The density of a network is defined as the number of interactions that occur in a network, divided by the maximum number of possible connections. This number varies between 0% and 100%. The more actors that are connected to one another, the denser the network will be (Scott, 2011). Therefore, the density was measured at the end of each week throughout the three months, so I have 12 values for each learning group. These values help to select the most active weeks for each group to conduct the content analysis on their discussions.

The other measurement, which focuses on the members themselves and describes their participation in the group in an individual manner, is centrality. Centrality indicates how well-placed an individual is to receive and send information to other participants in the network, by calculating the in- and out-degrees for each member. The out-degree gives an indication of the number of messages a member has sent to other participants in the group. The centrality measurement enables me to notice the active and isolated members and try to find their roles in the interactions (De Laat et al., 2007; Stepanyan, Mather & Dalrymple, 2014).

Calculating In- and Out-degrees in WhatsApp discussions. All previous studies that have conducted SNA on students' online interactions have been applied on learning management systems (LMS) platforms such as Blackboard; the researchers have used special software such as UCINET to analyse the data derived from the log files that can be exported from the LMS. Log files can save information about students' posts and who has replied to whom, so it is very clear and easy to sort and visualise these data using UCINET. For WhatsApp, there are no log files for the group interactions; all we could export from it were the conversations and media, as

a .txt file. It was therefore very complex to find and calculate directed messages in the WhatsApp group conversations.

There are a number of significant tools that try to analyse and visualise WhatsApp chats. One of them is WhatsAnalyzer. Developed by Anika Schwind and Michael Seufert, this program can answer questions such as: How many messages have been sent in a WhatsApp group? Who sends the most media? And who rarely participates in conversations? These kinds of information can provide a comprehensive picture of the group but they cannot directly support the SNA measures such as In- and Out-degrees, so I did not use this tool.

Another online chat analysis programme, provided by “WhatsApp Data Visualizations”, can be found at: <http://chatvisualizer.com/>. This service could also provide useful information about how long a chat lasted, number of words per message, letters per message, messages per day, and the most active day. The disadvantage of this analysis is that it cannot calculate messages sent and received by a member in the group (in and out degrees). Also, to use the service, the whole conversation must be sent to an email address on the website, so I did not use it as the participants’ consent should be considered here.

The most helpful way to conduct SNA on a WhatsApp discussion is by using Python to create a program that can read the .txt file and analyse it to provide information about who responded to whom and how often that happened. This information can be presented as a “response matrix” to show how many connections happened between each member in the group and the direction of the messages (sender and receiver). This approach is useful as we can get in-degrees for each member by counting up all their received messages, and the out-degree through the sum of all sent messages showing in the response matrix. The only disadvantage with this

method is that the participants had to have used the “mentions” feature in WhatsApp (this can be applied through typing “@”, selecting the desired member to mention “the receiver”, then writing the message); it cannot detect directed messages or responses if the user did not use this feature.

Each line in the WhatsApp conversation .txt file has date and time, the sender’s name and then the message, so the program will read this data and sort it in the output matrix. If the participant used the mentions feature, the line will contain “@” and the name of the mentioned person “the receiver”. I tried to apply this procedure, but the output was not precise because many participants did not apply the mentions feature when replying to each other in the conversations, but they did reply directly to each other using different methods – such as mentioning the receiver’s name within the message or replying to a previous message – as we will discuss in the following paragraphs.

In this study, in-degree indicates the number of messages that appear as direct comments or responses to an enquiry from a given member. As we applied this to the WhatsApp discussions, the in-degree for member X means the number of messages that were directed to X or replied to X’s messages. The out-degree of X indicates the number of messages sent by X and directed to a specific member in the group.

To obtain accurate results I therefore conducted SNA on the WhatsApp discussions manually with the aid of MS Word and MS Excel. I calculated the total messages for In- and Out-degrees for each member manually at the end of each week during the 12 weeks of data collection. Firstly, I created two sheets in MS Excel for each group (formal and informal); the first sheet was for in-degrees and the second for out-degrees. In the first column of the sheets, I put the names of the members. At

the end of each week, I scanned the conversations of that week and identified directed messages (messages that were directed to a specific member), and starting with the in-degrees sheet, I put a mark in front of each participants' name to indicate when I found a message sent by someone in the group to reply to their post. I then added up these marks to identify the number of replies or directed messages to each participant during that week. This calculation therefore indicated their in-degrees for that week. The same procedure was used to calculate out-degree in the out-degrees sheet – I put a mark to record each directed message sent by each participant to another member, and the total marks indicated the out-degree for each participant during the week.

Detecting directed messages in WhatsApp.

Three methods were used to capture the replies or directed responses that formed the In-degree for the receiver and Out-degrees for the senders:

- 1- Using Mentions feature in WhatsApp. The participants were encouraged and reminded to use this feature in their discussions as this feature allowed them to specifically refer to someone in the online group. It also appeared clearly when I exported the chats as .txt files. Another advantage of this feature is that when a participant mentions someone, a notification is sent to that person indicating that they have been referred to. To encourage participants to use this, I posted this message every week as a reminder: "To mention someone in a group, simply type the at symbol "@" and select the person's name from the pop-up list". So, when A mentioned B in the WhatsApp discussion, I calculated one point in-degree for B, and one point out-degree for A. If A mentioned more than one other person it would have meant one point in-degree for each of the mentioned members.

- 2- The second way to capture directed replies was using the quote-reply feature in WhatsApp. This new feature promises to be especially useful in busy group conversations, where it might not be immediately obvious which member of the group – or even which question – the user wants to answer. I noticed that many participants tended to use this feature in their conversations, so it could be considered as a significant feature to capture directed messages between group members. To use this new feature, the user has to press and hold on the message they would like to include in their reply; then, a number of options will appear above the chat bubble. These include Reply, Star, Copy, Info, Forward, and Delete. When Reply is selected, the previous quote will appear as an embedded message in the reply. However, notification is not sent to the person who originally posted the quote to indicate they have been referred to, as happens in the mentions feature. If A replied to B's quote, I calculated one point in-degree for B and one point out-degree for A.
- 3- Identifying messages that mentioned another member's name within their text. This approach is more complicated and time-consuming to identify, but there were many participants who kept using it to reply to others or ask directed questions to specific members of the group. It looks like the mentions feature but there is no @ "mentioning mark" before the messages so the application cannot alert the sender about the reply to their post. To identify this, I exported each week's conversations from my phone to my computer as .txt files, then I used MS Word to search for the name of each group member. When I found someone's name in the middle of a message, I read the whole message to identify whether it was a direct reply or question to that member or not. If it was a directed message to the mentioned member it was counted as one in-

degree point for the mentioned member and one out-degree point for the sender of the message.

Examining group connectedness using SNA.

The main purpose of applying social network analysis in this study was to identify the three weeks of most active conversations on the WhatsApp groups as samples. I then applied content analysis on these samples for each group to shed light on the factors that could enhance these active conversations and the highest levels of connectedness among the group members.

Another important reason for using SNA is to describe the overall sense of connectedness and how the group members were interacting on WhatsApp. This is in order to relate the patterns of interactions to the affordances of WhatsApp, which will support the answers to the research questions.

Table 3: Participation rate, In- and Out-degrees, and network density for the two cases

Case	Weeks											
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
1 Teacher post	17	20	33	34	35	22	12	22	26	28	26	22
Students average posts	3.62	5.38	7.14	15.62	15.33	12.86	7.14	7.05	7.90	8.19	7.52	6.86
Students average Out-degree	2.09	3.01	2.86	3.83	3.12	2.98	3.21	3.54	3.24	4.33	4.01	2.74
Students average IN-degree	3.48	3.83	3.75	3.68	3.53	4.56	4.87	3.62	3.98	3.9	2.33	3.02
<u>Total Avg of In- and Out-degrees</u>	5.57	6.84	6.61	7.51	6.65	7.54	8.08	7.16	7.22	8.23	6.34	5.76
Actual connection	74	69	74	116	88	114	69	86	116	128	80	84
<u>Network density %</u>	35	33	35	55	42	54	33	41	55	61	38	40
2 Group leader post	54	77	97	87	60	84	97	143	134	94	105	121
Learners average posts	11.7	21.75	43.85	36.65	39.35	40.15	35.2	26.65	32.8	27.8	32	21.75
Learners average Out-degree	4.88	5.66	8.59	6.55	6.86	10.5	6.89	9.08	6.87	8.08	7.97	6.98
Learners average IN-degree	5.08	9.89	13.43	7.34	6.09	8	5.87	4.56	7.03	7.07	6.77	4.6
<u>Total Avg of In- and Out-degrees</u>	9.96	15.55	22.02	13.89	12.95	18.5	12.76	13.64	13.9	15.15	14.74	11.58
Actual connection	86	145	131	82	91	148	107	124	103	99	93	97
<u>Network density %</u>	45	76	69	43	48	78	56	65	54	52	49	51

Table 3 above presents the total number of posts by the teacher/leader, average number of student posts, average In-degree (received messages) and average out-degree (sent messages) for all participants during the 12 weeks. This information was used to identify the most active weeks, in which the group members showed the highest levels of connectedness. The levels of connectedness were evaluated through calculating two primary measures: (1) centrality, which indicates how well-placed an individual is to receive and send information to other participants in the network (In- and Out-degrees), and (2) the volume of connections that occurred between participants (network density).

The density of a network is defined as the number of connections that occur in a network, divided by the maximum number of possible connections (Scott, 2011). It describes the proportion of the potential connections in a network that are actual connections. A “potential connection” (PC) is a connection that could potentially exist between two “nodes” – regardless of whether or not it actually does. $Density = (AC/PC) * 100$, this number varies between 0 and 100%. The potential connection can be calculated as $PC = n * (n - 1) / 2$, therefore, the PC for the formal group ($n = 21$) = 210, and for the informal group ($n = 20$) = 190. In contrast, an “actual connection” (AC) is one that actually exists. The number of actual connections is therefore always equal to or less than the potential connections. AC was counted weekly, and then the network density was calculated each week as $Density = AC / PC * 100$, that means that there are 12 values of the group density during the data collection as shown in Table 1.

Participation in the group in an individual manner is known as centrality. Centrality indicates how well-placed an individual is to receive and send information to other participants in the network, by calculating the in- and out-degrees for each

member. As mentioned previously, in this study, the in-degree indicates the number of messages that respond to an enquiry from a given member, while the out-degree gives an indication of the number of messages a member has sent in direct reply to other participants in the group. The centrality measurement enables me to notice the active and isolated members in each group and focus on their roles in developing the interaction (De Laat et al., 2007; Stepanyan et al., 2014).

Selecting Content Analysis sample. To identify the most active three weeks for each group (when the participants showed the highest levels of connectedness and participation), I started by looking at the total average of in- and out-degrees (see Table 3). This indicates the average of receiving (in-degree) and posting (out-degree) directed messages by group members during that week. As we can see, the highest five values in case 1 were in Weeks 4, 6, 7, 9 and 10. The averages of sending and receiving messages for each student were: 7.51 in Week 4, 8.08 in Week 7, 8.23 in Week 10, and so on. As discussed in the literature review, In- and Out-degrees are not the main indicators for the sense of network connectedness, as they just illustrate the number of in and out messages for each participant but do not tell us about the types of edges, or how many edges or connections occurred. This means that, if two students in the group have a high level of directed conversation (receiving and replying to each other), the average of In- and Out-degrees will be high in that week, even if the rest of the group members were not participating in the discussion. Therefore, I must combine another factor with the centrality measurement to give an accurate sense of connectedness, which is the network density. Network density identifies the number of actual connections that happened between group members – a wider variety of connections leads to higher network density. In this case, the highest network

density occurred in Weeks 4, 6 and 10. Thus, the group's sense of connectedness was stronger in Week 6 than in Week 7 because the connections between the participants were more diverse. The chosen weeks that indicated a high level of connectedness for case 1 were therefore Weeks 4, 6 and 10.

For the informal group (case 2), I applied the same procedure to identify the three weeks where the learners showed the highest levels of connectedness. The five highest values for average In- and Out-degrees were in Weeks 2, 3, 6, 10 and 11. I then selected the densest weeks from these five. The selected weeks where the informal learners showed high levels of participation and connectedness with each other were therefore Weeks 2, 3 and 6.

3.8. Addressing Trustworthiness

Addressing the trustworthiness of qualitative data is essential in determining the credibility and reliability of the data obtained. However, there is no single, clear set of validity and reliability tests available in the literature for each research phase in case study research. However, the evaluation methods proposed by Lincoln and Guba (1985), which have been widely used in qualitative studies, include four criteria for establishing the trustworthiness of qualitative data: credibility; dependability; confirmability, and transferability. In this section, the focus of the discussion is on these four criteria to ensure the quality and trustworthiness of this study.

3.8.1. Credibility

Credibility refers to confidence in the truth of data, which can be ensured by persistent observation, triangulation, peer debriefing, member checks, and searching for disconfirming evidence (Lincoln & Guba, 1985). Hoepfl (1997) asserts that credibility, which is distinct from internal validity in scientific research, depends less on sample size than on the amount of data collected and the power of the analysis. Garrison and Anderson (2003) recommend that credibility can be addressed in the analysis of online conference transcripts through theoretical consistency, correlation with other studies and the use of triangulated measures. Triangulation is based on the assumption of using multiple data sources, methods and even investigators, and aims to obviate bias in a data set or methodological approach and increase confidence in the research findings (Creswell & Miller, 2000). Denzin (1978) identifies four different forms of triangulation: data triangulation; investigator triangulation; theory triangulation, and methodological triangulation.

Credibility for this study is established through data triangulation, theory triangulation, and methodological triangulation. Data triangulation is achieved by using several data sources, including interviews, focus groups and content analysis of online conversations. The reason for this is that using different kinds of data can explain the concept from different standpoints; thus, I investigated the development of online learning communities from the view of the participants as individual members using semi-structured interviews, and as a group of participants through using focus groups, and also from the actual learning practices through analysing extracts from their online conversations.

Theory triangulation is achieved in this study through the use of a proposed theoretical framework that emphasises studying the concept of online learning communities based on three theoretical levels: individual, interactional and group. As presented in the literature review, this framework combines three levels of theoretical approaches to address the development of online learning communities on social media, which are: individual, interactional and group. Thus, multiple theory approaches are used in designing the data collection tools (interview schedule and coding scheme). Interpretation of the findings based on this tri-dimensional theoretical framework can achieve theory triangulation in this study and therefore increase its credibility.

Methodological triangulation in this study involves using more than one method to gather and analyse data. This is the most complicated triangulation technique applied, as using different methods of data collection requires different analysis procedures. This study adopts thematic analysis to analyse interview and focus group transcripts, and content analysis to analyse online conversations. Social net-

work analysis of WhatsApp conversations was also applied to describe the online interaction that happened during the three months in the two groups, and to select samples for content analysis. Different approaches, such as interviews and online conversation analysis, are methodologically distinct. However, all methods were designed based on the same theoretical framework, quantitative findings deduced from content analysis and social network analysis are used to explain and support the qualitative data indicated from the interviews.

3.8.2. Dependability

Dependability equals reliability in positivism, which refers to the stability of data over time and across conditions. In scientific research, reliability is an important issue to ensure that the findings are precise. However, qualitative and interpretive researchers recognise the difficulty in reproducing social phenomena because of the challenges involved in repeating the exact conditions under which data were originally collected (Strauss & Corbin, 1998). Even if the same participants took part in another similar study, it is questionable whether they would offer similar responses. This is a result of various reasons, such as having reflected on the initial research process, or their understanding of the key issues have developed or changed. For interpretivism, Lincoln and Guba (1985) state that dependability can be ensured by stepwise replication and enquiry audit. The use of an “enquiry audit” involves checking the consistency of the research through examining both its process and the product.

The dependability of the current study has been ensured through reflecting on and outlining in the transparent way the procedures that led to the research findings. I have detailed the processes of data collection, data analysis, and interpretation of the data. Earlier in the methodology chapter, the detailed procedures of designing

data collection tools, applying those tools and analysing the collected data were presented and justified. I also checked my interpretations using several procedures: I conducted a pilot study to evaluate my tools, such as the interview schedule and coding scheme. In the Findings chapter, I highlight which topics were unique and interesting during the data collection and explain what the themes mean and what questions emerged from the themes. In the Discussion chapter, I present my thoughts about themes and sub-themes, providing a rationale for why certain themes are merged together. Moreover, dependability of the qualitative data gathered from the interviews and focus groups was ensured by carrying out the fieldwork consistently and ensuring all participants had sufficient opportunity to tell their experiences, systematically analysing the evidence, and by supporting interpretations with evidence from content and social network analysis.

3.8.3. Confirmability

Confirmability refers to the objectivity or neutrality of the data, so that two or more independent people can reach an agreement about the relevance or meaning of the findings (Lincoln & Guba, 1985). It requires providing evidence that the researcher's interpretations of participants' constructions are rooted in those constructions and also that data analysis and the resulting findings and conclusions can be verified as reflective of and grounded in the participants' perceptions. In essence, confirmability can be expressed as the degree to which the results of the study are based on the research purpose and not altered due to researcher bias (Mason, 2002).

To ensure the confirmability of this study, peer review and member checking were applied to the interview thematic analysis. Definitions for each theme and sub-

theme were provided to my colleagues along with a sample of participants' responses based on each theme, so they could check and verify the coding process and support the confirmability of the thematic analysis results. Also, a summary of the main findings from each interview and focus group was discussed verbally at the end of each meeting and then sent to the participants by email to obtain their confirmation regarding my interpretation of their discussions.

In the content analysis procedure, the reliability of the coding scheme was addressed and reported. As shown in section 3.6.3: Coding Scheme Reliability paragraph, an acceptable figure was obtained, which means that the agreement between the two coders was acceptable, which provides confidence about the reliability of the content analysis.

3.8.4. Transferability

In interpretive research, transferability corresponds to generalisability, and it refers to the extent to which the findings from the data can be transferred to other settings or groups (Lincoln & Guba, 1985). In positivism, external validity or generalisability refers to the ability to generalise research findings across different situations. It can be addressed through chosen random and representative samples, while in qualitative research the transferability is applied by the readers of research. Thus, transferability does not implicate broad claims, but it invites readers of research to make links between conditions of a study and their own experiences. Lincoln and Guba (1985) suggest that the transferability of qualitative research to other contexts depends on the degree of correspondence to the original circumstances and the conditions to which it is transferred. To address this, the researcher of a qualitative study

must provide adequate information to describe the environment surrounding their research and include a rich description of the study itself. Readers of the research can then generalise and transfer the findings to other similar situations (Lincoln, 2001).

Addressing generalisation for case study research is difficult as the main aim of the case study is actually particularisation but not generalisation of the findings. However, in some forms of case study, such as instrumental cases that seek to explore a particular phenomenon in depth, the researcher can describe in detail the case that will be studied and the bounded system within it. This information then can be used by the readers to determine whether the instrumental case is similar to their cases and decide whether the findings of this study are valid to their research situations (Lincoln, 2001; Mason, 2002).

Thus, to make the current study relevant as transferable research in the field of developing online learning communities on social media, I have described in detail the participants and their demographic details. For example, in the first case, I described the students, the teacher, and the module itself. For the informal case, a detailed description has been provided about the members, and how, when and by whom the WhatsApp group was created. I provide extended presentation of the higher education in SA and also on the informal learning contexts. However, this study is not proposed to generalise its findings to all graduate students in SA or all informal learning groups on WhatsApp or Twitter, as it is simply one study by one person of two specific learning groups. This study therefore makes suggestions about possible elements that could enhance the development of online learning communities through social networking tools, and explores the possible uses of Twitter and WhatsApp as learning tools in formal and informal learning contexts in SA. Readers

can consider their own contexts and decide which of these elements may or may not be relevant or similar cases.

3.9. Ethical issues

There are three main ethical concerns relating to social media research: ensuring the informed consent of all the participants; the distinction between public and private spheres in the online environment, and granting the participants privacy (Ackland, 2013).

The process of informing participants about the nature of the study so they can freely decide whether to participate or not is the first ethical concern that faces a researcher investigating social media. It seems unrealistic to obtain the consent of everyone on Twitter (i.e., all the users who participate in a specific hashtag or are friends of the teacher or group leader). Two factors mean that this process is extremely complex or even impossible: first, it is unrealistic to try to acquire permission from every user; second, it can be unclear when obtaining data from the public domain, such as websites and blogs, whether use of such content needs to be approved by its authors or not. The common agreement of most scholars seems to be that researchers are free to use data available in the public domain; however, researchers should still obtain consent when they are conducting research on those sites where some of the unintentional users' privacy may be revealed (Christopherson, 2007; Tsang, Au, Kapadia & Smith, 2010). The challenge then becomes the distinction between public and private spheres, which become blurred in social networking. For example, users may expose some personal information about themselves in a public space like Twitter, but with the belief they are only interacting with a small group of people (their followers). This develops a perception that they are having a

discussion in a private place, and that others will not use this information. Thus, researchers should consider how to obtain consent from a large number of users on social media platforms, as well as in which cases these consents are necessary. This study has obtained consent from all the WhatsApp groups' members who also participated in the Twitter discussions; however, other users on Twitter who were not in the WhatsApp groups were not informed, as no directly related data were collected from them, such as their identity or their tweets.

Another ethical concern mentioned by Ackland (2013) is participant privacy. In social media research, it is often not clear when to grant anonymity to participants. Privacy violations can occur when "extensive amounts of personally identifiable data are being collected and stored in databases" (Smith, Milberg & Burke, 1996, p.172). The conversations of students on social media could reveal some information about their identity, and personal events that might have been added and modified on their social media profiles over the data collection period, that could create a large amount of personal information that could therefore violate participants' privacy. This problem can be minimised by separating personal data in a file and not using them if they are not relevant to the research questions, or by using nicknames or symbols if the researchers need to discuss some elements of participants' personal details (Christopherson, 2007).

3.10. Summary of the chapter

This chapter presents the design of the research and the procedures applied to collect and analyse data. The paradigmatic stance was identified based on the researcher's worldview of reality, which orients the way knowledge is studied and interpreted. Accordingly, a case study research design was determined as the form of the interpretive research design. The form of instrumental case studies was used based

on the aim and questions of the research. The procedures for selection of the cases was explained and justified. Then, detailed descriptions and the demographic data of each case were discussed.

Semi-structured interviews, focus groups and online discussion forums were presented as the main methods of data collection. The process of designing data collection tools based on the proposed theoretical framework was explained, and the rationales and procedures for administering these tools were provided. Three analytical techniques were applied for this study: thematic analysis, social network analysis and content analysis of WhatsApp conversations. The reasons and procedures for conducting these types of analysis were discussed. The quality and trustworthiness of the study were addressed based on the four evaluation criteria proposed by Lincoln and Guba (1985). Finally, a number of concerns that must be addressed when conducting research relating to social media were discussed, including ethical concerns such as the nature of consent and carefully identifying and respecting users' expectations of privacy on social media.

4. Findings

4.1. Introduction

Two fundamental goals drove the collection of the data and the subsequent data analysis. These goals were to develop a base of knowledge about the meaning of the online learning community, its main elements, as it is perceived and used by two distinct groups of learners (formal and informal). Second, to determine the role of social media in developing online learning communities in formal and informal learning groups in order to explore good practices of formal and informal educational uses of social networking. This chapter will set out how findings from the three data analysis procedures are linked to answer the research questions.

Three main data analysis procedures were applied in this study: a thematic analysis was performed on the interviews to generate a thematic research map and to develop a coding scheme to analyse the content of WhatsApp discussions; more details were presented in methodology chapter. Second, a social network analysis was performed on the WhatsApp groups' discussion to map out the interaction among group members and to select the sample of interactions for further content analysis (the three most active weeks), as mentioned in the methodology chapter. These three weeks were selected based on the highest degree of group density and number of connections that were formed among the group members. Then the third data analysis procedure was content analysis, applied on the WhatsApp conversations during the selected three active weeks. I will now explain the findings of these three data analysis procedures in order to answer the research questions.

Q1: What are the main factors that could enhance the sense of an online learning community from the participants' viewpoints?

Q2: What is the role of social media in developing online learning communities?

4.2. Factors in the Development of Online Learning Communities

Q1: What are the main factors that could enhance the sense of an online learning community from the participants' viewpoints?

To answer the first research question, I present the results of the thematic analysis, which can be summarised in this thematic map (Figure 3):

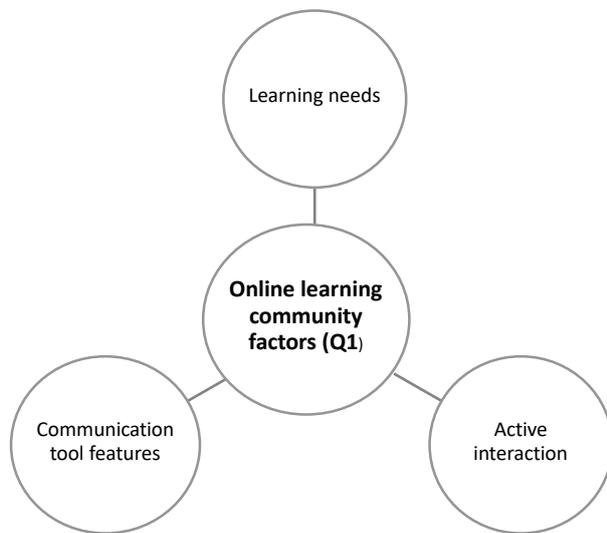


Figure 3: Thematic map of online learning community's factors

I will now follow with an extended discussion for each of these main themes, providing some example quotations from the participant interviews, and then I will triangulate these inductive findings by providing examples from the social network analysis (SNA) or/and content analysis (CA) as additional sources of evidence.

4.2.1. Learning needs.

The participants of the two cases specified that their learning needs were one of the main initial motives for joining and participating in the WhatsApp learning groups and Twitter learning-hashtag discussions. Although the educational needs of

both groups (formal and informal) were different, they all agreed that the existence of a learning need among members is an important factor for developing and sustaining the community of online learning on social media.

Formal learning group's needs. The highlighted learning needs of the formal learning group were to gain a deep understanding through the WhatsApp discussion, and also to link the theories discussed in the lectures to the real-life practices from schools and teachers' tweets on Twitter. Most of the formal students stated that they joined the WhatsApp group because they needed to review the lecture topics and discuss the related issues raised by the teacher. They indicated that by participating in the online groups, they gained a deeper understanding of the topics (S2, S4, D12, S16). One of the students said, 'Sometimes I don't understand what the lecturer means in the class, especially when she talks about the theories, and I feel hesitant to ask for clarification, and then when we discussed this in the WhatsApp group and I read my friends comments I can get the point' (S3, 15). Another student stated that using WhatsApp for module-related discussions helped her to understand the concepts and theories in the module because she can read the other students' explanations and construct her understanding around them (S8, 75).

Another formal learning need was to relate the lecture to practice. The teacher of the module stated,

This module is based mainly on the theories of learning and the instructional design of learning tools, thus lots of concepts and technical words are used in the lecture, and I think students in this stage in order to understand such theories, they need to link these theoretical concepts with real examples... so I used WhatsApp and Twitter to provide some real examples through sharing external resources.

Another student indicated that

We need to link what we have discussed in the lectures on the theories of designing and using instructional technology with real instructional tools that applied in our schools or shared by the teachers in social media, so using WhatsApp in this module to share real resources and to enable this kind of reflection between theory and practices was very useful to me. (S4, 23)

As we can see, the formal students joined the online group in order to gain a deeper understanding of the lecture through teacher and student discussions and the informal explanations of related topics, which helped them to develop their understanding.

Informal learning group's needs. The participants in the informal group indicated that they joined the WhatsApp learning group to practice the English language with others. The leader of the group stated that a lot of his followers on Twitter ask him to give examples of informal English phrases and when they can use them: 'the idea of creating a WhatsApp group to teach and practice informal English language came to my mind, and I received a lot of positive reactions from my followers' (L, 23). Therefore, the notion of establishing this WhatsApp group was inspired by his followers' learning needs, and he (as the group leader) clarified this as the learning aim of the WhatsApp group. Almost all of the learners in this group stated that they decided to join the WhatsApp group because of their need to learn and practice informal English while avoiding hesitation and mistakes in real public situations; this matches the purpose for creating the WhatsApp group mentioned by the group leader on his Twitter account. This provides evidence of the importance of learning needs as a main factor for joining and participating in online learning groups.

So, learning needs are considered one of the main motives behind creating and joining online learning groups, and we can see the formal students and informal learners' different motivations, based on their learning needs, for joining their WhatsApp learning groups. It seemed that a theme was emerging around the notion of 'learning needs' and the relationship of these learning needs to the development of the online community. In this respect, the question arose:

Q.1.1. How do learning needs influence (or determine) other aspects of online learning communities?

There were two practical aspects that seemed to be influenced by the online group's learning needs: the design of the networked group and the conversation content (Figure 4). The group design was more influenced by general learning need, which was mainly related to the aim of joining the online learning group. While discussion content was related more closely to particular needs or 'learning outcomes' that should be achieved during a particular fixed time such as a week.

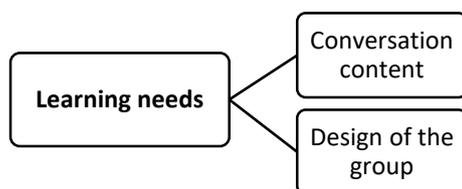


Figure 4: Thematic map of learning needs

4.2.1.2. Design of a networked group.

The structure or design of a networked group, whether it is a formal or informal group, the role of each member of the group and so on, are actually influenced by the members' learning needs. For example, the leader of the informal group created the group because the group's needs could be met in informal learning settings. He said,

I studied English language as a second language at the university, but I think to practice the language we need an informal learning environment to learn from each other, and to share different media to support our language through practicing it. (14)

One of the learners said,

I think it's much fun to learn the English language from the discussion with people outside my class, and maybe we don't know each other very well, because that made me not care too much about my linguistic mistakes, and we can correct each other if someone did something wrong without awkwardness. (L10,16)

The learning needs here determined the design of the networked learning group. It became an unstructured learning group where the members do not need to know each other, but can still practice their second language in a comfortable environment. Their participation is voluntary, and there are no roles assigned to the member, ensuring that they can casually participate in an unstructured learning environment.

In the case of formal learning, where the learning need was to discuss the topics mentioned in the lecture, group members have to know each other well to refer to each other's contributions in the classroom talks. The teacher also needs to know who takes part in the online discussions so they can assign participation marks to them. This is particularly important because some students do not want to speak in the class, so their participation in the WhatsApp group ensures that they still receive marks for participation. The members of this group are formal students of an academic module who wanted extra time and opportunities to discuss related lectures and issues. Therefore, the design of this group was fully structured and directed by

the module instructor, and all the participants had to use their real academic identities to join and formally participate in this group.

4.2.1.3. Conversation content

The second important aspect that could be influenced by learning needs is conversations content. (In this section, conversation content refers to the learning resources and the messages posted in WhatsApp learning groups) so I will present here the link between the content of online discussion on WhatsApp and the learning objectives that translate learning needs. To present this link, I referred to week 6 as examples of content analysis of the WhatsApp discussions for the two groups.

CA example of Week 6:

To illustrate the relation between the learning needs of that week and the content of discussions that occurred in WhatsApp during that week. I present part of the findings of the content analysis, which was analysis of week 6 WhatsApp discussion. I choose that week because it was one of the three active weeks chosen for content analysis. In addition I chose this week in particular because the teaching plan for week 6 was very clear for me, may be because I interviewed the teacher of formal group and the leader of the informal group in Week 6. So I was fully informed what the group members were want to achieve during that week, because the teacher and group leader in their interviews talked more about what they are doing and how they planned for that week. Therefore, Week 5 (one week before the sixth) for the two groups seemed a good chance to study the relation between the learning objectives of week (6) extracted from the teacher/leader interviews, and the findings of content analysis of WhatsApp discussions in that week.

I first present the learning objectives of week 6 for each group and then I present the findings of content analysis of week 6 conversations, to show how learning

objectives as small part of learning needs could influence the content of online discussions.

In the formal learning group, the lecture of week 6 was about presenting the concept of instructional design for educational tools and discussing the main modules of instructional design. One of the lecture’s objectives was for the students to be able to identify each stage of the instructional design process. The teacher said, “As this objective needs a high level of conceptual skills, the students need to link the modules of instructional design with examples of educational tools; so I asked them to post an educational application as screenshots, and select one of the instructional design modules from the textbook to explain the design process of the selected educational app”. As previously discussed, one of the learning needs of the formal learning group is to link knowledge to practice. The teacher used WhatsApp discussions to enable the students to demonstrate their understanding by sharing educational phone applications and using the concepts of instructional design to develop them.

Table 4: Content analysis of WhatsApp conversation for week 6 (formal learning group)

Code Name	Code	Total messages 292	
		Frequencies	Percentages
1-Initiate conversation		30	10.27
Asking a question	I1	4	1.37
Propose action or inquiry activity	I2	1	0.34
Sharing a resource to start dialogue	I3	25	8.56
2-Response (engage in the talk)		59	20.21
Answer the question	R1	30	10.27
Ask more questions	R2	8	2.74
Support the answers with resources	R3	21	7.19
3-Discussion		78	26.71
Comment on other contributions by giving more	D1	58	19.86
Agree with others contributions	D2	18	6.16
Disagree with others contributions	D3	2	0.68
4-Reflection		79	27.05
Connect ideas with previous knowledge	C1	63	21.58
Connect ideas with wider contexts	C2	4	1.37
Summarising	C3	12	4.11

Now I illustrate the link between these learning objectives and the content of the WhatsApp discussions for week 6. As we can see in Table 4, there were 292 messages sent in week 6 by students and the teacher. Twenty percent of these messages were classified as responses to a previous question (R), and 26% were classified as discussions (D), such as comments on other posts or adding a new point. That indicated that the student met their learning needs by discussing the lecture topic. More than 19% of the whole week's conversations occurred as comments on other posts that added more information (D1). That means that the learning objective for the lecture, which was the students have to identify each stage of the instructional design has been met through response (R) to the questions raised by the teachers or students, and also through the discussion (D) that occurred to add more information to the other posts (D1) or agree or disagree with other posts (D2, D3) to demonstrate their understanding on the stages of the instructional design.

Another important indicator is the percentage of messages that were classified as reflection on the online conversation. Sixty-three out of the total 292 messages connected ideas with previous knowledge (C1), with the major example of this being the goal mentioned by the teacher which was the student has to apply instructional design models discussed in the lecture to the selected educational mobile application to explain its design process which correspond to the code (C1: connect ideas with previous knowledge).

Table 4 shows that the 70% of WhatsApp conversation of week 6 was classified as Response, Discussion or Connect ideas with previous knowledge (C1), because these kinds of talk reflect the learning objectives for that week. So to sum up, the first learning objective of week 6 was to be able to identify the stages of the in-

structional design. This is reflected in the messages coded as Response (R) or Discussion (D) in the WhatsApp conversation. The second objective was: to post an educational application as screenshots, and select one of the instructional design modules from the textbook to explain the design process of the selected educational app. This coordinated with messages coded as Connect idea with previous knowledge (C1).

A similar finding can be deduced from the content analysis of week 6 for the second group (informal learning group) where the main learners need to practice their second language and discuss issues in an informal language. To achieve this, the leader of the group suggested two objectives to be achieved by Week 6.: 1) To pronounce English phrases correctly, and 2) to understand their meaning by providing a corresponding meaning in Arabic. The leader shared with the learners a short story in English, and asked them to read it and send their comments as voice messages to the group. The group members then had to comment on each other's pronunciation, discuss the story, and explain some of the English phrases they did not understand in Arabic. The second activity during that week involved the learners being asked to share aphorisms in English. The group then discussed the meanings of the aphorisms and tried to find similar sayings in the Arabic language.

Table 5: Content analysis of WhatsApp conversation for week 6 (Informal learning group)

Code Name	Code	Total messages 887	
		Frequencies	Percentages
1-Initiate conversation		47	5.30
Asking a question	I1	10	1.13
Propose action or inquiry	I2	2	0.23
Sharing a resource to start	I3	35	3.95
2-Response (engage in the talk)		78	8.79
Answer the question	R1	55	6.20
Ask more questions	R2	13	1.47

Support the answers with	R3	10	1.13
3-Discussion		286.00	32.24
Comment on other contributions	D1	243	27.40
Agree with others contributions	D2	26	2.93
Disagree with others	D3	17	1.92
4-Reflection		285	32.13
Connect ideas with previous	C1	5	0.56
Connect ideas with wider	C2	276	31.12
Summarising	C3	4	0.45

The relationship between these two learning objectives of Week 6 and the content of the conversations that happened in that week, can be illustrated through Week 6 content analysis findings. As we can see in Table 5, about 5% of the total messages were Initiating Conversation (I1,I2,I3), and more than half of them involved sharing resources to start the conversation (I3). The resources being the short story and the shared aphorisms posted by the learners and the group leader. A large number of resources involved the initiation of conversation, and the total responses were 55 messages out of 887, for the story, most replays were voice messages. In the aphorism discussion, the learners tried to express their understanding in English. We can deduct that learners met their learning needs, by examining the messages that were classified as Comments on other's contributions or Responses (D1,D2, and D3). More than %32 of the total messages posted in this week were classified under discussions category (D), most of them was comments on other's readings as voice messages. In the second activity, more than 30% of the conversations were reflections on the metaphors and link them with learners contexts. As seen in Table 5, 276 messages were classified as connecting ideas with wider contexts (C2), which is quite a big number in comparison to the other codes. And that one of learning objective for week 6, that indicated by the group leader which was "understanding English aphorisms and tried to find similar sayings in the Arabic culture". That seems that this learning objective was met through the messages that coded as (C2).

I found that the findings of content analysis for week 6 conversations in the two groups were coordinated with the learning objectives stated by the groups' teacher/leader for that week in the two groups. That means that the participants were interact in a high level of sense of connectedness in week 6 as an example could be because they were trying to achieve similar and explicit learning objectives that contribute to achieve their main learning needs.

We can conclude from these results that having a general learning need among members of online learning group is the one of the main factors that motivate them to join into and participate in the online learning group. Based on these needs, the group design and its rules and conditions are determined. Moreover, learning needs enable the teacher or the leader of the group to identify learning objectives that could be achieved in a fixed time which can be reflected on the learning content of conversation occurred during that time.

4.2.2. Active communication

The second factor that could enhance the sense of online learning community as perceived by the participants was active communication among group members. A considerable number of participants including the teacher and group leader agreed, that the existence of active communication among group members is one of the main reasons that encourage members to stay in the group, especially when they have a question or want to discuss some learning-related points with others. One of the interview questions was: "When you will decide to leave this group?" Less than half of the formal group members (9 students) stated that they will leave the group when the teacher would leave it or when the module is finished; while the rest of the formal students and all the informal group members stated that they would leave the group when it would become less active. Some participants used the term "silent

group”. That means that more than 80% (17 out of the 21 formal group members and 16 out of 20 informal learning group) of all the participants from the two groups perceived that active communication is a key factor for maintaining the online learning community. One of the informal learners said: “As long as I receive instant responses to my questions, I think this group is useful for me and I feel that they try to help, even if some of them replied “sorry I don’t have any idea”; but if I did not receive any response, that made me feel there is no point to stay in this group.” (L8, 53). Thus, active and continued conversations among online group members enhance the sense of caring for each other and connectedness among members. Some of participants (L,8,L4,L15) pointed to the importance of receiving responses from all or most of the members in the online group, not just from old friends, and this could improve their feeling of being connected with the group.

While investigating the importance of active communication in developing the sense of online learning community, the question arose: *What are the factors that contribute to facilitating communication between the community members?* The participants from the two cases indicated three practices (factors) that they felt enhanced communication between the learning community members as shown in (figure 5): 1) teacher or group leader presence, 2) ongoing contact with more-able peers, and 3) having a socio-emotional element in the online conversations. I will discuss each of these factors in turn.

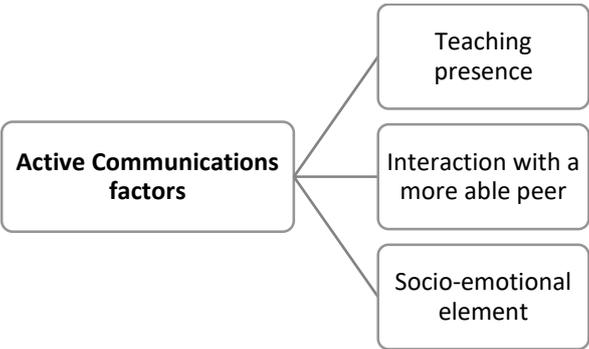


Figure 5: Thematic map of active communications factors

4.2.2.1. Teacher/group leader presence. The participants in both cases indicated that the teacher/leader had a vital role in maintaining the conversation in the learning groups. They suggested that asking questions to start conversations and providing instant feedback were the two most significant roles of the group leader. One of the students stated that, “When I respond to a question or share interesting information, I want to see the other comments, especially the teacher’s, because I want to know if she saw my participation, or sometimes because I need instant feedback on my response” (S19,23).

Table 6 Content analysis of teacher posts

Code Name	Code	Total of teacher posts during the three active weeks: 84	
		Frequencies	Percentages
1-Initiate conversation		7	8.33
Asking a question	I1	3	3.57
Propose action or inquiry activity	I2	2	2.38
Sharing a resource to start dialogue	I3	2	2.38
2-Response (engage in the talk)		2	2.38
Answer the question	R1	1	1.19
Ask further questions	R2	0	0.00
Support the answers with resources	R3	1	1.19
3-Discussion		30	35.71
Comment on other contributions by giving more info	D1	25	29.76
Agree with others contributions	D2	3	3.57
Disagree with others contributions	D3	2	2.38
4-Reflection		12	14.29
Connect ideas with previous knowledge	C1	5	5.95
Connect ideas with wider contexts	C2	4	4.76
Summarising	C3	3	3.57
5-Metacognition		39	46.43
Set up a plan for the learning activities	M1	12	14.29
Monitor achieving the aim of the learning	Mo1	8	9.52
Monitor the time of doing the tasks	Mo2	3	3.57

Monitor the plan of the learning		Mo3	6	7.14
Guide direction of dialogue	Keep the focus	G1	5	5.95
	Finish the talk	G2	3	3.57
	Raise a new topic	G3	2	2.38
6-Affective language			9	10.71
Greeting other members		A1	5	5.95
Expression of emotion		A2	4	4.76
7-unrelated			3	3.57
Personal experiences		T1	1	1.19
Social topics		T2	2	2.38

Teaching presence has significant role in starting the dialogue (Initiate conversation I1,I2,I3). Table 6 shows the content analysis of the teacher post, it revealed that all the messages coded as I2 (propose action or inquiry activity) were posted by the teacher in the formal learning group. Similarly, more than half of the questions posted to start conversations (which are different to questions that seek more information in the discussion category) were also sent by the teacher. Therefore, the teacher and the group leader played an important role in initiating dialogue in the WhatsApp learning groups. This role could be explicit, such as their I1 and I2 posts, or imbedded, as most of the participants' messages coded as Sharing a resource to start dialogue (I3) were initially motivated by the teacher's or leader's posts coded as Asking a question or Propose action or inquiry activity (I1, I2).

The content analysis of formal learning group WhatsApp conversations showed that teaching presence could maintain the debate through asking more questions to justification or clarify answers, and at the same time keep the focus of the talk through guiding the conversation and online learning activities. If we look at the content analysis of the teacher's posts during the most active three weeks of the formal learning group (Table 6), more than 70% of her messages were classified as discussion and learning regulation. More than 25% of her posts were commenting on

students' responses as question or directed feedback. These kinds of posts may have fostered student interaction as when the teacher asked questions, she also asked for justifications of the answers. This encouraged the students to think about their answers and the other's answers. As one of the students confirmed, "When I post my answer to the teacher's question and then another student posts an answer different to mine or that conflicts with mine, I want to see the teacher comment on our discussion" (S6,43). This means that asking students to clarify or justify their answers, was an important strategy to foster the dialogue in the formal online learning discussions, especially with the teacher giving feedback by commenting on the arguments of the students (D1,D2 or D3).

As presented in table 6, the content analysis of the participants' and the teacher's posts confirmed that the teacher had a vital role in directing and controlling the learning in the group. As we can see more than 46% of the teacher's posts were categorised under the metacognition section. For example, setting up the time for the learning activity (M1), monitoring the achievement of the learning aims (Mo1,Mo2), and guiding the direction of the interactions (G1,G2,G3). These kinds of messages may have enhanced the students' online interactions by encouraging them to be aware of their time, what they have achieved, and what they have to do next. This, in turn, led them to participate in the online discussions in order to be updated about their learning plan. For example, a student who did not participate in the online learning activity may have been motivated to do so by regular messages from their teacher. One student declared that, "Sometimes I forgot to participate in the weekly WhatsApp learning discussion, and when my teacher sent another notice about the activity deadline, I tried my best to send my contribution on time". This enabled all the students to take part in the online discussion at an indicated time, which increase the

possibility of the students to participate in the online activities and consequently reviewing and commenting on each other's contributions.

Table 7: Content analysis of group leader post

Code Name	Code	Group leader posts during the three active weeks 258		
		Frequencies	Percentages	
1-Initiate conversation		12	4.65	
Asking a question	I1	3	1.16	
Propose action or inquiry activity	I2	5	1.94	
Sharing a resource to start dialogue	I3	4	1.55	
2-Response (engage in the talk)		18	6.98	
Answer the question	R1	5	1.94	
Ask further questions	R2	7	2.71	
Support the answers with resources	R3	6	2.33	
3-Discussion		47.00	18.22	
Comment on other contributions by giving more info	D1	30	11.63	
Agree with others contributions	D2	14	5.43	
Disagree with others contributions	D3	3	1.16	
4-Reflection		71	27.52	
Connect ideas with previous knowledge	C1	36	13.95	
Connect ideas with wider contexts	C2	31	12.02	
Summarising	C3	4	1.55	
5-Metacognition		21	8.14	
Set up a plan for the learning activity	M1	7	2.71	
Monitor achieving the aim of the learning	Mo1	4	1.55	
Monitor the time of doing the tasks	Mo2	1	0.39	
Monitor the plan of the learning	Mo3	2	0.78	
Guide direction of dialogue	keep the focus	G1	4	1.55
	Finish the talk	G2	1	0.39
	Raise a new topic	G3	2	0.78
6-Affective language		78	30.23	
Greeting other members	A1	46	17.83	
Expression of emotion	A2	32	12.40	
7-unrelated Topics		11	4.26	
Personal experiences	T1	3	1.16	
Social topics	T2	8	3.10	

The same result could be seen in the informal group leader's participation in Table 7, the results of the content analysis shows that 27 % of his posts were classified as reflections (C1,C2 and C3) on the other's responses. 25% of the leader's

posts were connecting learners responses with previous or wider ideas, which appeal learners to review and discuss their answers. Affective language formed more than 30% of the leader's messages (A1 and A2), such as when he greeted the participants or posted emojis that conveyed his feelings. As he said, "I always try to use symbols, such as question marks, mystery marks, or even emojis to show my group some meaning, such as I disagree, or I am not sure, I don't understand.... and I think that casual (informal) way of interaction makes them feel more comfortable and alert them to review and clear up their answers, especially when they had spelling or grammar mistakes" 82. This could be an explanation of the learners' perception of the role of the leader of the WhatsApp group as a director of their learning activities, his main role was to facilitate and motivate the interactions among learners through reflect on their responses and use affective language to develop the relationships between group members.

In addition to content analysis the SNA gave us important visualisation of the teacher's presence during three active weeks. This analysis showed that In- and Out-degrees of the teacher and the group leader were relatively high during the three active weeks compared to other weeks (see figure 6 and 7). The most active three weeks for formal group were 4, 6 and 10; and the informal group members were more active during the weeks 2, 3, and 6. These figures showed that the teacher and the group leader were more dynamic during these active weeks, and sent and received more directed messages to specific members in their groups. As was showed in Table 6 and Table 7, and based on the content analysis, most of the teacher's and group leader's messages were classified as discussion, reflection and metacognition such as feedback or as asking more questions to enable discussions. These kinds of messages could be a reason of high level of student interaction and connectedness.

The teacher of the formal learning group said, “When I post a question to reflect on what we have discussed in the lecture, I try to ask students to comment on the other’s replies”. This is a good example of the role of teacher’s presence in increasing the level of interaction between students, as when the students commented on each other posts by sending directed messages, the level of In- and Out-degrees of the participants are also increased. This, in turn, means that more connections were made between the group members, and therefore the density of the network increased. The content analysis as shown in Table 6 and Table 7, indicated that the teacher’s and group leader’s posts tended to include questions to encourage discussions, comments to enhance reflection, and direct instructions to regulate learning. These types of posts increased online interactions in the two groups as perceived by the participants and confirmed by conversation content analysis. Thus we can conclude that the teacher/leader played important role in keep the interaction going among online learning members.

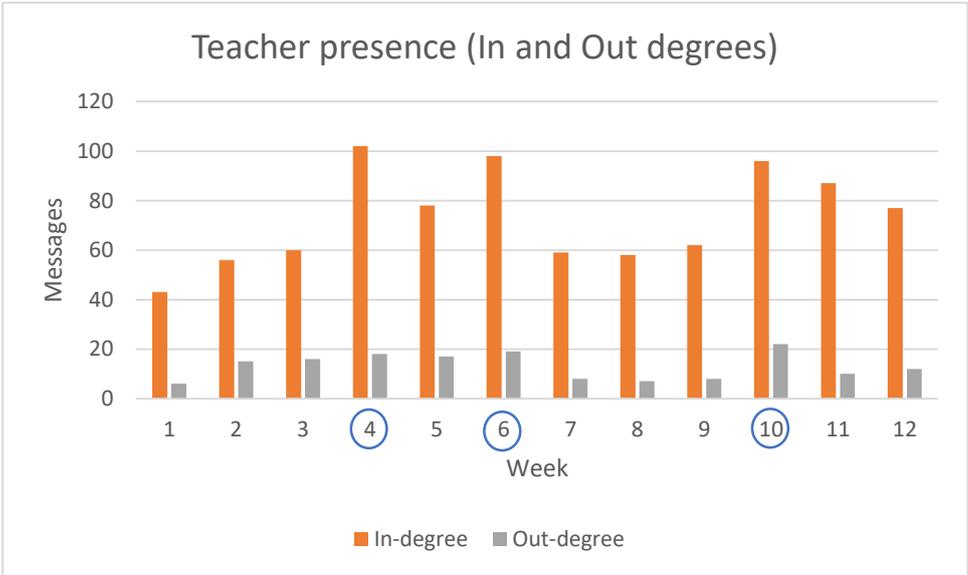


Figure 6: Teacher In- and Out-degrees during all 12 weeks

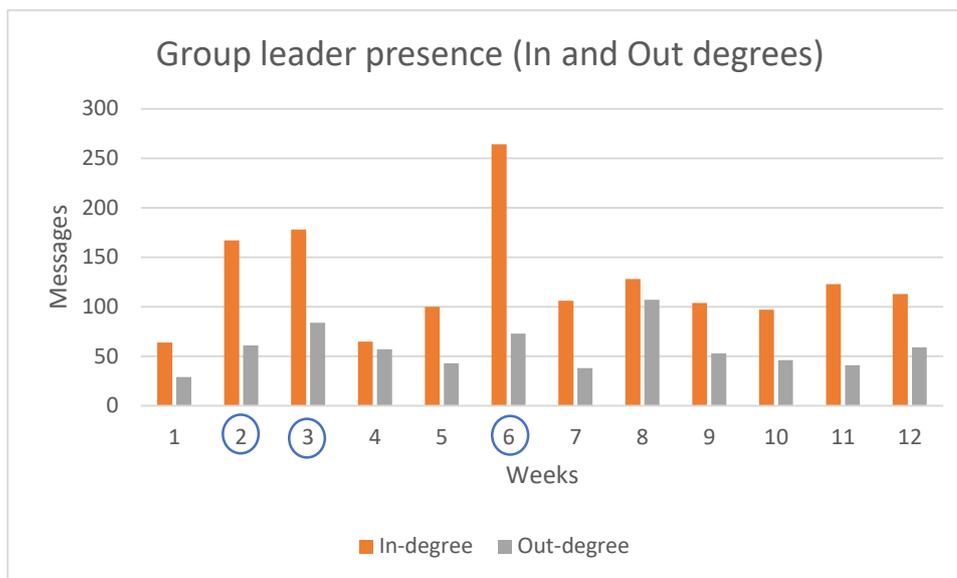


Figure 7: Group leader In- and Out-degrees during 12 weeks

4.2.2.2. Interaction with a more-able peer. Exchanging knowledge and experiences with learners of a different level of performance seems to be another key factor for developing online interactions and maintaining discussions in WhatsApp groups. All the participants in the two cases indicated that they wanted to interact with people who demonstrated further understanding of the studied subject. One of the student's confirmed that "the main advantages of participation in the WhatsApp discussion is to see other students' views and share their understanding, which helps me to construct my knowledge" (S3,17). Moreover the teacher of the formal learning group suggested that discussions between a high achiever and a low achiever enables both of them to construct and review their understanding by perceiving the knowledge from a different point of view. The low-achieving student will use the other student's explanation to construct their own understanding of the discussed topic, while the more capable student will confirm their point of view by providing detailed explanations and supportive resources. The group leader of the informal learning group asserted that the advanced learners tend to be more willing to respond to the questions posted by

other learners, and they try to support their answers with examples. The variety of learners' levels was more obvious in the informal learning group (case two) than the formal learning group, as there were no conditions for joining this group. This kind of interaction enabled the members to ask questions and get responses from learners at different levels, and this led to the respondents discussing and reflecting on each other's responses, especially if there were differences between their answers.

To triangulate this finding with the SNA, I selected 5 more-able members from each group and I focused on their In- and Out-degrees and compared them with other members in their group. During the interviews with the group leader in case 2 and the teacher in case 1, I asked them to nominate at least five highly capable participants. In the formal learning group, the teacher selected them based on their scores in the mid-term exam (S6, S7, S11, S14 and S18). In the informal learning group, the group leader selected them based on their scores in an online quiz he posted it in the group to examine their understanding of some English sentences (L2, L9, L15, L17 and L18).

Social network analysis showed that all selected more-able members have high In-degrees which means that they tend to receive more replies than the average of the other members, which subsequently indicates that they have important role in keeping the interaction going in the WhatsApp group. I then re-analysed the interviews of these high-achieving students and noticed that 4 out of 5 indicated that they prefer to share their views in the WhatsApp discussion rather than in the class. Interestingly, they gave different reasons for this preference. One of them said, "Because I don't have social relationships with my classmates, I prefer to use the WhatsApp group to reply to their questions or share important resources online rather than face-

to-face” (S7,33), and another one said, “WhatsApp discussions enable my classmates to know me more because I always appear quiet inside the class “(S18,37). It thus seems that, some of the students act different in the online discussion compared to in the class, and according to the five high-achiever interviews, most of them preferred to participate in the WhatsApp discussion rather than in face-to-face discussions in class for social or personal reasons. This led me to investigate further their role as high-achieving students and active members in the online discussions.

Based on the SNA, the average rates of In and Out-degrees for the formal and informal groups are shown in Table 8. According to this table, I classified the participants into four characteristics:

- Active member: has more than the average “in-degree” and “out-degree”.
- Moderator: has more than the average of “in-degree”, and less than the average of “out-degree”.
- Critic member: has less than the average of “in-degree”, and more than the average of “out-degree”.
- Isolated: has less than the average of “in-degree” and “out-degree”.

Table 8: Average rate of In and Out-degrees for the two groups

	Formal learning group	Informal learning group
Average In-degree	44.55	82.73
Average Out-degree	38.96	88.91

Active members tended to send directed messages, and also received messages in the discussion, which meant they were online and participating most of the time. They tried to read most of the responses and comment on them. The moderator members received more directed messages, which means that a large number of

participants tended to ask them questions or comment on their responses. This also meant that the moderator member's posts influenced the participants' thoughts in the WhatsApp discussion, as the participants did not accept their posts as they were, and tried to understand and discuss the posts with the moderator members (author). This may be because they posted interesting news and social topics that encouraged the other members to talk. I called them "moderator members" because they had the ability to direct the conversation and change its focus. The teacher and group leader are classified as moderator members in their groups as they send a lot of undirected messages, which are not counted as "out", but then a large number of participants replied to them through directed messages, so they tend to have low "out-degree" and large "in-degree", and a lot of discussions happened after the directed responses. This enabled them to move the focus of the talk to other points.

Critic members tended to comment on the others' responses via directed messages that involved a question or a general comment. Sometimes the author of the original post replied, but most of the time they did not. This is why the critic members' In-degree (received messages) was low while their Out-degree (directed sent messages) was high. The fourth type was the isolated members, who have low degrees of "in and out" as they do not direct their posts to specific members in the WhatsApp discussions. Therefore, their contributions appear as general messages that do not add to their Out-degree. Due to their lower number of posts or undirected posts, they also do not receive directed messages from the other participants (low In-degree). This classification of participants in the WhatsApp groups helped me identify what type of student the high-achieving students were, and to understand better their role in developing the conversation between group members.

The results from the formal group showed that three of the high-achieving students were classified as “active users” (S6, S11 and S14), which means they interacted very well with a large number of other members by sending and receiving directed messages. The other two high-achieving students (S7, S18) were moderator members. Due to the high degree of “in” of the moderator and active members, they seemed to facilitate an increased interaction level in the online group conversations as they received a lot of responses from the other members.

The results from the informal group also allowed the classification of the five members nominated as more-able learners by the group leader. Four of these learners were active users (L2, L9, L15, and L18), and one was a moderator (L17). Therefore, all these members seem to have a vital role in keeping the discussions going in WhatsApp by getting more direct responses to their posts (high In-degrees). This gives us important evidence about the role of high-achieving/more-able members in enhancing the interaction, however these findings do not demonstrate the directions of the interactions and who’s interact with whom or how many members involved in a thread of discussion. Nevertheless it shows that the number of posted messages in WhatsApp group is increasing with existing of such active and moderator users who have large amount of received messages (In degree). Thus the group interactions maintained through the continues messages that posted by community members to those active and moderator members.

4.2.2.3. Socio-emotional factor. This theme describes the social and emotional interaction between the group members. The emotional interactions were carried out using affective language or by exchanging empathetic messages, such as greeting each other, calling each other nicknames, or even using symbols to convey emotions

and feelings. Personal experiences and social news were also counted as socio-emotional discourse, especially when the participants described their feelings when telling a story. This type of talk seemed disruptive, especially when they discussed topics that were unrelated to the learning content, but it has the power to strengthen the interactions among the group members. When they share their emotional and personal stories, they reveal themselves to each other, and this encouraged the participants to join in the discussions as the participants perceived.

The interview analysis revealed that the participants in the two cases prefer to use affective language in the online learning groups to help them feel more comfortable when taking part in the discussions. One of the students of the formal group shared their personal experiences and gave examples of her participation in a local Photoshop exhibition for designing educational images. She said, “After sharing this experience with my colleagues in the WhatsApp group, I received lot of inspiring expressions that made me very proud and feel more glad for their sweet comments. It also gives them a chance to know something interesting about me, so they can ask me when they need help with using Photoshop!” (S14,64). As we can see, sharing personal and emotional stories could encourage the participants to join in interesting discussions, even if they are unrelated to the learning content.

The group leader of the informal group believed that “posting non-related learning posts, such as social news and casual chatting, makes a lot of members participate in the talk, and sometimes their conversations last for a long time. I think that helps group members build their online friendships, and I have to let them have this chance”. Moreover, two participant from informal learning group agreed that the

presence of a group leader could limit the members' freedom of talking about unrelated issues, but it is important to keep the balance between interesting social interactions, and participating in the online learning activities (L7, L12).

Content analysis of the most active three weeks shows that there was a large amount of affective language and unrelated topics used by the participants during these weeks as it forms about 26% of formal learning group's messages and 37% of the informal learning group's messages and that percentages are quite large related to other codes. This may be evidence of a positive relationship between member interactions and the use of affective language. To gain more understanding of this, I referred to the four types of online learning members. As discussed earlier, active and moderator members have the ability to increase the interactions between members as they receive a lot of directed messages. Table 9 shows the active and moderators for the two groups. In their interviews, all of them indicated that they prefer to use informal language and affective expression in WhatsApp conversations. Also all the active members asserted that greeting members and call them using their name are important strategies to get replies from the other members. While all the moderator members agreed that telling personal stories and sharing important news increase the discussions among group members in the WhatsApp, as that makes other members reply or comment on this kind of stories.

Table 9: Active and moderator members in the two groups

	Formal learning group	Informal learning group
Active members	S3,S5,S6,S11,S12,S14,16	L2, L3,L4,L9,L12,L15,L18
Moderators	S4,S7, S18	L17,L10

Moreover, the content analysis of the active and moderator members' posts during the three active weeks, revealed that more than 40% of active and moderator

members' posts were classified under affective language (A1, A2), personal experiences (T1), and social topics (T2) in the two groups. That means that nearly half of their messages were socio-emotional in its nature. That means that active and moderator users seemed to send many socio-emotional messages that conveyed their feelings towards the other participants, or even towards the discussed topic. It also means that using affective language and talking about personal experiences may have increased the directed messages between online participants, and thus increased the interactions within the online groups.

To sum up, active communication among group members was added to the learning needs as main factors that could develop the sense of learning community from the participants' viewpoints. To understand the motivations that could encourage participants to join in the WhatsApp discussion, content analysis and social network analysis beside the interviews findings revealed that there were three factors that could maintain and simulate the interactions among online learning members: teaching presence, interaction with a more-able peer, and the socio-emotional element in the online conversations.

4.2.3. Communication tool features

The third factor that contributes to the development of a sense of learning-group coherence was selecting and using of a suitable communication tools for all of the online learning community members. All the participants from the two learning groups pointed to the importance of using a convenient and common communication tool for which they already have personal accounts and with which they are familiar. Hence, since they have used it for social purposes, when they use it for an academic purpose, they will get to know other aspects of each other such as their interests and

some personal details. Consequently, this could strengthen the sense of connectedness among learning members. As we can see, a convenient tool is a general term; according to the participants, the tool used should be common and familiar with all the learners, and some of participants indicated that the tool should be easy to access in terms of creating and managing the account as well as in joining the online learning group. Other participants indicated that the communication tool should provide some features that can improve the identity of the group based on their common interests or learning needs. The following thematic map in figure 8 shows the features of the tools that could enhance the sense of group connectedness from participants' viewpoints.

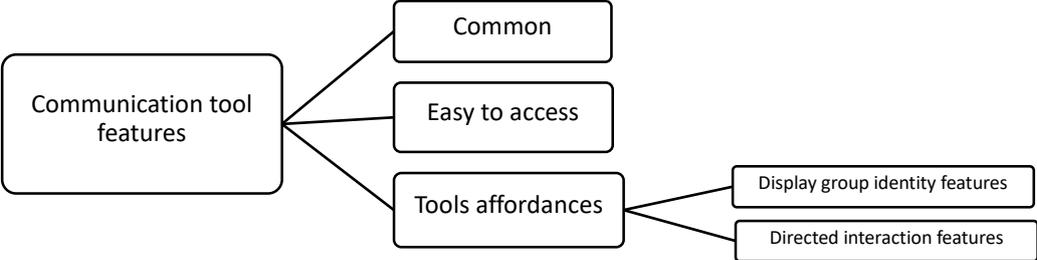


Figure 8: Thematic map of tool features

4.2.3.1 Common. A common tool means that the tool is familiar among the learners, for they are using it as a habit and as part of their daily lives. All the participants in the two learning groups were had accounts on Twitter and WhatsApp for five years or more. The teacher of the formal group also observed that using WhatsApp to build an online learning group was very easy and straightforward compared with other applications she had used before, because students use these kind of social networking applications for entertainment and social interaction. Hence, applying the same applications for learning and teaching purposes could maintain the connections between members of the learning group as well. All participants have personal accounts on

WhatsApp and Twitter, developing a status that describes their personality and displays their real pictures and/or something personal such as a picture of their children or their favourite places.

Using a common and familiar communication tool ensures that students stay online for a long time, thus increasing the opportunity to make them aware of any changes and activities that occur in the online learning group. It seems that the participants use WhatsApp and Twitter as part of their daily routine. More than half of the participants from each group stated that they check their phones—especially WhatsApp and Twitter—several times per day to remain connected with friends and stay up-to-date with the latest news. A significant number of the participants from the two cases thought that using common social media applications such as Twitter and WhatsApp could help keep them connected with their learning group and keep them updated with the issues discussed in the group. As one of the students noted, “when I am online on WhatsApp chatting with my best friend I see notifications in the top of my screen displaying my class discussions, so I know what they are talking about, even if I did not participate with them, I still connected with them and updated about their activities because I’m almost online on WhatsApp, while if we use uncommon communication applications I think I will miss more events just because I forgot to check the app frequently.” (S4,36). This student felt that using common and familiar apps such as WhatsApp for online learning discussions helps her to remain connected with the group, enhancing her sense of connectedness. The informal group leader asserted, “The leader of online learning group should carefully select a proper social networking tool to establish his online group. Because selecting a common and proper tool is not just related to the participants’ preferences as communicative

app but also it's related to their motivations and to what extent they will stay connected or online on this app... More online members could lead to more connected and active learning group." (L,43). Thus, common tools lead to strongly connected members because they tend to check the app continually; in contrast, if the participants are not familiar with the tool, they may miss some messages or conversations because they did not check or are not interested in checking the app frequently

4.2.3.2. Easy to access. Another point raised by the participants regarding the feature of the convenient communication tool was the availability and ease of access: through their phones. The informal learning group leader asserted that "the communication tool should be easy to access for all members; they should be able use their personal accounts or create a new account, and they should have the right to participate or to leave the learning group without conditions... Such environments give learners more freedom to join in and to learn with the online learning communities" (L,48). The participants perceive the use of social media such as Twitter and WhatsApp was easier compared with other applications or formal academic communication platforms such as Blackboard (Bb) required by the institutions and which the students must use their academic email accounts to join. As one student said, "I prefer to use WhatsApp in all modules instead of blackboard discussions because it is easy to access from my phone and I think I would get instant responses from my colleagues faster in such app" (S14,25). To ensure the ease of use, the layout of these applications should be familiar to the users. As the teacher of the formal group said: "I suggest to use WhatsApp in online discussions for academic modules because the interface of this application looks like the text message layout (SMS) in mobile phones, so they don't have to learn how to use it. I'm sure they will not ask me how

to create an account or how to use the app ... and therefore, there is no late students because of technical constrains as we sometimes faced on Blackboard” (T,13)

The content analysis of the three active weeks for the two groups' discussion also confirmed these findings as members did not ask technical questions in the formal group, indicating that the students are familiar with WhatsApp and they do not have any problems with it.

4.2.3.3 Tools affordances. The last point stated by the participants regarding their experiences in using WhatsApp and Twitter as learning tools was the affordances of these applications that contributed to developing their sense of an online learning community. Participants mentioned two main affordances:

4.2.3.3.1. Displaying group identity. The first one was the features that highlight group identity, such as enabling members to select a name and a picture for the WhatsApp group that demonstrate their interests and their common goal as online learners. Both the informal group leader and formal group teacher highlighted the importance of selecting an appropriate picture and name for the learning WhatsApp group, so learners could distinguish it from other groups and feel that they belong to this group by matching their learning needs with the name of the group and its picture that expresses the group's context. The name of the informal group was “Let's Speak English”. One member of this group (L5,81) said “If someone chat in “Let's Speak English” group, the name of the group appears on my home screen, and that remind me my goal which is practicing my English language as much as I can to improve my fluently, and this prompts me to participate and interact with the group” (L11,63).

The content analysis of the WhatsApp conversation in the three active weeks shows that the names of the formal group and informal groups in WhatsApp did not

change (table 10), these were still the same original names chosen by the teacher in the formal group and by the group leader in the informal one. That shows that the names of the groups were acceptable to the members as reflecting their identity as a group of online learners. The picture of the formal group also did not change by the members: books and computer and the logo of King Saud University, this picture demonstrated the group's interest as an academic group (figure 9). In contrast, the picture of the informal group was changed two times by two different members—the group leader and one of the learners (L3). The first one occurred in the second week by the group leader (see figure 10), and the learner (L3) updated the second picture in the sixth week. This picture shows people sitting next to each other with “We Speak English!” written on it (figure 11). All these pictures illustrated teamwork and used the English language to promote the meaning of collaborative learning and discussions in English as the group's goals.



Figure 9: Formal group picture by the teacher



Figure 10: The first picture of informal group by the group leader



Figure 11: Second picture of the informal group by L3

4.2.3.3.2. Directed interaction affordance. The second affordance of WhatsApp and Twitter is the ability to send direct messages. For instance mentioning a specific member in the group or directly commenting on his or her post (a “like” or retweeting in Twitter). Fourteen students out of 20 stated that they used the mention-feature in Twitter and WhatsApp in this module discussions to alert the teacher or other colleagues about a post. Almost all the informal members tended to use these features in WhatsApp group discussions and Twitter to prompt someone from the learning group to see his or her post. Of course, this feature in social networks plays a vital role in increasing the number of connections between learning members. The participants indicated that they usually reply or comment on the posts that mention their names. One of the interview question was: “do you reply to a group member when he/she mentioned your name or used quote-reply on your previous post? Most of them said “yes”, they would reply to this kind of directed messages in WhatsApp groups and Twitter, and when I asked “why?”, They stated that mentioning someone means asking them to look at and comment upon the post. While interaction among members is important to keep the whole group active and to encourage collaborative

learning, directed messages between specified members inside the group could increase the number of connections between two or more members, thereby increasing both group density and the sense of online community.

The content analysis reveals a significant amount of directed messages happening in the three active weeks. Table 10 shows that about 27% of formal group messages, and Table 11 shows 20% of the informal group messages sent in the three active weeks were directed messages, meaning that the user directed a message to a specific member in WhatsApp using the mention feature (@) or quote-reply features to alert or ask comments from the mentioned member.

Table 10: Content analysis of WhatsApp Affordances (in the Formal learning group)

Code Name	Code	Frequencies	Percentages
Directed messages (mention a member @, or quote-reply)	W1	234	27.5 %
Update group name or picture	W2	1	0.12 %
Technical help	W3	0	0 %
Total messages during the three active week		854	

Table 11: Content analysis of WhatsApp Affordances (in the Informal learning group)

Code Name	Code	Frequencies	Percentages
Directed messages (mention a member @, or quote-reply)	W1	495	20.86 %
Update group name or picture	W2	2	0.08 %
Technical help	W3	3	0.13 %
Total messages during the three active week		2373	

The interviews also indicated to the affordances of Twitter that could enhance the sense of online community. It revealed that using Twitter can develop the identity of an online learning group in a different way such as providing a hashtag feature to discuss an idea related to the lecture or learning content. As a hashtag is a keyword

or a phrase used to describe a topic or a theme, this method can keep the group of learners focused on a particular topic raised by a member of the learning group; moreover, this feature can alert other users with the same interests to participate and share their views. Since a hashtag automatically becomes a clickable link when the user tweets it, anyone who sees the hashtag can click on it and be brought to a page showing the feed of all the most recent tweets on that hashtag. Therefore, a learning community of Twitter users can put hashtags in their tweets to categorise them in a way that makes it easy for other group members or users sharing the same interests to find and follow tweets about a specific topic or theme. The teacher of the formal group declared that: “It's great to use hashtags to discuss some points related to our lectures to see who my students demonstrate their understandings as a group of academics specialised on this area and to see how they comment on each other tweets as well as comment and response to other external users interesting in our learning topic.”

Using hashtags to discuss academic topic also could alert other academics outside the learning community to share their knowledge and latest publications, as in the informal group when the leader asked the learners to participate in the hashtag #Askenglish by asking any question in English. One of the learners (L6) tweeted on #Askenglish, and then she said in the interview “my English language teacher in my school saw my tweet on #Askenglish and she posted an educational poster demonstrate how to ask several questions in English and that was helpful for me and my WhatsApp group members as I shared it with our WhatsApp group”. As we can see, the other informal group members could see her teacher’s posts under that hashtag, making it a useful resource for them as well, and facilitating communication with other users specialising in the same domain.

Thus, the communication affordances of tool seems as the third factor that play an important role in developing and maintaining the sense of connectedness among online learning groups.

At this point then, I began wonder about the differences between the role of WhatsApp as a discussion tool and Twitter as a microblogging application in the two learning contexts, leading to the second research question: *What is the role of social media in developing online learning communities in formal and informal learning groups?* In the next section, I will try to answer this question through a discussion of the key functions of using WhatsApp and Twitter as learning tools, shedding light on the main uses of these apps in formal and informal learning communities.

4.3. The role of social media in developing online learning communities

There were differences between the formal group and the informal one in the uses and application of Twitter and WhatsApp in learning practices. To investigate the role of Twitter in developing online learning community, I will discuss the main functions of using Twitter and WhatsApp for learning purposes. Then I will focus in more detail on the different uses of WhatsApp and Twitter as learning tools in formal and informal learning settings.

Twitter for developing OLC. The most common advantage of using Twitter to develop a community of learning was to develop students' academic and social presence. Almost all the participants indicated their area of specialty and their social status in their profile on Twitter. This profile can be customised to say as little or as much about the user as he/she would like. Therefore, the profile gives the audience a first impression about the author, allowing someone to decide to follow or unfollow

him. One of the informal learners (L12,23) said, “when I write my Twitter profile in English I show other users that I would like to talk English instead of my First language (Arabic), so my followers or other users tend to comment on my tweets or message me in English”. Hence, using a Twitter profile to demonstrate user interests or hobbies could improve one’s social and academic presence, as the leader of informal group explained that as “people who have the same preferences tend to follow each other in Twitter”, thus reveal some personal and academic interests on Twitter profile facilitate forming a community of common-interest”. That is exactly what happened in the informal learning group when the leader noticed a large number of his followers are interested in practicing English as a second language and then he started to think to create a WhatsApp informal learning group. All the informal learners indicated that they followed the leader of the group because he mentioned that he is interested in practicing informal English language with other users, and he provided free online short lessons in English. Thus, there was a match between their needs or interests and those of the group leader’s profile.

The same findings appeared in the formal group as the teacher of that group indicated that all the students tend to show their academic-specialty, and some showed their university name on their profile, which could increase the chance of contacting previous students or other users in same specialised area or even with faculty in the department of the same college. One of the formal students (S5) indicated that

“I mentioned in my Twitter profile my real name, my character as helpful and enthusiasm person, my specialism and the year of my study... After I finished my preparation-year in the university, I felt how much it was hard to new student come from secondary schools to adapt to the university life, then I

started to give advices to new students in the preparation-year, and then the head of the preparation-year asked me to join to a committee to help new university students and to reply to their questions on Twitter, I agreed and I update my Twitter profile to show that I am a member in the new students' help committee, my followers increased more than 2000 ...most of them were new students”

As we can see, using a Twitter profile to demonstrate personal character and academic status helped to make this student known to other new students as well as the faculty, adding to her reputation in the department and increasing her social interactions. As a result of increasing the number of followers with the same interest or in the same organisation, the academic and social presence of the Twitter user will be developed. As the teacher indicated “getting a large number of followers on Twitter from the same institution or workplace would improve the user social and academic reputation because this gives him a chance to be recognised in his work environment or study place especially if he tweets useful advises” (T,75).

WhatsApp for developing OLC. The participant perceived that using WhatsApp for learning with a community provides a completely different advantage: enabling a learning group to have an instant and open means of communication. As the teacher stated that “A WhatsApp group is a private group, so the group leader adds all members, thereby facilitating a safe, instant and open discussion environment for the students” (T,32). All the participants emphasised that the main advantage of using WhatsApp as learning discussion tool was getting instant responses and feedback. I will present later how the feature of WhatsApp to mentioning someone in the group ensured that the mentioned person was alerted, so he or she would

instantly reply to the sender from the learning group. Also, the feature showing the sender who read the message in the group also encouraged other users to reply, as many participants indicated that they tend to reply to any question in the learning group because the sender will know that they have seen the message. Moreover, the real-time nature of WhatsApp has given it a sense of immediacy for events, emergency questions or stories as they happened. As the teacher of the formal group said, "I noticed that students used WhatsApp in this module not just for academic discussions as we supposed but also to share their thoughts and feelings, especially before the test there were a number of students expressed their tension and they received support from other members, during late-night... as they know there is a number of the group members are still awake to study for the test" (T,39). Accordingly, WhatsApp features such as instant messaging, showing member status as online or offline, the last time a member had been online, showing if the other members have read the messages or not and directing the messages to specific member in the group all create an open and instant communication environment that enables students to stay updated and connected with their online learning group, helping them get immediate responses at any time.

As we can see, the main function of using Twitter by a community of learners was for participants to develop an academic and social presence of community members while the function of using WhatsApp was providing an instant and open communication environment for the community members. In order to get a deeper understanding of these main functions and how they could be influenced by the learning context (formal or informal), I will focus on the following two questions raised at this stage:

Q2.1. What are the main uses of WhatsApp in formal and informal learning situations?

Q2.2. What are the main uses of Twitter in formal and informal learning situations?

4.3.1. WhatsApp as an open and instant communication tool

The primary use of WhatsApp, according to all participants, was for conducting instant and open interaction with the community members. However, there are some differences in applying WhatsApp as a learning communication tool in formal and informal learning contexts. Figure (12) presents these uses separately based on the learning contexts.

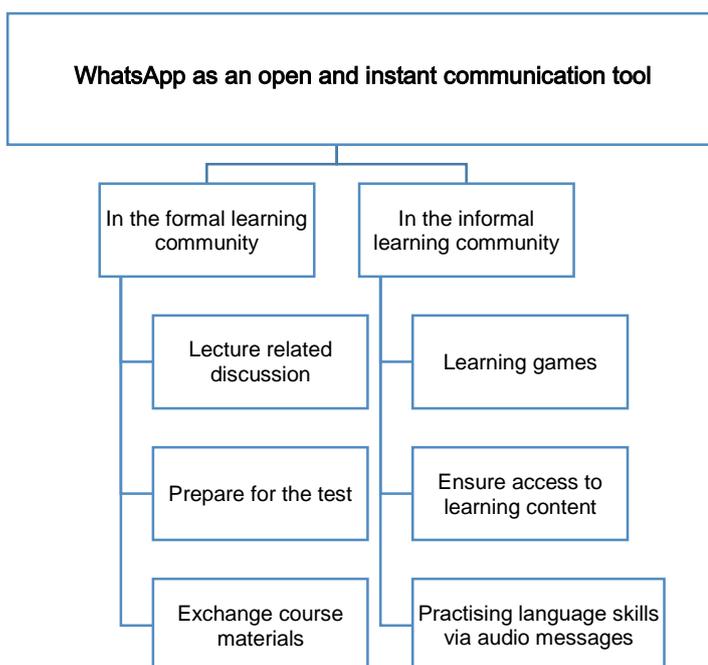


Figure 12: Thematic map of WhatsApp learning uses

4.3.1.1 Formal learning uses of WhatsApp.

4.3.1.1.1 In-depth lecture related discussion. The formal learning group mainly used WhatsApp to complete their in-depth talks related to the lecture. Many students

stated that they prefer to use WhatsApp “to ask course-related questions as it keep written records about that” (S4, S11, S6). Also number of students stated that using WhatsApp in this module facilitated discuss lecture-topics in more details as there is no time constraints, while some of them indicated that they prefer to participate in WhatsApp discussions rather than inside classroom discussion because it gives them “more time to arrange their ideas and support their responses with resources from the textbook” (S11,35). Also the teacher indicated that “WhatsApp discussion enable to hear the voices of some students that seemed to be quiet in the lecture” (T,12).

Moreover, content analysis of WhatsApp conversation revealed that most of the questions posted in WhatsApp were lecture-related. Figure 13 shows that 17% (150 messages of WhatsApp messages coded as Initiate Conversation (I1,I2,I3), Further analysis of messages indicated more than 80% of these were lecture-related questions (121 messages out of 150 messages). This means that the topics were introduced in the classroom and then followed up in WhatsApp as questions (I1) or sharing resources to start the conversation (I3).

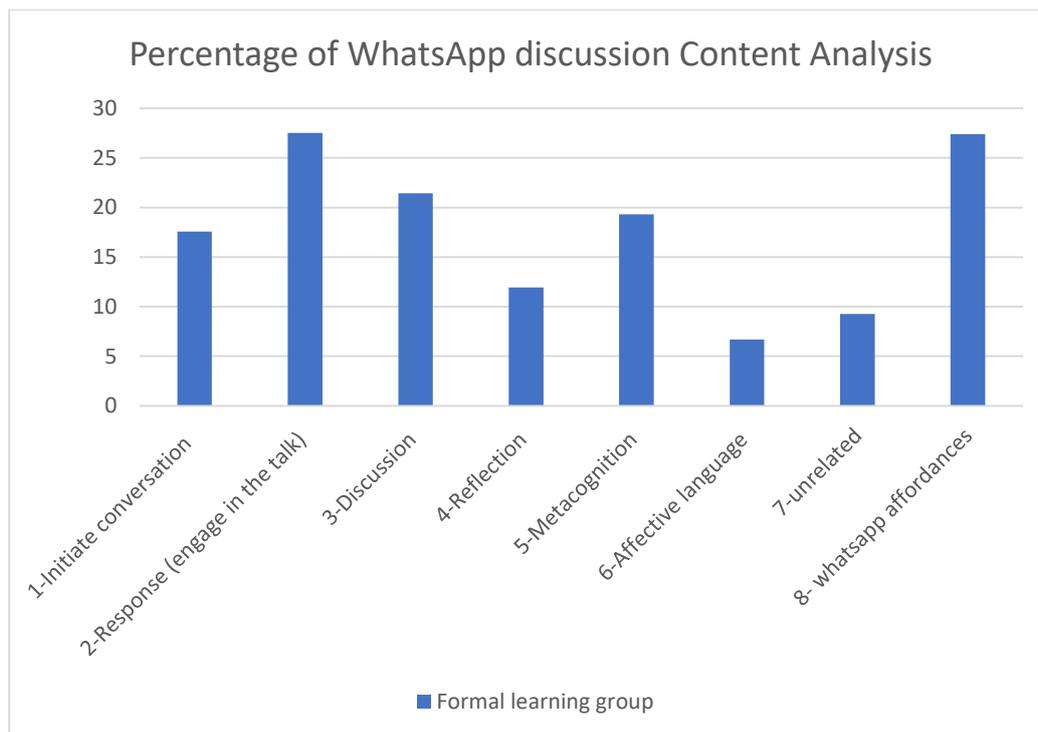


Figure 13: Content analysis of formal learning group discussions

4.3.1.1.2. Prepare for the test. The second important use of WhatsApp in the formal learning group was for studying together in order to prepare for the test. Nineteen students indicated that WhatsApp group discussions was helpful to them to ask and discuss questions before the test. The teacher of the module stated that “ As most students were preparing for the mid-exam in their homes and late at night; hence, using WhatsApp to study together and share questions was noticed at the night just before the exam” (T,16) .

The content analysis shows that 19% of messages posted in the three active week were classified as Metacognition (setting up a plan and monitoring both time and learning plans). These kinds of messages were mainly related to the mid-term exam. That means that the students used WhatsApp to discuss together how they could divide the module sections (M1), for example: “ let’s start study the first chapter of the textbook, then we will discuss related question together” (WhatsApp msg 473).

In this week there were 20 messages coded as Mo1 and Mo2 to monitor time to and the plan of the study. For example, one student posted on WhatsApp “have we finished the questions of the second chapter?” (WhatsApp msg 511). And another one posted: “We still have 24 hours before the test” (WhatsApp msg 589). Using WhatsApp to prepare for the test was mainly seen in the formal WhatsApp discussions; however, it is not just used to share questions and studying together for the test, but also they used it to regulate their learning through metacognitive process such as setting a plan for studying (ex. messages coded as M1) and monitor the time and the achievement of the plan (as the messages coded as Mo1 and Mo2).

4.3.1.1.3. Exchange course materials. Another important use of WhatsApp in the formal learning group was exchanging course materials. The teacher and students perceived that using WhatsApp in this module was very important and useful to exchange course resources and lectures notes. The teacher noted that “I think WhatsApp facilitated sharing course material such as students’ mind maps or lecture notes... as the students can take photos of their notes and post it directly on our module-WhatsApp group”.(T,48)

Also, sharing course material can be noticed in the content analysis of the formal learning group WhatsApp conversation, under the category (response): code (R3) which is “Support answer with resource”; there were 135 messages coded as (R3). Generally, these resources were pictures of textbook pages, PowerPoint slides from the lecture presentations, or students’ notes. More than half of formal students stated that using WhatsApp was useful for sharing such course materials, and they felt all students in the WhatsApp group were supportive and cooperative, more so than in the classroom (S3, S6, S11).

As we can see, using WhatsApp as a synchronise communication tool for a formal learning group facilitated communication between students and their teacher outside classroom times for different purposes, students most perceived this as in-depth lecture related discussion, preparing for the test and exchanging course materials.

4.3.1.2. Informal learning uses of WhatsApp. The informal learning group demonstrated slightly different uses for WhatsApp as an educational conversational tool. Next section presents the main three uses of WhatsApp in the informal learning case.

4.3.1.2.1. Learning games. One of the main perceived use by the informal learners is using WhatsApp to conduct and engage in educational games. The group leader indicated, “ We use WhatsApp to do many kind of linguistic games such as choose a word and ask the learner to give synonyms, or antonyms, best translating from English to Arabic and reverse, sharing as much as they can of rhyming words”. Almost all the informal learners indicated that using WhatsApp enabled them to practice the language with fun, and the best practice to do that was to play educational games as a group or in teams (L5,L7,L11). One of the learners stated that “The most useful activity that I would like to participate in with this learning group is vocabulary game and finding its meanings” (L7,25). Thus learning games on WhatsApp group perceived as the most useful and interested activity by the participants.

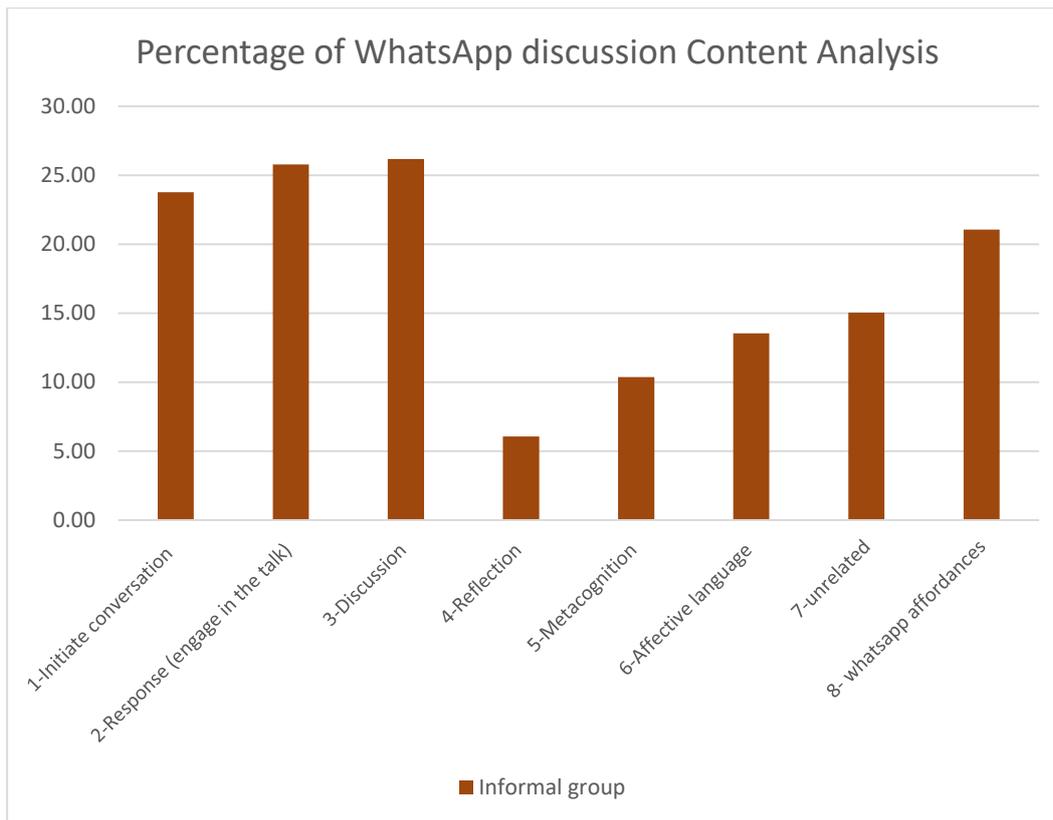


Figure 14: Content analysis of the informal learning discussions

The content analysis confirmed this finding, as the analysis showed a large number of messages were classified as Initiate conversation (Figure 14), particularly (I2 and I3). There are 234 Messages coded as (I2) when the participant suggest an activity or ask a question to start a game such as “give three rhyming words with “wood” ” or “what is the synonym of “sympathetic”? , while there are 288 messages coded as (I3) as they posted resources such as links to online words games or pictures of puzzles or completing sentence games (see figures 16 and 17 as examples of this kind of games).

In each of these puzzles, a word starts and ends with the same letter. Can you figure out what the word is?

1. _ivi_
2. _rus_
3. _ido_
4. _rom_
5. _useu_
6. _athtu_
7. _ras_
8. _ypis_
9. _eapo_
10. _ardia_
11. _ero_
12. _ende_

Figure 15: Learning game example 1

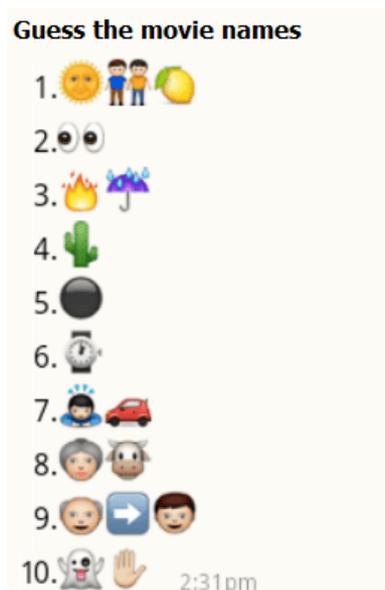


Figure 16: Learning game example 2

4.3.1.2.2. Ensure access to learning content. The second use of WhatsApp as an informal learning tool was to ensure that the learning content had been delivered to the whole online learning group. As the leader of the group stated that “when I post useful learning resources such as a video or an instructional poster, usually I check who has seen it by swiping my messages right to the left. If I noticed that there were

a large number of members did not see it, sometimes I resend it again or ask them any question about the recourse to encourage them to see it". It seems that the use of Twitter has facilitated access to learning resources through following academic and specialised learning communities, however Twitter is updated every second, so the oldest tweets could be hard to find. Also, we can't assume that all online learning group members are following the same educational or academic accounts. Thus, posting the learning content as files to the private WhatsApp group ensured that students could automatically save them in their devices, discuss them in the WhatsApp group and return to them at any time. Many learners (L2,L4,L11) indicated that they used the "star messages" feature in WhatsApp to keep their favourite list of educational recourses posted in this informal learning group in order if they wanted to look up later. In addition one learner said, "going back to the information or indicated talk now is very easy using Chat-search feature in WhatsApp" (L4,21). WhatsApp facilitates the access of the content through three different features: 1) checking reading receipt feature to confirm that the content had been delivered and seen by the learners, 2) star-messages feature to enable learners to keep a bookmarked list of their favourite learning content, and 3) a Chat-search feature to enable the learner to look up for a specific information in the previous talks in WhatsApp group.

4.3.1.2.3. Practicing language skills via audio messages. The third use of WhatsApp by the informal learning group is practising listening and speaking English through recording and receiving audio messages. The leader of this learning group emphasised that voice messaging is a powerful way to practise second language speaking and listening skills, as the learner can save the messages and listen to

them several times, also it gives the learners more time to listen carefully and translate vocabulary that they did not understand. As he suggested that “hearing the talk several time improve the ability of speaking through imitating the pronunciation and memorising English sentence structure “(L, 25). Thus using WhatsApp to record and listen to voice messages could improve listening and speaking skills as the group leader perceived.

According to the learners, using voice messages to practice English language decreases the pressure of using second language in synchronous communication such as face to face conversations or phone calls (L2, L4, L7, L11, L15). One of the learner stated that “Using WhatsApp voice messages to practice the language is useful because I can plan what I’m going to say, and check words I don’t know how to say” (L11, 34). While another learner stated that “using voice messages in this learning group helped me to listen carefully to myself and try to correct my pronunciation when I compared with other speakers” (L7, 23). So listening to other voices dialog could help a learner to evaluate his/her speaking ability. Another learner indicated that voice messages encourage her to talk confidently, as she stated that “I usually have struggle in speaking to others in English, but when I tried voice messages in this WhatsApp learning group, I started to listen cautiously to others and when I felt that I’m ready to talk I have prepared my talk and just say it and sent it! By doing that several times, I feel more confident to participate in English talking” (L18, 25). As we can see voice using messages on learning WhatsApp group helped learners to listen and understand what the other person says, also it enables them to prepare and evaluate their sentences and consequently speaking confidently. These were the most learning uses of WhatsApp by the formal and informal learning groups, the next section presents the most educational uses of Twitter in the two cases.

4.3.2. Twitter as a space for developing academic and social presence

The primary use of Twitter, according to all participants, was for developing academic and social presence. However, there are some differences in applying Twitter as a learning communication tool in formal and informal learning contexts. Figure (17) summarises these uses separately based on the learning contexts.

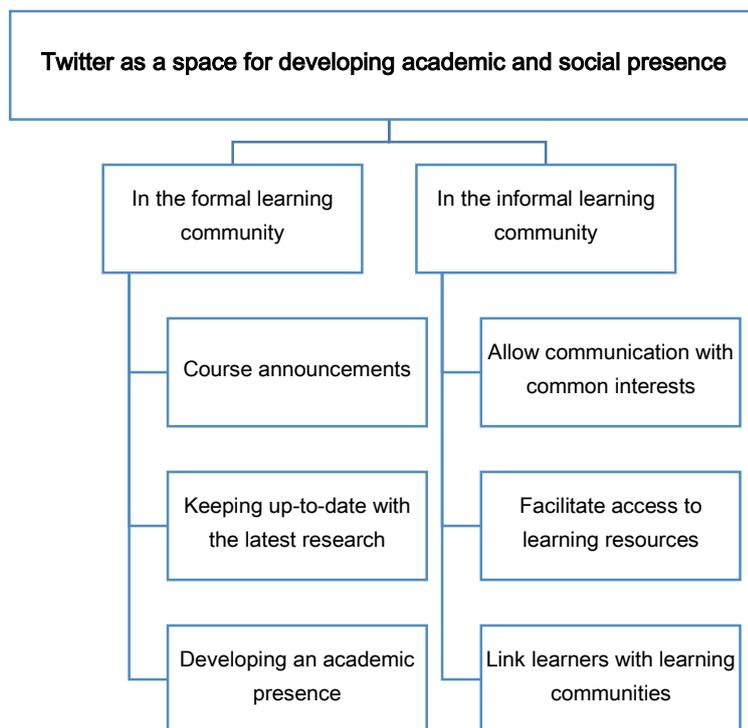


Figure 17: Thematic map of Twitter learning uses

4.3.2.1. Formal learning uses of Twitter.

In the formal learning case there were three significant uses of Twitter : (1) enable the teacher to post immediate course-related announcements, (2) keep students up-to-date with the latest research and events, and (3) enable students to demonstrate their academic interests by sharing their specialties in their profiles or tweeting on their academic topics. I will discuss these in turn.

4.3.2.1.1. Course announcements. The real-time nature of Twitter was harnessed by the teacher of the formal learning group to give immediate advice guidance and links to relevant resources. As the teacher said, “usually I tweet to my students if there were any changes in the lecture’s time or place, then I post that in our Blackboard to just record that formally, because I think they will receive it faster on Twitter” (T,51). Moreover most of the students stated that they have set their mobile devices to receive the push notifications for the tweets from their teachers, so they can get the teacher’s guidance related to that module immediately (S3,S5,S11.S16). That means that the customisation of push notifications on twitter could help the student to be alert about what they are interesting to know, such as, in this case, number of students tended to put the notifications of their teacher tweets during the term times. Also the teacher stated that “I think that the most advantage of applying Twitter by teachers in the university is the ease of contact with large numbers of students instantly to provide updated information about the course such as cancelling of the lecture in bad withers, changing the room when there is a technical problem” (T ,48).

4.3.2.1.2. Keeping up-to-date with the latest research. Twitter enabled students to share the latest research to keep them up-to-date. As the teacher said, “I start following scientific journals in my domain when I start my master programme, now when they post a new paper I retweet that to my students so they can look at it too” (T,71). Almost all the students agreed that using Twitter in this module helped them keep informed with all the interesting news, including the latest research in their domain, some of the students mentioned that the teacher also played important role in sharing the useful Twitter accounts that focused on their interests as instructional tools designers (S5,S6,S11,S18). Also the teacher stated that “it’s exciting to use Twitter in

my course... and I see the most advantages of this is that giving my students more insight into what's actually going on in their academic field”.

It also can inform the students about the latest events and academic talks outcomes. The participants from the formal learning group including their teacher have pointed to the role of Twitter in providing a simple way for attendees at a conference to share their views about particular sessions and activities with others. To illustrate, 4 students mentioned Apple's conference, and that they knew the features of the new iPhone from the people who attended this conference and shared instant news about latest Apple devices.

4.3.2.1.3. Develop an academic presence. Formal learning group member have emphasised that using Twitter can develop their academic presence through updating and showing their projects or by mentioning study domains in their profiles, as well as through commenting on, liking or retweeting academic tweets that reflect their knowledge and interests. As one of the students (S19) said “Keeping updating with the latest research and conferences in my area lead to develop my academic presence, as my followers will see my comments, likes and retweets on these specialised topics or hashtags and that shows a good impression about my academic status.” The teacher of this student emphasised that Twitter gave current students a place to voice their thoughts, ideas and projects, which can contribute to the development of their academic presence.

4.3.2.2. Informal learning uses of Twitter.

4.3.2.2.1. Facilitate access to learning resources. The informal learning group used Twitter initially to exchange learning content and to facilitate access to related learning resources such as educational websites, posters and educational videos.

The learners stated that they use Twitter as a source of learning content, as they follow a number of academics and other specialists who post useful and new learning resources. Also, I noticed that the group leader tended to share links with the WhatsApp group of learning resources or useful tweets on Twitter. He justified that: “The Twitter content is updating every second, and I think using Twitter as source of information or learning content would be much better for the online learners mainly if they learned to get the information from valid Twitter accounts such as formal institutions or specialised people ... for our informal learning group, I recommend to just see the tweets of native speakers to improve the participants’ second language.” (L,45).

Another form of facilitating access to learning resources is by retweeting the content, putting it in the bookmarks or even take screen shots. One of the learners (L6) stated that, “I have a folder on my phone to save all useful tweets as screen shots, particularly when I like the structure of the sentence in English, so I keep it to build my own sentences just like the sentences structure of native speakers’ tweets” (37). Another learner stated that saving useful blogs and in my bookmarks in twitter as my learning content list in my mobile phone, and that enable to get it back at any time and share it with my friends when they need it” (L2,32).

4.3.2.2.2. Allow communication with common interests. Another main use of Twitter in the informal learning context was to allow communication with people of common interests, thus promoting and creating social and academic relationships. One learner stated that “when I look at a particular Twitter account for example my teacher Twitter account, then scrolling down, Twitter suggest to me some accounts to

follow which look like my teacher's...These accounts selected based on several common features such as work place, specialism and that's way Twitter has ability to ease following people with common tasks or missions". Thus, aggregating information about the users via Twitter and use this information to suggest similar accounts to follow could increase the chance of reaching to more people with common interests.

Connecting people with the same interests contributes to building and developing online learning communities which increase the chance sharing and learning together as the leader stated " the most advantage of applying Twitter in informal learning setting is to link to the various people globally with similar interests of our own, which enable us to learn from each other through sharing our knowledge and personal experiences" (L,66) . Also he suggested, using Twitter to reach to as many users as possible with similar interests or hobbies can be achieved through participating on specialised academic or social hashtags, when the Twitter show you who else interesting or tweeting in this topic.

4.3.2.2.3. Link learners with learning communities. Learners have also remarked that the use of Twitter in the informal learning practices enable to link learners with educational institutions and communities. A good example was in the way the informal group was formed. The leader of the group stated that " I noticed a large number of my followers on Twitter are tweeting in English language and they interested in practicing English as a second language on their conversations and then I decided to create a WhatsApp informal learning group" (L,5) so the use of Twitter in this case has led to establish an online learning group on WhatsApp consisting of 20 informal learners. Also, 16 learners from this group stated that using Twitter enabled them to join many online courses in different fields such as academic writing, programming,

time management and so on. These kind of online courses provided by recognised institutions or specialised experts and they used their Twitter account to announce about the new online courses or live videos talks.

Another way to link user with online learning community is through using Twitter to announce about virtual learning groups or online courses, for example “tweet a web site link of an online course such as coding courses, when I click on the link, I can register on the course directly, and see other students who registered too” (L2,34). So the use of Twitter here is just for calling similar interest people to join in pre-existing online learning communities or create their own learning group on other platforms.

To sum up, the most common advantage of using Twitter in a community of learners was to develop students’ academic and social presences while WhatsApp provided an advantage of having open and instant communication space. However, there were different uses of these tools (WhatsApp and Twitter) based on the structure and the needs of the learning groups. For the informal learning group they felt that Twitter has significant role in giving a quick course announcement, keeping them informed about latest research and enabling them to develop their academic presence. While using WhatsApp in this module enabled them to continue in-depth lecture related discussions, ease the process of exchange course materials and ease preparing for the test. On the other hand, the informal learning community showed slightly different uses of Twitter and WhatsApp in their learning practices. They perceived playing learning games, ensuring everyone received learning resources and practicing learning activities with voice messages as main uses of WhatsApp for

them. Twitter has potential uses in facilitating accessing and storing learning resources, empowering people with similar interest to find each other, and linking informal learning with online learning communities.

In the next chapter I will discuss and explain the link between the three factors of developing online learning communities (the findings of the first research question) and the role of Twitter and WhatsApp on developing formal and informal online learning communities (the findings of the second research question), through explaining and inserting the related uses of Twitter and WhatsApp under the three main factors of developing online learning communities on the light of networking learning theories and the previous literatures.

5. Discussion

5.1. Introduction

This chapter includes a discussion of the research findings in light of previous studies and the proposed theoretical framework presented in the literature review chapter. The first part summarised participants' view of the factors of developing online learning communities on social media as an answer to the first research question. The participants perceived the presence of common learning needs, the presence of active communication among community members and the use of convenient communication tools as the main factors of developing and sustaining their learning communities on social media platforms. Then, the second part discusses a number of interesting educational uses of Twitter and WhatsApp that emerged from the two cases, in order to link the participants' perceptions of the concept of an online learning community to their learning uses of Twitter and WhatsApp as educational tools. The third part offers a reflection on the research findings in light of the proposed theoretical framework of studying online learning communities through the three main perspectives: individual, interactional and group perspective. Finally, a summary of this discussion will be presented to conclude the discussion of the findings.

5.2. Developing online learning communities on social media

The participants in the two cases indicated three main factors that they think could develop and sustain an online learning community. The first of the factors identified was the "presence of common or similar learning needs", which seemed to motivate students/learners to join and participate in their online learning group. Two practical aspects were perceived to be influenced by the indicated group's learning

needs: “group design” and “the content of the online conversation”. The findings for this factor in section (4.2.1) showed that the design of the online group (i.e., the role played by the participants) is determined by the participants’ learning needs and their intentions when joining the group. The findings also showed that the online learning activities and the content of their conversations are designed based on the teaching plan during a specific period of time, such as a week or the duration of a lecture.

The second factor of developing an online learning community the presence of “active communication” among the learning group members to ensure the maintenance of the group’s connections and the members’ engagement in online learning activities. In this respect, an additional research question emerged: *what are the factors that contribute to facilitating online communication between the group members?* The participants from the two cases identified three fundamental practices that they felt enhance communication between group members: 1) teacher or group leader presence, 2) ongoing contact with high-achieving peers, and 3) having a socio-emotional element in the online conversation.

The third factor was the selection and use of communication tools that are suitable for all community members. This factor is concerned with the features and affordances of the tools. The results showed (in section 4.2.3) that the tools should be common and easy to access for all group members, so that they could all both feel and be connected with their online learning groups. The tools should also offer two key affordances; displaying group identity, and the possibility of directed interaction (such as mention features using @ and direct-reply features). In short, this part of the findings has revealed that the presence of common or similar learning needs, active communication among members and appropriate tools and features are the

three main factors that contribute to developing and sustaining online learning communities from participants' perspectives. The next three sections discuss the findings of the three factors in the light of learning theories and previous literature.

5.2.1. First factor: Learning needs

The results (in section 4.2.1) show that the development of the online learning community is enhanced by making sure that the group of learners has similar learning needs. The ultimate goals of the online learning communities in the two cases studied were to share learning experiences, which led to constructing knowledge collaboratively and improving retention rates for the participants as they perceived. These findings are consistent with many other studies that identify meeting participants' specific learning needs as a fundamental goal of online learning communities (Shea 2006; Thorne, Black & Sykes, 2009). This can be explained by (Ryman et al., 2009, p 40) who added the individual strengths to the common group goal as two aligned factors of developing and sustaining online learning communities, he stated that "When learners believe their goals are aligned and their individual powers are necessary to achieve this goal, then it provides a rationale for sustaining learning relationships, provides cues for how to relate to each other and consequently how to approach conflict". Thus, identifying a particular set of learning needs in a specified domain or learning subject is highlighted as one of the main factors that enable participants to join and take part in online learning groups in addition to identify the task and the power of each member.

However, some literature highlighted the way a community approaches conflict as a crucial factor in its development and effectiveness (Alper et al., 1998; Johnson & Johnson, 2009; Smith, 2005). They suggested that building interdependence to sustain a community requires the ability to promote constructive controversy (Johnson & Johnson, 2009; Somech, 2008; Smith, 2005). As the ability to review, question, and comment on other contributions is one of the most important aspects of community development and sustaining. That gives more importance to

the design and the environment to establish respectful and cooperative relationships among community members. Ryman et al (2009) claimed that the establishment of interdependent relationships is crucial for discovering how learners will deal with conflicts as they move into the discomfort of learning. Thus, it seemed that the conflict should exist in the community members' assets and knowledge, but not in their ultimate goal as one group (Ryman et al, 2009; Somech, 2008). In this regard, Somech (2008) focused on the goal and task interdependence as two essential components of developing relationships within the learning community. According to Somech (2008), there are four possible combinations of task and goal interdependence which prompt competitive or cooperative environment: First, low task and goal interdependence lead to indifference between members of a group and little or no conflict. Second, high task and goal interdependence lead to cooperative and productive approaches to conflict. Third, low task and high goal interdependence stimulate a low degree of individual accountability which creates doubt in the group intentions and that could impact the group to be more competitive in its nature. Fourth, high task and low goal interdependence lead to create a highly unstable and competitive environment as the group members tend to work together and share resources without a common focus. This environment leads the members to use group resources for personal objectives.

A number of studies that investigate the factors that create a cohesive and sustained community demonstrate identifying the learning goals of the group as the first stage of designing an effective online learning community (Ryman et al., 2009; Shea, 2006). Shea (2006) focuses on the development of shared goals, trust and mutual support as three main features of "high functioning communities", as he suggests that these characteristics lay the foundation for an effective pedagogy of

constructivism. Developing an online learning community with a clear learning purpose allows the participants to actively engage one another regarding their ideas and perspectives in the same learning domain, which can be educationally valuable, exciting, and challenging. This means that an online learning environment should be designed and implemented with an emphasis on shared educational goals to develop a productive online learning community. The current study found that “sharing common learning goals” and “learners believing that their needs would be fulfilled through their interaction with the other group members”, were perceived, by participants in both the formal and informal learning case studies, to be fundamental elements for developing a sustained and successful online learning community. A learning community is not simply a group of members – a sense of belonging is a critical element of a learning community, i.e. the feeling that each group member matters and that each individual’s needs are satisfied through the cooperative efforts of the group. According to McMillan and Chavis (1986), who identify various elements of identifying and measuring the sense of community, including: membership: the feeling that one belongs to a group; influence: the feeling that one can influence a group and that the group is important for its members; fulfilment of needs: the feeling that one’s needs can be satisfied with help from the group, and shared emotional connection: the sense of being connected with others in the group. The present study agrees with the importance of fulfilling members’ needs; however, it also highlights that individuals must identify their own learning needs in an individual manner as a first step, then try to join or create an online learning group that they believe will meet their needs. Moreover, the current study indicates that using social media such as Twitter and WhatsApp to develop an online learning community started by identifying common learning needs that facilitate the process of

people connecting and interacting with others with similar learning interests and therefore developing a virtual learning community specializing in a particular learning subject. The use of social media to develop online learning communities in formal and informal learning settings will be discussed in more detail in the section dealing with communication tools, listed above as the third element of developing an online learning community.

The findings of this study in section (4.2.1) indicate that understanding the identified learning needs of the online learning group enables effective designing of the other key aspects of an online learning community, such as group structure and online learning activities. Therefore, learning needs may be more broadly defined so students can determine a path, based on their own interests and goals. The group teacher/leader can then suggest a structure for the group, including assigning roles to the members and designing suitable learning activities. For example, the findings (in formal learning group section 4.2.1) show that the members of the informal learning group revealed similar learning needs, which were focused on developing their second language by practising it with other people. The leader of the group emphasised that an informal learning environment was needed to encourage the learners to practice their language skills and learn from each other and that different media should be used to support their second language. The results (see informal learning group in section 4.2.1) further indicate that the participants preferred learning English language through discussions with people outside the classroom, and with people that they didn't know very well, because that made them feel less self-conscious about their linguistic mistakes and more comfortable taking part in conversations without being concerned about criticism from other people. Thus, these learning needs determined the structure of the networked learning group. It

became an informal learning group where the members did not need to know each other, and with no formal evaluation of their performance. It subsequently provided them with an opportunity to meet their learning needs by practising their second language with other people in a comfortable environment. This informal learning environment aligned with the theory of language socialisation, which suggests a model of foreign language development that links a beginner-level learner of a language with involvement in particular speech communities. It argues that interactions with members of a community are seen as crucial processes to help beginners develop discrete semiotic resources as well as normative patterns of interaction and status-appropriate identity stances (Duff, 2002; Thorne, Black & Sykes, 2009). Likewise, Garrett (2008) theorises that: “As a developmental process... language socialisation is much more than a matter of learning to produce grammatically well-formed utterances. It is also a matter of learning to use language in socially and logically appropriate, locally meaningful ways, and as a means of engaging with others in the course of – indeed, in the constitution of everyday interactions and activities” (p. 190). In accordance with the language socialisation approach, the present study has confirmed that practicing a second language with other members in an online learning community can be a useful way to meet participants’ learning needs, by enabling them to collect useful resources, to be more aware of their language usage, and to see different examples and phrases used by other speakers.

In the case of formal learning, where the learning need was to discuss the topics mentioned in the lecture, it was necessary for the group members to know each other so that they could refer to each other’s contributions in the classroom. The teacher also needed to know who was taking part in the online discussions so

they could assign the students' participation marks. This was particularly important as some students were not comfortable speaking in class, so their participation in the WhatsApp group ensured that they would still receive marks for participation. These findings agree with many studies, such as the work of Chi, Kang and Yaghmourian (2017) and Cacciamani, Perrucci and Khanlari (2018), regarding the potential uses of technology and mobile devices in stimulating conversational learning in formal learning settings. These studies also claim that online discussions can extend the range of learning activities and the reach of human discussion into other areas through computer-based discussion tools such as instant messages and online chat spaces. Thus, social media can be used as a means of communication, through which learners can collaboratively construct and review their knowledge, from anywhere, at any time (Cacciamani et al., 2018). The current study added that the students can also use online resources that can support them in better understanding the subject and therefore allow them to meet their learning needs more efficiently. According to Stahl et al. (2010), learning materials should be offered to learners over time in bite-sized chunks. They justify this based on the fact that retention of new information reduces quickly unless the information is revised in some way to prevent it being forgotten. Many strategies have been suggested to increase retention, including overlearning, immediate recall and spaced repetition. These strategies support the approach that reviewing knowledge in bite-sized chunks is more effective than learning the same amount of information as one large unit (Stahl et al., 2010). It can, therefore, be surmised that WhatsApp enables online learning groups to revise and share learning materials and discuss them in depth. This method of offering course material is less taxing for the students and makes their studying easier.

Moreover, smaller amounts of learning materials, such as photos or documents, can be stored on the students' devices for easy access.

Another important clarification provided by the findings is the link between the development of shared learning needs and the design of the learning activities by the group teacher/leader. The findings in section (4.2.1) show that common learning needs within an online community enable the teacher or the leader of the group to identify learning objectives that can be achieved in a fixed time (a week for example), which can be reflected in the learning content of conversations occurring during that fixed period, known as cognitive presence in Community of Inquiry model Col. The cognitive aspect and teaching presence are fundamental requirements of any learning practice (Garrison et al., 2000). Cognitive presence explores how the learner's mind is adapting, integrating, thinking about and sometimes struggling with ideas (Garrison and Anderson, 2003). Cognitive presence in Col explains the extent to which a community can construct meaning, from the initial practical inquiry to the eventual resolution of a problem. This study has found that cognitive presence in online learning community conversations is ultimately determined by the learning activities designed by the teacher/leader, and that teachers (or group leaders in informal learning) use their knowledge of the learning needs of the participants to state a list of learning objectives that should be achieved during a period of time, on the basis of which they design or select online learning activities. Thus, not all the categories of Garrison et al.'s (2000) practical inquiry model apply to online community conversations, because there are different learning objectives stated for a specific period of time. For example, the learning objective of week 6 for the informal learning group was for learners to pronounce certain English words correctly, and to understand the meaning of English paragraphs or phrases and find similar sayings in

Arabic culture. To achieve this, they engaged in two different learning activities and used several resources during week 6. First, the leader shared a short story in English with the group and asked them to read it out loud and send their recordings as voice messages in the group. The group members were then asked to comment on each other's pronunciation, discuss the story, and explain some of the English phrases that they did not understand. The second activity during that week involved the learners being asked to share aphorisms in English. The group then discussed the meanings of the aphorisms and tried to find similar sayings in Arabic culture. As a result, the content analysis of that week's conversations revealed that most messages were classified within one of three main categories – responses (R), discussions (D), and connecting ideas with wider contexts (C2). In the "R" messages, the participants read the story and sent their audio recordings in response to the leader's request. "D" messages appeared when the participants commented on other members' contributions or responses. The third category, "C2", reflected one of the learning objectives for week 6, as indicated by the group leader, which was "understanding English aphorisms and trying to find similar sayings in the Arabic culture". It therefore seems that the cognitive presence elements in the participants' WhatsApp discussions reflected the learning objectives stated by the group leader, which were to read, discuss and link ideas. Not all the categories or indications of cognitive presences identified by Garrison et al. (2000) (as listed above) appeared in the group's conversation during that week. This reflects that the cognitive indicators the online group conversation are determined by the objectives set by the teacher or group leader, which, as mentioned above, are based on the participants' learning needs. This discussion therefore shows a link between teaching presence and cognitive presence, as it illustrates that the role of the teacher as "instructional

designer and organizer” (Garrison et al., 2000) is based on the learning needs of the group members. The teacher must listen to their needs and use them to form practical learning objectives, then find or design opportunities for the learners to actively participate in a discourse to achieve these objectives. Consequently, the cognitive presence in the online discussions should reflect the learning objectives stated by the teacher.

5.2.2. Second factor: Active communication

The second element of developing online learning communities on social networking was identified as the existence of active communications. The findings of this study in section (4.2.2) emphasise that active and continuous conversations among online group members enhance the sense of caring for each other and connectedness. Moreover, the participants from the two cases indicated that active interaction is fundamental to successfully sustaining the community of learners on social media. They perceived that receiving responses from all or most of the members in the online group, not just from old friends or people who they already knew face-to-face, improved members’ feeling of being connected with the group. Receiving replies from a number of participants in the online group means that they care about the questions raised in the community and willing to support each other. This result can be explained through the idea of bond-based attachments for individuals presented by Ren et al. (2012). He suggests that bond-based attachment works through interpersonal bonds, whereby people develop relationships with other members of a group, and therefore the members feel attached to their communities in part because of the friendships they develop with other members. Empirical research suggests that a key element of community success is engaging community members in continuous interactions; according to Preece and Maloney-Krichmar

(2005), most people who visit online communities participate little and leave quickly. Therefore, to ensure community success, Ren et al. (2012) recommend enhancing members' attachment to the group. According to their study, there are two ways to develop member attachment to the community – by fostering the group's identity-based and bond-based attachments. Ren et al. (2012) argue that bond-based attachments can be enhanced in a number of different ways, one of which is interactive interpersonal communication. In online communities, the frequency of interpersonal communication is a key determinant of the extent to which people can build relationships with one another (McKenna et al., 2002) and therefore enhance their attachment to the whole community. This point has been raised by number of studies regarding online learning communities and the factors that make a good community (Blayone et al., 2017; Ryman et al., 2009) which advocate that every member of a learning community should not only be responsive to what they perceive but also be active and ready to engage with all proposed questions. This means that members should not only be present when there is something to argue about or respond to, but that they must also be willing to share their ideas for the benefit of the whole group, particularly when they are productive and related to the group learning goals.

Further than the importance of active communication in developing the sense of online learning community, this study investigated the factors that could enhance interactive communication among community members. It revealed three practices that could enhance communication between the learning group members as they perceived – teacher or group leader presence, ongoing contact with high-achieving peers, and having a socio-emotional element in the online conversations.

The teacher/leader has a vital role in maintaining the conversation in the learning groups; however, there are slight differences between the ways that the teachers in the formal and informal learning communities. It was noted that asking questions to start conversations and providing instant feedback were the two most significant techniques used by the teacher in the formal learning group, while the informal group leader facilitated interactions between his group's members through reflecting on their responses and using affective language to develop the relationships between group members. These differences could be a result of the nature of the learning groups' settings. In the formal learning community, the group consisted of formal students for an academic module, so the members knew each other and met every week face-to-face in lectures. This could be a reason for their participation in WhatsApp discussions and Twitter interactions being at a relatively low level, meaning that the teacher needed to keep the interaction going among the members through asking questions or proposing learning activities to encourage the students to actively take part in the online discussions. According to Calder and Murphy (2018), the pedagogical approach developed by the teacher, including the tasks, and the classroom culture, are essentials in the learning through applications, as they claimed that the students might have learning applications available but not necessarily engage with them in ways that improve their learning experiences. The current study added that the role of teacher in developing active conversation among an online community members, on an instant conversation application such as WhatsApp, can be enhanced by providing instant feedback on students' responses. The instant feedback posted by the teacher could involve asking more questions to motivate students to think about and evaluate their contributions or commenting on students' contributions (agreeing or disagreeing) to encourage other students to

share their views. The presence of the teacher in this group may be one factor that led to the language of the group conversation being relatively formal – the participants did not tend to use signs and emojis in their written discussions. In the informal learning group, however, the participants did not know each other personally (face-to-face) so the leader of the group needed to create a comfortable environment by using more affective language, such as when he greeted the participants warmly or posted emoji symbols that conveyed his feelings. He also reflected on participants' answers through connecting their responses with previous ones or broader ideas, which encouraged the learners to review and discuss each other's answers and therefore stimulated interpersonal interaction between the group members.

The communication with more experienced peers is a further factor of enhancing active communication among online learning group members. Exchanging knowledge and experiences with learners of a different level of performance seems to be a key factor for maintaining the discussions in social media platforms such as WhatsApp and Twitter. As presented in the findings (4.2.2.2), high-performance members in the two cases had high in-degrees, meaning that they received a large number of replays of their contributions. This gives important evidence about the role of high-achieving/more capable members in enhancing the group interaction. It showed that the number of posted messages in the WhatsApp group increased with the participation of such active and moderator users, who received a large amount of replies (In-degree). Thus, the participation of active and moderator members, who were more capable/highly-skilled members in both cases, can contribute to maintaining group interactions.

Previous studies have found that the variety of prior information possessed by group members and how data and information resources are distributed within the

group, affect group performance and interactions (Stasser, 1992). However, the current study has further found that group interactions depend not only on the richness and variety of information resources provided by group members, but also by the interpretations and understanding that members bring into their communities. In a learning community, students are likely to learn as much from one another as from learning materials or from their teacher feedback. What they learn in this way is, inevitably, the creative cognitive process of offering up concepts and allowing other members to criticise or expand on them, or even of reshaping them in the light of peer feedback (Chi, Kang & Yaghmourian, 2017; Huijser, Kimmins & Evans, 2008).

This study confirms that interactions with high-achieving peers is a key factor that enhances online communication among the community members, and has further found that this factor can also support students in being more prepared for tests. The results (4.2.2.2) have revealed that interaction with more able peers before a test allowed the participants to review critical module topics. This process can be understood through the concept of the Zone of Proximal Development (ZPD), defined by Vygotsky as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under guidance or in collaboration with more capable peers” (Vygotsky, 1978, p.86). From the results of this study (4.3.1), it seems that using WhatsApp created an opportunity to work within their ZPD for some students, as they could negotiate significant queries with the aid of more able peers, thus developing their understanding and leading them to feel more confident and well-prepared for the test.

The findings of this study in section (4.2.2.3) also indicate that shared events and emotional connections are a key factor in enhancing active interaction among the community members. This suggests that the members of a community must be able to share their experiences with one another, whether they are good or bad, as this helps the other group members see what the potential outcome may be if they were to take similar action. In this respect, the results also reveal that using affective language and talking about personal experiences increased the number of directed messages between online participants (4.2.2.3), and thus increased the interactions within the online groups. Sharing personal stories and experiences can also create connections and build trust (Chen & Wang, 2009; Shea, 2006), which then creates a strong sense of community among the members. Chen and Wang (2009) explains the role of the socio-emotional factor in online discussions as “soft power” that is embedded in online dialog. This study’s results in section (4.2.2) are in accordance with a number of studies that argue for the important role of social and emotional dimensions in enhancing interaction among community members (Chen& Wang, 2009; Garrison and Anderson, 2003; Ren et al. 2012). Ren et al. (2012) assume that sharing personal information about members and their unique identifying characteristics raises the attachment level of individual members to the group. Opportunities for self-disclosure and exchanges of social and emotional discussion shift attention from the group as a whole to individual members and therefore more interaction will have occurred between the members of the group. The present study adds more confirmation to this evidence in that posting non-learning-related information, such as social news and casual chatting, fosters conversations and can extend the discourse for a long time, and that it therefore helps group members build their feelings of connection with each other. From the participants’ views, some of

them indicated that the presence of a teacher or group leader could limit the members' freedom for talking about unrelated issues, although the group teacher/leader perceived that trying to keep the conversation focused on the learning goals is one of their main responsibilities to ensure that the participants are interacting and learning effectively together. Thus it is suggested to maintain a reasonable balance between interesting active interactions and participating in the online learning activities (Baran, Correia & Thompson, 2011). This could be indicated in the group's rules and conditions, or the teacher/leader can take responsibility for ensuring that reasonable opportunities are provided to take part in social and personal conversations. It has been recommended by a number of studies that the teacher or group leader's role should be to foster and support the online learning community, but not to take total control over every post (Anderson et al., 2001; Bouhnik & Deshen, 2014). This means striking a balance, in which learning community members feel empowered and have the freedom to speak their mind.

5.2.3. Third factor: Communication tool features

The evolution of communication technology has provided online educators and learners with a variety of social networking applications and communication tools, requiring the teacher or group leader of an online learning community to make careful decisions about which tools best suit the members' goals and needs in terms of joining and developing an online learning community. Alongside choosing which online resources or websites to subscribe and contribute to, the emphasis on which tools to use and how and where to use them are critical elements to developing a successful online learning community. The current findings in section (4.2.3.) confirm that the choice of appropriate communication tools to develop online learning communities on social networks is a matter that requires discussion with the

participants who will be the community members, rather than the group teacher or community leader taking the decision in isolation. Blayone et al. (2017) emphasise that learning is affected and modified by the tools used for learning, while at the same time, those tools are modified by the ways in which they are used for learning.

The use of social media applications enables learners to share and collaborate with experts, including other educators from all over the world. Thus, creating learning communities requires that in “initial contact with authentic learning environments, many students willingly and instantly engage (Herrington, Oliver & Reeves, 2003, p.65). However, to ensure the willing and instant engagement of the online community members, well-known communication tools that are highly-used among the participants should be used, as it has been found that using popular social networking applications ensures that students stay online for a long time, thus increasing the opportunities to make them aware of any changes and activities that occur in the online learning community. It was noted that the participants in the two cases used WhatsApp and Twitter as part of their daily routine. Moreover, the participants from each group stated that they checked their phones – especially WhatsApp and Twitter – several times per day to remain connected with friends and stay up-to-date with the latest news, which led to making them more connected with their online learning communities. Similar results are revealed by Manca and Ranieri (2017), who found that using social network applications that students spend more time engaging with can have a positive impact on motivation and engagement in online learning practices. They mentioned that this can be linked to LMS that have emerged over the last twenty years (e.g. Moodle, Blackboard, WebCT). Also, they have found that learners’ perception of online learning may negatively influence their

learning behaviour if they are not familiar with the tools used for online learning practices.

Another important finding in section (4.2.3.2) regarding the features of appropriate communication tools relates to the availability and ease of access through the participants' mobile devices. The teacher of the formal group observed that using WhatsApp to build an online learning community was very easy and straightforward compared with other applications she had used before. And that was a result of its features being easy to apply. Moreover, it has been noted that the participants perceived the use of social media such as Twitter and WhatsApp to be easier than other applications or formal academic communication platforms such as Blackboard (Bb), which are required by some institutions and which the students must use their academic email accounts to join. Evidence suggests that we can improve learning effectiveness by giving the learner control over and responsibility for their own learning. This is the foundation for such approaches as problem-based and community-of-inquiry-based learning (Garrison et al., 2000), and it is central to the grand vision of Pedagogy 2.0, where learners have the freedom to decide which tool is easiest and most available for them and how to engage in personally meaningful learning communities.

The third feature of the convenient communication tools was identified as offering affordances that enable interpersonal interaction and the display of group identity. The findings of this study in section (4.2.3.3) emphasise that the social networking applications that are used to developing online learning communities should stimulate interpersonal attachment between members by enabling direct replies through e.g. quote-reply and mention features, as well as stimulating attachment to the whole group by providing features that allow users to display a

group name and a special icon and to post rules for joining the online group. These findings are supported and explained by the concepts of social presence (Garrison et al., 2000) and online group identity theory (Ren et al., 2012) that recommended to create an identity for the online community through establishing consistent attributes, such as group name, purpose, and an online space that enables people with specific interests to join in and interact with each other.

The findings of this study in section (4.3) add to the theoretical antecedents of online group identity (Ren et al., 2012) that it can also be developed through the communication tool's affordances. This means that developing an online group identity in WhatsApp is different from developing it in Twitter or other social networking tools because of their different affordances. In this study, group identity did not appear as a significant code in using Twitter for formal and informal learning purposes. However, it appeared as an important code under the WhatsApp affordances category in the content analysis scheme. The results (4.3.1) show that using WhatsApp to create online learning communities demonstrates just the first three elements of the theoretical antecedents of online group identity as stated by (Ren et al., 2012). WhatsApp can be used to create group categorisation (such as its name and icon), group information (such as stating the purpose of the group when starting the group) and group homogeneity (as the group leader can select similar members and remove irrelevant members such as people who joined by mistake or with incorrect phone numbers). WhatsApp cannot, however, be used to attain fourth and fifth elements of group identity – intergroup competition and facilitating familiarity with the group – because a WhatsApp group is secure and private for the members, and no other groups or members from outside the group can see the group activities

and make comparisons between groups or rank them as suggested by (Ren et al., 2012).

Twitter, as a microblogging tool, was found in this study to be ideal for self-expression through sharing personal views, thoughts and interesting news. The comments and thread of conversations that could appear under a tweet can also develop space to facilitate interaction between the followers of the tweet's author. However, this group of followers cannot be considered an online group because it is impossible to identify constant members, group information and so on. As presented in the findings (4.3.2), the significant function of Twitter in the two cases was developing the social and academic presence of the participants. Social and academic presences can help strengthen the relationships between the members in the WhatsApp learning group. Hence Twitter cannot be used to create an explicit online group identity, but it can be used to provide the participants more space to project their personality and interests and therefore facilitate connecting people with similar interests. This then allows for creating online communities using different tools offering group identity features such as WhatsApp. This is confirmed by literature that suggests research should look beyond studying developing online communities through interaction using only a single medium (Preece & Maloney-Krichmar, 2005), as the field is now much more diverse, and typically the communities being studied communicate via a range of means of social networks.

5.3. The role of Twitter and WhatsApp in developing OLC

This part is concerned with the role of social media tools such as Twitter and WhatsApp in developing online learning communities in formal and informal learning contexts. The second research question (namely, What is the role of social media in developing online learning communities?) was answered in the Findings chapter though capturing the main functions of Twitter and WhatsApp as social networking educational tools, as revealed by the participants of formal and informal online learning groups. The findings of the two cases showed that the main function of using Twitter was to develop the academic and social presence of the students/learners (section 4.3.2), while the main learning function of using WhatsApp was to provide an instant and open communication environment for online learning community members (section 4.3.1). In order to gain a deeper understanding of these main functions and how they might be influenced by the learning context (i.e., formal or informal learning), I focused on and presented further findings that demonstrate the significant uses of WhatsApp and Twitter as educational tools in the two cases. In this section, three main uses of each tool were selected and discussed based on their importance and relevance to the factors of developing online learning communities that presented earlier. The uses of WhatsApp and Twitter by formal and informal learning groups in this study will be discussed by relating them to the three factors of developing online learning communities as follows:

- Regarding to the first factor of developing online learning communities on social media (identifying common learning needs), I will discuss how learning needs could be met through using WhatsApp for practising language skills using audio messages. Also, I will explain how participants' learning needs could be met by using Twitter to keep them up to date with the latest research.

- The second factor of developing online learning communities was the existence of active communication among community members. This will be discussed how active interaction in a WhatsApp formal learning group has encouraged students to use it for test preparation purposes. Also how active interactions accrued on Twitter stimulated the use of this tool by the teacher to post reminder tweets and quick course announcements.
- Communication tool features as the third factor of developing an online learning community will be discussed through explaining how the features of WhatsApp were used to ensure access to course materials for the informal learning group. We also how the features of Twitter were harnessed to develop an academic presence for the formal learning group and to allow communication with like-minded users.

5.3.1. WhatsApp affordances

Based on the findings in section (4.3.1) and available literature, this section will discuss the uses of WhatsApp for ensuring access to learning content, for preparing for the test and for practising a foreign language through WhatsApp audio messages.

Using WhatsApp to ensure access to learning content. One interesting finding regarding the use of WhatsApp as an informal learning tool was that it ensures the same learning content has been delivered to the whole online learning group (4.3.1.1.2). This point was mainly emphasised by the group leader and also agreed on by the group's participants. This section presents two affordances of

WhatsApp that can be used to ensure learning resources are accessible to all group members.

First, the privacy and security of WhatsApp groups is the main affordance for sharing and accessing valid learning resources. Informal learning and personal learning environments are based on using verified learning resources. The development of Web 2.0 technologies has given learners a large collection of tools, sometimes called social networking applications, for creating, organising, and making meaning from content (Martindale and Dowdy, 2010); however, when informal learners have access to open online resources created by individuals, it can be challenging to ensure the validity of these materials. In short, the challenge is to provide access to the same materials for all group members and to ensure the validity of the content. The literature around using social media for learning purposes has pointed out the issue of learning material content and to what extent it relates to or serves learning goals (Brown, Czerniewicz, & Noakes, 2016). Moreover, the consolidation of learning resources for an informal learning community is another issue (McPherson, Budge, & Lemon, 2015), as we cannot assume that all informal learners are following the same scholars or educational accounts on the various social networking applications. Thus, the findings of this study in sections (4.3.1.1.3) and (3.3.1.2.2) suggested that using WhatsApp as a secure learning space could be one solution. For example, posting learning resources as files or webpage links to a private WhatsApp group ensures that all group members receive the same amount of learning materials. Moreover, the closed and isolated space offered by WhatsApp groups enables the selection and evaluation of online learning materials.

The second feature of WhatsApp that facilitates its use for ensuring access to learning material is the identification status. This feature allows the sender (the group

leader, for instance) to check whether and by whom the learning materials were sent, delivered and seen. As mentioned in the findings section (4.2.3.3), the group leader relied on this feature to monitor the learners and remind them if they did not see or play to an important piece of media sent in the group. This study revealed that the affordance of the message status identification in WhatsApp is important for the group leader in an informal learning setting, as it gives him insight into the participants' receiving status and to what extent they have accessed the learning materials posted in the group. This kind of information could be used to evaluate WhatsApp learning groups' effectiveness particularly in informal learning practices, and could also be used by the group leader to identify unwilling to learning members who do not benefit from the group and remove them to create space for other learners. As the findings in section (4.2.3.3) showed that the group leader took advantages of checking message-status-identification in his learning WhatsApp group. Thus, the group-privacy and message-status-identification features of WhatsApp allow it to be used as a medium to check the validity, delivery, and accessibility of online learning materials gathered from several resources.

WhatsApp for Preparing for the test. As stated in the findings chapter, section (4.2), the present study revealed that there were three factors that maintained and stimulated interactions among online learning group members: teacher presence, interaction with a more-able peer, and socio-emotional elements in online conversations. In this section, I will justify how these factors support students when preparing for their tests through WhatsApp discussions before the test date. One of the common reasons of students anxiety is related to concerns that arise before the test which known as "test anxiety" (Harris and Coy, 2003). In this regard, I will discuss the

use of WhatsApp discussion group as a treatment to deal with test anxiety in the formal learning group. According to Hembree (1988), test anxiety (TA) comprises two primary components: cognitive concerns and emotional concerns. "Worry is the cognitive component of test anxiety reflecting the debilitating thoughts and concerns the test-taker has before the test. The Emotionality component, sometimes called "tension", refers to the heightened physiological symptoms stemming from the arousal of the autonomic nervous system and associated affective responses" (Nadinloyi et al, 2013, p.304). The conclusion that can be drawn from TA studies is that there are two main treatment techniques to reduce TA: behavioural treatments, to deal with the emotionality component, and cognitive treatments, to deal with worry (although this technique can also assist in reducing emotionality). What interests me in my findings that the students tended to use WhatsApp heavily two or three days before the test. Furthermore, the findings in section (4.3.1.1.2) showed that WhatsApp was used to get them prepared for the test as they perceived, thus I will discuss this finding in relation to reducing students' stress and preparing for the test through interactive communication.

Cognitive treatments address how one thinks about situations, which then influences how one experiences them. They are used to help an individual learn to focus on the tasks at hand rather paying attention to interfering, self-oriented responses. Applying this technique through WhatsApp conversations appeal the students to move toward overcoming the fear of performing poorly on an exam by identifying and changing these negative and unpleasant thoughts to task-related thoughts and positive evaluations of their performance such as sharing suggested exam questions and provide their ideal answers. The literature suggests that an important source of support for students can come from other students in the same course

(Chi, Kang & Yaghmourian, 2017; Kundisch et al 2012; Tsang & Tsui, 2017), as they are able to provide information on how to approach a task or to discuss what a particular theoretical concept means. The findings of this study in section (4.3.1.1.2) revealed that using WhatsApp to prepare for the test was mainly seen in the formal WhatsApp discussions; however, these were not only used to share questions and study together for the test, but also to regulate their learning through metacognitive processes, such as setting a study plan and monitoring the timing and achievement of this plan.

The finding of formal learning group in section (4.2.2.1) revealed that the teacher's presence was an important factor that enhances discussions and supports students before the test in WhatsApp conversations, as she answered any questions related to the test such as time limits, the importance of concentrating, also she clarified the different types of test question formats. This helped to calm the students and help them be prepared for the test conditions. This is in line with several studies contending that developing good study habits and test-taking skills act as test anxiety reduction methods and increase performance levels (Nadinloyi et al, 2013).

The findings of this study in section (4.2.2.2) defined interactions with high-achieving peers as the second factor that enhances online communication among members. This factor can also support students in being more prepared for tests in terms of improving their cognitive development and reviewing critical module topics. More Knowledgeable Other MKO refers to anyone who has more knowledge, ability or understanding than the learner, which can include teachers, parents, friends and siblings, while ZPD reflects the level of progress that is immediately above the learner's current level (Verenikina, 2003). From the results of this study (4.3.1), it seems that using WhatsApp provides a ZPD for some students, as they can communicate

with MKO regarding test preparations, such as module topics revision and negotiating significant questions with the aid of more able peers.

Using WhatsApp as a behavioral treatment to help students to reduce their test anxiety and be prepared for their test can be explained through exchanging of affective language such as emotional support language. The findings of the formal learning group in section (4.2.2.3) confirmed that the socio-emotional element plays a vital role in promoting active interaction in the WhatsApp group. As noted above, test anxiety can be reduced by transforming negative and unpleasant thoughts into task-related thoughts and positive estimations of their performance. This can be achieved by increasing the level of emotional talk that makes students feel they are sharing the same feelings and working to achieve the same goals. Thus, active and instant communication among students on WhatsApp was served as behavioural and cognitive treatments for preparing for the test and reducing or releasing students stress. It has been noted that the three factors of enhancing active communication among the formal learning community members (teacher presence, interaction with more-able peers, and socio-emotional elements) can support students in managing their study plan, reviewing and negotiating critical questions, and subsequently being more prepared for the test both emotionally and cognitively.

Practising a foreign language through WhatsApp audio messages. One of the main informal learning uses of WhatsApp revealed by this study is practising English as a second language through audio messages. It seems that the approach of learning foreign languages has shifted from watching or reading educational resources, such as videos and articles, to chatting with real native speakers using au-

dio communication. This approach promoting learning by practising through networking technologies, which are mainly based on communities of learners in which people can acquire and practice the new language (White, 2017). Consequently, today's language learners have a wide variety of choice in apps that offer an online learning environment, which can take the strain out of learning a foreign language. A common method of learning foreign languages through smartphones is to join an app-based community where strangers from all over the world chat with each other, using text, audio and video chat with native speakers. The idea of these apps is to connect and match strangers so they can practice the languages they each want to learn. Some examples of these apps include Tandem and SpeakingPal. Such apps support text messaging, audio and video chatting.

This study focused on how the learners integrated WhatsApp into their English language practising. It revealed that applying WhatsApp as a voice communication tool to practice English as a second language is an effective way for these learners to meet their learning needs. One of the most interesting findings in this regard was the use of audio messages to practice a variety of skills such as reading, conversation and listening. According to White (2017) in some situations, speaking directly with a native speaker is not accessible or desirable for new learners, as they may not have the ability to speak confidently and clearly or might not like to talk to strangers online. Thus, There are many advantages of using asynchronous voice messages to practice a foreign language presented in the findings of this study, which is in line with similar studies such as (Gleason and Suvorov, 2011; Wu, Hsieh and Yang, 2017). Wu et al. (2017) revealed that using audio messages on the LINE app to learn and practice English as a second language was one function that developed learners'

oral proficiency. The researchers noted that the learners showed a good ability to apply this function to learning a second language. Moreover, results from Gleason and Suvorov (2011) indicated that teaching strategies using Wimba as an online conversational tool can help improve students' listening and speaking skills, as well as motivate students to practice listening and speaking more often after class. This study adds that using WhatsApp as asynchronous voice messages to practice a foreign language can reduce the pressure on some learners and improve their confidence when speaking the language with others. This is because the participants can prepare their messages before recording them, thus providing them with more chances to try their best to speak correctly. Another point was that messages can be recorded and listened to several times to evaluate their sentences structures, or even to practice listening to other speakers. Thus, the current study confirms that the advantages of communicate with other people in a second language through WhatsApp as an asynchronous voice communication tool was a successful way to meet the participants' learning needs of developing several language skills, such as listening and speaking, as well as contributing to improving their confidence in conducting conversations with other.

5.3.2. Twitter affordances

Based on the findings and available literature, this section will discuss the uses of Twitter for urgent course-announcements, for developing academic and social presence and for keeping students informed with the latest researches.

Twitter for urgent course-announcements. Using Twitter for course announcements was one of the educational uses of Twitter most widely noted by students and the teacher in the formal learning group. This finding can be interpreted as

being a result of the active and instant communication that accrues among students and the teacher on social networking tools such as Twitter. Moreover, the current study indicated that the students checked their Twitter accounts several times per day to track news and share social and interesting tweets. It found that this status of being highly tethered to Twitter can be used to deliver a quick announcement or an important instruction by the teacher. Although students should know task due dates and module instructions from the syllabus or the module learning management system page (LMS), the teacher confirmed that quick instructions posted via Twitter seem to be received faster by the students than other means of communication, such as e-mail or LMS, which require the student to log in and navigate to the module page to get the instructions.

As presented in the findings section (4.2.2), teacher presence is one of the main factors that enhance students' online communication. Therefore, the significant role of the teacher should be used to direct students' learning, such as posting useful tweets that emphasise a concept covered in a lecture or recapping the upcoming due dates. Blessing et al. (2012) found that students who received informative reminder tweets did significantly better at remembering concepts on an exam. Correspondingly, Jones and Baltzersen (2017) stated that students expressed appreciation for the quick and timely recap tweets posted by their teachers. Denker et al. (2018) recommended integrating social media such as Twitter and Facebook into a large lecture classroom, as it found that students do participate when social media is integrated into the large-lecture modules, as participation in these lectures is often limited. One form of integration of social media into the academic module is creating a Twitter account for the module where the teacher can post recap tweets and useful resources.

Thus, the idea of using Twitter for course announcements has harnessed the role of the teacher in enhancing student communication via an online learning community, as well as the familiarity of Twitter as a source of news and due date reminder tool. Teachers can take advantage of the real-time nature of Twitter to give immediate advice and post tweets as text-based messages that are read by community members (i.e., the teacher's followers).

Using Twitter to develop academic presence. Social presence theory emphasises the role of both the medium's attributes and the participants' perceptions of presence in a sequence of online interactions. It can therefore be argued that using Twitter to develop an academic presence, which is one of the findings of this study, can be discussed as a factor of both Twitter's features or "attributes" and the participants' ways of presenting their academic status to their learning communities. In this regard, I will focus on two features of Twitter and how they can be used to develop an academic online presence.

Creating a formal profile on Twitter is the first step in creating an academic online presence (McPherson, Budge, & Lemon, 2015), as this feature can be used to present a student's real name, academic specialisation and/or interests. A Twitter profile can display interesting information such as research area or projects using the language of Twitter, such as hashtags, @s and links. This enables the audience to learn more if desired through the clickable links in the profile. Stating this information in a clear and interesting way makes an impact on both the user's academic presence and their audience, as it can be considered a call for people with the same interests to follow the account (Srinivasan, Senthilraja & Iniyar, 2017). Moreover, indicating the university name in the Twitter profile seems to be a useful way to attract more audience members from the same institution or university, which could improve

the reputation of the student or faculty member in their institution's community (Lucky & Rubin, 2017; Srinivasan et al., 2017). This factor was noticed in the findings of this study in section (4.3.2), as it was revealed that updating a Twitter profile with a user's latest academic or administrative responsibilities leads to developing an academic presence inside the university. That could be a result of collecting and presenting data in Twitter. For example, if someone uses Twitter to search a university's name, the Twitter presents the university's account along with other Twitter accounts of people working at or enrolled in that university. Thus, crafting two or three sentences that convey students' expertise and educational institutions on their Twitter profile is helpful to attract other followers from inside or outside the institution and improve academic presence for the student.

The second feature of Twitter that enhances developing an online academic presence is its real-time nature, as the students can increase their online academic presence through "working out loud" during their learning journey (Lucky & Rubin, 2017). This feature allows the students to post their current learning activities inside or outside lectures, either on the university life account or on their personal Twitter accounts. Also, taking part in a live Twitter chat on students' academic area is considered useful for showing off their academic experiences and expertise to the people around the world who participate in these live conversations. It also allows them to follow other professionals in the same domain. The findings of this study in section (4.3.2.1.3) revealed that using tweets to convey current students' learning practices and represent academic projects is helpful to attract other followers with the same interests.

Twitter for keeping informed with the latest researches. The findings in section (4.3.2.1.2) indicate that Twitter has been widely used by the students to keep them informed about the latest research and projects in their academic field. When students are given the opportunity to be updated and informed about the latest discoveries and constructed knowledge happening in their field through rapid-updating information technology such as Twitter, this can add to and reconstruct their knowledge, meaning that they will come to further cognitive development and accordingly progress towards meeting their learning needs.

This study has confirmed that the main advantage of using Twitter in both formal and informal learning groups was for connecting people with common interests or learning needs, consequently creating a virtual public environment for a virtual community of online learning. According to Wenger, White & Smith (2009) this kind of learning environment allow each member brings a unique set of resources or experiences to this online learning community, which contributes to informing and updating the other members with the latest information and developing their cognitive skills by absorbing the newly construed meanings and relating them to their previous knowledge. Thus, the networking and participatory features of Twitter allow the learners an opportunity to take ownership of their scholarship by interacting with other people who share the same interests, resulting in all learners joining together in knowledge construction and reconstruction practices.

A fundamental feature of Twitter that facilitates connecting people with similar interests is Twitter's user recommendation service "Who To Follow". This list of recommended accounts is selected based on the similarity between these Twitter accounts (Goel, Sharma, Wang & Yin, 2013). A number of studies have investigated and suggested models to find similar Twitter accounts (Goel et al., 2013; Tran,

Hwang & Nguyen, 2018). They used several indicators to measure similarity such as: (a) mutual follow (a mutual follow is a bidirectional edge in a follow graph, as it is assumed that if two users follow each other, they might be similar), (b) topics derived from tweet content analysis (meaning that similar tweet content indicates similar Twitter accounts), (c) location (this indicator supposes that geographically close users could share some similar experiences or local news), and (d) email domain (considered to be a good resource for identifying users' workplaces or organisations; for example, if two users are from the same ".edu" domain, they are likely from the same university or institution). These indicators of similarity could be used to connect people with similar interests with each other, as well as with online communities. According to Goel et al. (2013), similarities between Twitter accounts are not only used for suggesting additional accounts to follow, but can also be used for community detection.

Tran et al. (2018) proposed a recommendation method based on content and user characteristics. This proposed method investigated the real tweet data and thus demonstrated its effectiveness. The method mined user characteristics to find appropriate hashtags for the recommendation. Three factors were used to investigate users' characteristics: interaction level, the similarity of past tweet content, and previously used hashtags. Thus, Twitter's recommended account list feature can help users to find similar people. As we can see, the similarity indicators include the contents of the tweets and the hashtags participated in. Such that people with similar interests can find and follow each other easily through the recommended lists. The current study also confirms this point; as presented in the Findings chapter, section (4.3.2.3), Twitter's ability to connect like-minded people is evident. When the participants visited the group leader's Twitter profile and followed the account, a list of similar users

popped up as suggestions under the text "You might also want to follow". The findings indicated that this was a useful feature to help participants connect with more people who had the same learning needs or interests.

Based on this discussion, we can conclude that using a combination of social media tools, such as WhatsApp and Twitter, for formal and informal learning practices leads to developing the sense of an online learning community from participants' perspectives, as these tools have a proven capability to meet the learning needs of online community members. These tools also provide active interaction spaces for their users. Moreover, WhatsApp and Twitter were convenient for all the members of the learning communities. Thus, the sense of online learning community was examined through using WhatsApp and Twitter to attain the three required factors (learning needs, active interactions and tool features).

5.4. Online learning community framework

As explained in the literature review chapter, my understanding of developing an online learning community on social media is that the sense of learning community is developed on three levels: the individual level, interactional level, and group level. The proposed framework, as shown by Figure 1, in the literature review chapter section 2.6, focuses on examining the sense of online learning community on these three levels. In this section, I will discuss to what extent the findings of this study are consistent with the assumptions of this framework.

5.4.1. Individual level

This level of the concept of learning community was examined by investigating each member of the learning group individually. There are two main aspects that should be focused on here: the first aspect addressed the way in which the student control and monitor his/her learning process (self-regulation component), and the second is how the student presents him/herself to the online learning community (social presence component). In both cases of this study the findings were confirmed that the common learning need of the learning community affirms the individual efforts. It indicated that personal objectives or learning aims become interrelated around a common purpose. Thus the developing for such a learning community goes beyond the social media tools themselves and involves meeting a common learning need.

Self-regulated learning. The findings of this study confirmed the role of self-regulation and metacognition in developing the individual-level aspects of an online learning community by identifying learning needs. As mentioned in section (4.2.1) in the findings chapter, identifying learning needs is the first stage of developing an online learning community. The participants indicated that their learning needs were

the main derive of joining and participating in the online learning groups. The findings also indicate that the learning content and the group design were influenced by these learning needs. However, there was not such strong evidence regarding monitoring learning and evaluating the study plan as other aspects of self-regulation. The participants in the individual interviews did not mention how they monitored what they learned through their participation in the online learning group. The content analysis of the formal learning WhatsApp group revealed that fewer than 20% of messages were coded as metacognition, most of which were sent by the teacher regarding setting plans for the discussion, monitoring learning and schedules. For the informal group, the content analysis of WhatsApp conversation revealed that only a small proportion, around 10%, were coded as metacognition.

On the Twitter platform, participants' learning needs were also the main motivation for them to follow the teacher/leaders' accounts. The findings from the formal learning group indicated that the students followed the teacher on Twitter to meet their learning needs by finding recommended learning resources posted by the teacher, getting quick course announcements and receiving lecture-related reminder tweets. The informal learning group members also indicated that they followed the group leader on Twitter to meet their learning need through learning and practising English language by reading and commenting on his tweets. Therefore, this study is partly in agreement with the first aspect of the individual level relating to how the student can control and monitors his/her learning process, as the findings confirmed the importance of identifying the learning needs of the individuals, and of a group of individuals having similar learning needs, in encouraging them to create and participate in an online learning group. However, the findings did not indicate a similar signifi-

cance for other dimensions of self-regulated learning and the metacognition approach, such as monitoring and evaluating learning strategy, in developing the sense of online learning on an individual level. This can be explained by the nature of the learning system and the use social media by the learning community. In the formal learning group, Twitter and WhatsApp were integrated with a face-to-face formal learning lecture, creating a mixed learning style. Self-regulated learning practices could be part of the lecture time or used when the students were studying and reviewing the lecture as an individual activity. The nature of the formal learning system also put more responsibility on the teacher to manage and monitor students' learning. As presented in the discussion of the formal learning case, (Case 1), the content of learning and teaching strategies and evaluating students' learning were fully controlled by the teacher and under the academic department's supervision, which could be a justification of disappearance of the other indications of metacognition and self-regulation in the formal learning community. The results of the informal learning case also did not reveal significant indications of the other self-regulating learning dimensions (Informal learning group in section 4.2.1), which may be because the participants were voluntarily participating in this informal learning group for fun and to practice their second language with others, so there was no pressure to assess their skills. Further, the nature of the informal learning system makes it difficult to manage and evaluate learning strategies, as there is no specific curriculum or clear learning plan giving specific learning goals to achieve. Another reason for the absence of self-evaluating and controlling learning strategies could be that there were participants with different levels of English language proficiency interacting in one online learning group, because of a lack of proper assessments that would allow learners to measure their development in a precise way. The variety of the participants' proficiency

levels makes it impossible to assess their English progress by methods such as applying formative assessments, which would enable learners to compare their scores and therefore monitor their learning progress.

Social presence. The three categories of social presence were examined through the interviews and the content analysis of WhatsApp conversations. The interviews included some questions that examined the use of affective language, open communication and cohesive sense. In the content analysis, these categories were examined by developing a WhatsApp conversation analysis scheme as presented in the methodology chapter. There were three main categories in the scheme to address the indications of social presence: affective language; unrelated (personal stories, social events), and WhatsApp affordances (directed interaction, showing group name or icon, asking for technical help).

The findings of this study were mostly in agreement with categories of social presence; however, there are some dissimilar points that need to be explained here. The group cohesion and open communication indicators were more related to the tool features than to the classification of the individuals' responses. For example, the findings of this study did not reveal a significant indication that the participants viewed themselves as one online learning community; however, they used the features of WhatsApp to demonstrate the group's cohesion, such as groups' names and icon. The findings in section (4.2.3.3) also showed that the groups' icons in the two cases were relevant to the participants' learning aims and reflected the identity of the groups, such as showing the university logo for the formal learning group, and a symbol of the members' learning interests for the informal one. The features of WhatsApp and Twitter allow for open and instant communication. Participants used Twitter features such as "Like", "Retweet" and "Comment", enabling them to share their views

with other group members. The content analysis of the WhatsApp conversations showed that there were a significant number of messages that used the “Mention” and “Quotes-reply” features to direct their messages to a specific member in the group. Such features are important to enable open communication as a category of social presence (Garrison et al., 2000), as they stimulate directed interactions between community members. Without such features, open communication functions such as asking a question of a specific member or commenting on his or her responses could be limited or not exist at all.

From another perspective, this study confirmed the role of affective language and self-disclosure in developing individuals’ social presence in their online learning communities. The results (4.3.2) showed that students who presented themselves well and clearly in their Twitter profile, or who shared tweets about their personal experiences, gained more followers with similar interests to them. The same results were found in the WhatsApp conversation content analysis (4.3.1), which confirmed that posting messages not related to learning, such as personal stories, social news and casual chatting, encourage a lot of members to participate in the conversation. This helped group members to get to know each other better and to build online friendships. The results also confirmed that the existence of a socio-emotional element in the WhatsApp conversations was one of the main elements in stimulating and sustaining active communication among the members.

We can conclude that the individual level in this framework deals with the participant as one entity and examines how he or she regulates his/her learning as well as how he/she presents him/herself to the online learning community. The results of this study indicated that identifying learning needs is the first step towards consider-

ing creating or joining an online learning group (4.2.1). Other aspects of self-regulation were not reflected in the results of this study, which may be due to the learning context of the cases and/or the degree of integration of social media tools in their learning practices. Regarding the second aspect of the individual level, the findings of this study are compatible with social presence categories; however, some dimensions of the theory, such as group cohesion and open communication, were found to be more relevant to the features of social media. The study confirmed the role of socio-emotional elements and self-disclosure in facilitating interactive communication and building friendships, and therefore enhancing the sense of an online learning community.

5.4.2. Interaction level

In this level, the online learning community should be examined through analysing and studying the interactions that happened between the online community members. However, not all the conversations that happen in an online learning group are learning-related – as we discussed in relation to social presence. This part of the framework is dealing with the learning-related interaction because it is the main purpose of creating and participating in the online learning group. Two main theoretical aspects are used to guide the analysis of learning-related conversations. Firstly, the role of the teacher in enhancing and developing interactions amongst community members, which known as teaching presence in the CoI model. The second aspect is the cognitive presence, examining the extent to which a group of learners can construct meaning, share their understandings, evaluate them and propose a solution to a given question or problem.

Teaching presence. This study used Anderson et al.'s (2001) teaching presence categories as a basis to examine the teaching presence in the two learning cases. As presented in the case descriptions, the informal learning case was guided by a university student who is interested in teaching and practising English language use. He collected a number of people with similar interests from his Twitter account, then created an informal learning WhatsApp group, therefore he was considered to be the group leader and director for this informal learning community. Analysis of teaching presence was therefore conducted on the teacher of the formal group and the leader of the informal learning group. Garrison and Anderson (2003, p.66) emphasise that "teaching presence is what the teacher does to create a community of inquiry, and that includes cognitive and social presence". This study investigated indications of the teaching presence categories through interviews and content analysis of the teacher's/leader's WhatsApp messages.

The results of this study in section (4.2.2.1) were consistent with the teaching presence categories in the informal learning case; however, in the formal learning case, the role of teacher was significant in designing learning activities and facilitating online interaction, but the third category of teaching presence, direct instruction, did not appear as a significant theme of teaching practices in this case. As presented in the findings of the content analysis of the formal learning group (4.2.2.1), WhatsApp conversations showed that the teacher can facilitate and maintain the debate by asking further questions to request justification or clarify answers, and at the same time keep the discussion focused by guiding the conversation and using online learning activities. For the informal learning group, it was found that the significant responsibilities of the leader were to facilitate and motivate interactions among the learners by

sharing learning content, giving reflections on participants' comments and replies, and using affective language to develop the relationships between group members.

Direct instruction indications such as presenting learning content, summarising discussions, confirming understanding and diagnosing misconceptions (Garrison and Anderson, 2003) did not appear clearly in my results, which may be because such teaching activities can be used more effectively in a classroom environment. As mentioned earlier, the formal learning group applied a blended learning approach, thus direct instruction seemed to be more related to formal face-to-face interaction, while social networking interaction on Twitter or WhatsApp seemed more useful to discuss the lecture topics in more depth and support the students by suggesting several online resources.

Cognitive presence. The findings of this study indicated that the cognitive presence in WhatsApp conversations was categorised by the first two phases of the practical inquiry model – triggering event and exploration. The content analysis of the two groups in section (4.2.2) showed high percentages of messages coded as Initiate conversation, Response and Discussion categories, and low percentages of messages coded as Reflection and Metacognition. This means that the participants in both cases, formal and informal, were asking questions, responding to each other and discussing their views on other answers by adding more information, agreeing or not agreeing with others. These results in section (4.3.1) confirm that using WhatsApp enables the students to engage in the triggering event and exploration phases of the practical inquiry model; however, they did not engage in the third and fourth phases (integration and resolution). This may be because the learning activities conducted in these learning groups were designed to enhance discussion and share course materials, but not to solve a specific task or problem. The results in

section (4.3.1.1.1) confirmed that one of the main uses of WhatsApp in the formal learning group was to conduct in-depth lecture-related discussions, and these kinds of discussion do not require the participants to integrate and resolve or propose a solution, rather it is just a discussion about what they have learned in the lecture and relating this to practical examples. In the informal learning case, the observed uses of WhatsApp were to conduct learning games and use audio messages to practice English speaking and listening. For these learning activities, the learners only need to post their responses. In some situations they discuss or comment on each other's answers, but there is no accurate solution that needs to be summarised at the end of their conversation.

Cognitive presence on Twitter was not examined in this study due to time and privacy constraints. According to Riff et al. (2014), the space of online posts such as Tweets is "unlimited and unknowable and inherently unstable over time" (p. 168). Thus, it becomes difficult to construct content analysis on the participants' tweets in this study, however, the interviews revealed that the participants in the formal learning group used Twitter to keep up-to-date with the latest research in their field. According to the previous discussion in this chapter, keeping informed about the latest knowledge in the student's academic domain contributes to improving cognitive development and therefore meeting learning needs. Twitter was also used by the teacher to post tweets reminding students to review course material as small pieces of learning content over time. This was supported by new learning approaches such as micro-learning, which focuses on posting learning content as bite-sized pieces to improve learning and memorising (Armstrong & Sadler-Smith, 2008; Stahl et al., 2010). Accordingly, Twitter has potential uses for developing cognitive presence

through sharing relevant online learning resources and posting educational or reminder tweets.

5.4.3. Group level

This level focuses on examining the development of online learning communities by analysing an OLC as one whole object. This requires analysing the characteristics of the group that form its identity and its structure or topology. The theory of group identity focuses on describing details of the group, such as its name, purpose, and rules. Group structure is concerned with the design of the group, including the connections between the group's members and determines the information flow inside the group. Studying group identity and group structure provides a broad overview of the online community and identifies the features of the online community that foster its success and sustainability (Knight & Pye, 2005; Rulke & Galaskiewicz, 2000).

Group identity. The findings of this study in section (4.2.3.3) add to the theoretical antecedents of online group identity by Ren et al. (2012) that group identity can also be supported through the communication tool's features. This means that developing an online group identity in WhatsApp is different from developing it in Twitter or other social networking tools because of their different affordances. In this study, group identity did not appear as a significant theme in using Twitter for formal and informal learning community. However, it appeared as an important code under the WhatsApp affordances category in the content analysis scheme. The results (4.3.1) show that using WhatsApp to create online learning communities demonstrates just the first three elements of the theoretical antecedents of online group identity as stated by (Ren et al., 2012). WhatsApp can be used to create group categorisation

(such as its name and icon), group information (such as stating the purpose of the group when starting the group) and group homogeneity (as the group leader can select similar members and remove irrelevant members such as people who joined by mistake or with incorrect phone numbers). WhatsApp cannot, however, be used to attain fourth and fifth elements of group identity – intergroup competition and facilitating familiarity with the group – because a WhatsApp group is secure and private for the members, and no other groups or members from outside the group can see the group activities and make comparisons between groups or rank them as suggested by (Ren et al., 2012).

Twitter, as a microblogging tool, was found in this study to be ideal for self-expression through sharing personal information, thoughts and interesting news. The comments and thread of conversations that could appear under a tweet can also develop space to facilitate interaction between the followers of the tweet's author. However, this group of followers cannot be considered an online group because it is impossible to identify constant members, group information and so on. As presented in the findings in section (4.3.2), the significant function of Twitter in the two cases was developing the social and academic presence of the participants. Social and academic presences can help strength the relationships between the members in the WhatsApp learning group. Hence Twitter cannot be used to create an explicit online group identity, but it can be used to provide the participants more space to project their personality and interests and therefore facilitate connecting people with similar interests. This then allows for creating online communities using different tools offering group identity features such as WhatsApp or messengers. This is confirmed by literature that suggests research should look beyond studying developing online com-

munities through interaction using only a single medium (Preece & Maloney-Krichmar, 2005), as the field is now much more diverse, and typically the communities being studied communicate via a range of means that include online synchronous or asynchronous interaction.

Group structure. An effective group structure exists when the group reaches agreement about the division of tasks, roles, and responsibilities to carry out the work. A set of roles can be distributed to the group members, such as introducing the task, data collection, analysing, giving examples, clarifying, synthesising and summarising, timekeeping, and so on. In learning groups, the roles will change according to the nature of the task or the stage of argument (Jaques, 2000; Knight & Pye, 2005), and the most dominant member for one role may not be so for another. And in some learning groups, where there is no appointed leader, as in tutorless groups, the control may move between different members of the group. This leads us to discuss the second element of group structure, which is connections design or network topology (Wittie, 1981). A topology is the layout of a network. As presented in the literature review section 2.6.3.2, studying group structure involves task division to group members and group layout (topology). This study examined WhatsApp groups' structures by addressing these two elements. First, the plan of task division was investigated through interviews, asking the teacher of formal learning group and the leader of the informal learning group about their strategies of controlling and monitoring the learning groups. Secondly, the layout of connections between group members (network topology) is most effectively studied through social network analysis analysis and generating socio-graphs that explicitly show the number and directions of connections between members.

The results of this study in section (4.3) indicated neither the formal nor the informal group put a plan or task division in place to engage group members in learning tasks. However, as presented in the findings in section (4.2.1), the learning needs identified the teaching plan for the teacher or group leader, therefore they proposed learning activities based on their teaching plan for each week. However, the study did not reveal any evidence showing that the work or learning task was divided between the groups' members on WhatsApp. This could be a result of the nature of the learning activities, as the content analysis confirmed that the formal learning group tended to use WhatsApp conversations to exchange course materials, discuss lecture-related topics, and prepare for tests. These types of learning or studying activities don't seem to need task division or for roles or responsibilities to be assigned to the students as a studying group. The informal learning group primarily used WhatsApp to participate in online learning games or puzzles, practice language skills through audio messages and ensure delivery of learning resources to all group members. Such activities do not demand to assign work to each member; rather, they require a variety of knowledge and experiences that allow learners to share rich learning resources and therefore foster an active learning community.

To sum up, the group level of examining online learning communities is concerned with the group as one object. It suggests studying group identity and group structure to obtain a broad description of the studied online learning community. This study agrees with the importance of creating online group identity to develop the sense of online learning community among the members, and it confirmed that the affordance of WhatsApp allowed the groups to attain three out of five online group

identity indications identified by (Ren et al., 2012). However, this study could not examine group structure over WhatsApp and Twitter due to time, privacy and data collection ethical issues.

5.5. Summary of the chapter

This study investigated the role of a combination of two tools of social media, WhatsApp and Twitter, in developing online learning communities in formal and informal learning contexts. This chapter summarised the main three elements of developing online learning communities from participants' perspectives (common learning needs, active communication, tools affordances). It then demonstrated how WhatsApp and Twitter help to develop online learning communities through discussing their educational uses to meet participants' learning needs and allow for active communication, and through analysing their affordances that facilitate creating a sustained community of learners. Next, this chapter examined the findings of the study in light of the proposed theoretical framework presented in the literature review chapter. On the individual level, the results of the study in sections (4.2.1) and (4.2.2.3) pointed to social presence and identifying learning needs as the first personal step towards joining or establishing an online learning community. On the interaction level, the study completely agrees with the importance of having active communication between community members to sustain the online community. This study added two more aspects, which are interacting with more able peers and including socio-emotional elements in online conversations to the teaching presence as the main factors that motivate community member to interact. The final level of the framework is concerned with the group as one object. This study agrees with the importance of creating online group identity to develop the sense of online learning community among

the members, and it confirmed that the technical features of WhatsApp make it an effective educational communication tool and allow it to support creating online group identity for formal and informal learning practices.

6. Conclusion

6.1. Introduction

This chapter is organised in five sections. Following a review of the research, it presents the contribution offered by this study to the theory, practice, and methodology of researching this topic. Then, the implications of the findings are outlined in terms of suggestions for teachers, learners, and learning and teaching practice, as well as for researchers in this area. A discussion of research limitations and recommendations for further research focuses and issues are offered at the end of this chapter.

6.2. Review of the research

This section presents a brief review of the study; it outlines the research purposes, the procedures applied for data collection and data analysis and the main findings.

6.2.1. Research purpose

The study aimed to achieve two main purposes. The first aim relates to the human perspective of the online learning community; how learners feel about using social media applications to develop and participate in an online learning community. It concerns the factors that enable a group of learners to form a community of learning on any of a range of social media applications, determined by their choices and needs. The second aim is concerned with the technological perspective on developing online learning communities on social networking applications. It focuses on the role of social media in developing formal and informal learning communities. In this

regard, the study attempts to shed the light on the process of selecting social networking applications as tools of learning and interaction among the community members. It also focuses on the main uses of these applications (WhatsApp and Twitter) in formal and informal learning activities.

The ultimate intention is not to neatly separate these two perspectives (human and technological), which are in fact blended in current cases, but to examine what sorts of questions might be posed from each viewpoint, as well as what answers have already been obtained. Thus, the first research question, dealing with the human perspective, is: What are the main factors that enhance the sense of an online learning community from the participants' point of view? While the second research question, dealing with the technological perspective, is: What is the role of social networking tools in developing online learning communities? In order to address these research questions, I have developed an integrated model to examine the concept of developing online learning communities on social media, which is based on the effects of individual factors, interaction factors, and group factors. This model has been used as a theoretical framework to guide the data collection, data analysis, and discussion the findings.

6.2.2. Methods of data collection

As mentioned previously, this study intends to investigate the development of online learning communities on social networking applications. The literature review on this topic has shown that there are two forms of online learning community, based on their learning systems: formal learning communities, which are related to a formal institution or academic module or course and that are controlled by students or the

teacher of the module to meet their learning needs, and informal learning communities, which are developed by people with similar interests to exchange useful information and build their shared knowledge together (Daniel, O'Brien & Sarkar, 2007). Therefore, to understand the development of online learning communities through social media, this study focuses on two cases of learning groups that have used two or more social networking tools for learning within a community.

The first case is a formal learning group, consisting of a teacher and 20 students enrolled in an academic module focusing on 'design and use of educational technologies', which is a basic requirement for all graduate students in the college of education in King Saud University. The teacher of this module uses Twitter and WhatsApp to share online learning resources and discussions about lecture-related questions with her students each week. The second case – the informal learning group – consists of 20 participants who have taken part in a WhatsApp group for learning and practising English as a second language. These members are also followers of a Twitter account for learning and teaching English as a foreign language.

The data collection period lasted for three months. It consisted of observing the online discussions on WhatsApp for each group (formal and informal) and conducting interviews with all of the members of each group. Semi-structured interviews were conducted individually (one-to-one) with the teacher/leader and ten members (students/learners) from each group. The rest of the groups' members were interviewed in small groups as focus groups.

Two phases of data analysis: an inductive phase and a deductive phase. The inductive phase involves applying thematic analysis to the interview transcripts to generate a thematic map, which led to answer the research questions and generating a content analysis scheme to analyse the WhatsApp discussions. The deductive

phase includes content analysis and social network analysis to triangulate the emergent findings developed in the inductive analysis phase.

6.2.3. Main findings

The findings indicate that the participants identified three main factors that they think could develop and sustain an online learning community on social media. The first factor is the presence of common or similar learning needs, which motivates students or learners to join and participate in the online learning group. Two practical aspects were perceived to be influenced by the online group's learning needs: group structure and the content of online conversations. The findings for this theme show that the structure of the online group (i.e., the role played by the participants) is determined based on the participants' learning needs and their intentions when joining the group. The findings also show that the learning content in their online conversations is determined based on the learning plan during a specific period of time, such as a week or the duration of a lecture.

The second factor of developing an online learning community was perceived to be the presence of active communication among the learning group members to ensure the maintenance of the group's connections and the members' engagement in online learning activities. In this respect, an additional research question has emerged: What are the factors that contribute to facilitating online communication between the group members? The participants from the two cases identified three fundamental practices that they think enhance communication between group members: teacher or group leader presence; ongoing contact with high-achieving peers, and having a socio-emotional component in the online conversation.

The third factor was the selection and use of communication tools that are suitable for all community members. This element is concerned with the features and affordances of the selected tools. The results in section (4.2.3) show that the tools used should be common and easy to access for all group members, so that they can all both feel and be connected with their online learning groups. The tools should also offer two key affordances: displaying group identity, and the possibility of directed interaction (such as mention features using @ and direct-reply features). In short, this part of the findings has revealed that the presence of common or similar learning needs, active communication among members, and using appropriate social media tools are the three main factors that contribute to developing and sustaining online learning communities from the participants' perspectives.

From the technological perspective, the study revealed that the main function of using Twitter for learning purposes was to develop the academic and social presence of the students/learners within their learning community, while the main learning function of WhatsApp is to provide an instant and open communication environment for the online learning community members. In order to gain a deeper understanding of these key functions and how they might be influenced by the learning context (i.e., formal or informal), I have focused on and presented further findings that demonstrate the significant elements of the use of WhatsApp and Twitter as educational tools in the two cases.

6.3. Contributions of the study

6.3.1. Theoretical Contribution

Online learning community members use virtual meeting places to learn together through social, cognitive interactions. Therefore, identifying the critical and

theoretical aspects underlying the formation of online communities should help to understand and explain this kind of learning style. However, as shown in the literature review chapter in section (2.4), the concept of an online learning community is broad and a number of models have been widely used to examine it and identify its elements, such as Col (Garrison, Anderson, & Archer, 2000), CoP (Wenger, 1999), TAM (Davis, 1986), and FOLC (Blayone et al., 2017).

Despite these various attempts to examine and explain the formation of online learning communities, none have adequately theoretically described the development of learning communities in online spaces in terms of the factors that affect individuals who choose to learn within an online learning community, and also in terms of their interactions: how these individuals interact within the online community in order to learn together, and how the final structure of the online group is constructed on social networking technology. In which learning groups could be either formal or informal learning communities, and the members may use one or more social networking media, depending on their needs and preferences.

The theoretical framework proposed and used in this study could draw a new path for studying the concept of developing online learning communities on social media in the two types of learning contexts. It is therefore can be applied to support evaluators, designers, moderators, and users in identifying and understanding relevant aspects of developing online learning communities. The key aim of this framework is to provide a holistic view to understand the development of online learning communities from three main perspectives or levels: the individual level, including self-regulated learning and social presence; the interactional level, including cognitive presence and teaching presence, and the group level, including group identity and group structure.

This tri-level view of online community adds new perspectives to Col model by Garrison et al. (2000), which has previously focused solely on the interaction dimension and the role of social, cognitive, and teaching presence in developing online communities of inquiry. The current study's framework proposes two more dimensions: individual dimension that drive and control the member to learn within a community, and a group formation dimension that focuses on the final product of online interactions, including group identity and describing the structure or topology of the group. Thus, this framework explains the ways in which the Col model, self-regulated learning approaches, and group identity theories converge and diverge as frameworks for analysing learning through social networking technology. It can be argued that the relationship between these three ideas is surprisingly underdeveloped and deserves attention. The individual, interactional, group tri-level framework could not only help to explain group members' identities as individual learners, but also serve to reconstruct the identity of the collective community of learners.

6.3.2. Practical Contribution

The connectivist model of learning (Siemens, 2005) argues that there is an untapped knowledge that resides in distributed networks. The connectivist model views technology as being distributed and having multifaceted roles, with less structured learning content and without formal assessments, while the teaching is concentrated on instructional design and the facilitation of interactions (Siemens, 2005). Objective knowledge is perceived to be circulated between the network of learners, whereas learning is approached as the development and maintenance of networks of resources and members with the same interests (Anderson & Dron, 2011). Thus, it

seems that the principal form of learning in connectivist theory is that learners develop networks based on shared learning interests, through which they are motivated to explore various related topics, to decide what to learn, and to choose the communication media that are best suited to their needs (McAuley, Stewart, Siemens & Cormier, 2010). This suggests that different communication media (e.g. video conferencing, blogs, Wikis and chats) should be simultaneously investigated in terms of their technological affordances and how these affect or simulate the formation of connections within social media networks (Poquet et al., 2018). From this perspective, this study could add further empirical realities to the debate about how people form online communities and learn together on social networking platforms based on their choices; this is a level of reality that is missing from abstracted notions of communities of practice and communities of inquiry, and from approaches that focus on self-regulated learning and personal learning environments.

6.3.3. Methodology Contributions

Two methodological contributions are offered by this study: the first is the way in which social network analysis has been applied to instant-message-based conversations (i.e., WhatsApp discussions). As mentioned earlier, the absence of the feature of log files for WhatsApp makes conducting social network analysis for such an instant conversation environment very complicated. Thus, this study has used three methods to calculate the messages sent and received by each participant in order to establish a centrality measurement, which indicates how well-placed an individual is to receive and send information from and to other participants in their network (In- and Out-degrees). These methods fully explained in the methodology chapter in section (3.7.2.2), are: using the Mentions feature in WhatsApp; using the quote-reply

feature in WhatsApp, and identifying all messages that contain another member's name or nickname. These three features of messages can indicate that they are directed to a specific member in the group. Thus by applying these three methods, we can therefore calculate In- and Out-degrees in online conversation when there is no automatically generated log file for the group members' participation.

The second methodological addition offered by this study is the new way of selecting the content analysis sample. The aim was to identify the most active three weeks for each WhatsApp group (i.e., when the participants showed the highest levels of connectedness and participation): In order to select the ideal sample, I used the findings of social network analysis for each week in two steps.

I first started by looking at the total average of in- and out-degrees, which indicates the average number of received (in-degree) and posted (out-degree) directed messages by group members during that week. I then nominated the five highest values in each case (five highest centrality-measurement weeks for each group). However, as mentioned by the literature and in the methodology chapter, In- and Out-degrees are not the main indicators for the sense of network connectedness. They simply illustrate the number of incoming and outgoing messages for each participant (Scott, 2011; Shea et al. 2013); they do not tell us about the types of edges, or how many edges or connections have occurred. This means that, if two students in the group have a high level of directed conversation (receiving and replying to each other's messages), the average of In- and Out-degrees will be high in that week, even if the rest of the group members were not participating in the discussion. Therefore, another indicator had to be combined with the centrality measurement (In- and

Out-degrees) to give an accurate sense of connectedness, which is the network density. Network density identifies the number of actual connections between group members – a wider variety of connections leads to higher network density.

The second step of selecting the sample was identifying the three highest levels of network density that occurred in the five weeks nominated in the first step. There is a stronger sense of connectedness among the groups in these three-week periods as they show the highest centrality measurements as well as the highest density measurements compared with the other weeks of the data collection period. This new way of selecting the content analysis sample of conversations extracted from WhatsApp based on the findings of social network analysis can be used to solve two main challenges of using social media data for research purposes, such as the large volume of data and the quality of the information extracted from this public online environment. The next section discusses these challenges in more details.

6.4. Challenges of using social media for research purposes

Although qualitative research is generally challenging in terms of gathering and analysing data, there are additional challenges when using social media as a source of data (McKenna, Myers & Newman, 2017). This section articulates two concerns that must be addressed before embarking on research involving social networking sites, including the volume of data, the extent of data reliability and validity:

6.4.1. Large volume of data

One of the most obvious challenges in collecting qualitative data from several sources is the large volume of data involved. Although qualitative researchers tend to gather large amounts of data anyway, the size of social media datasets can be daunting, even for experienced researchers. The “big data” concept relates to “the

flood of data that is generated and captured as users interact with the myriad of IT systems that support daily activities from iTunes, Twitter, and YouTube through to ecommerce and public services” (Dawson & Siemens, 2014, p.290). In the educational context, student information systems and students’ online interactions with various technologies including emails, learning management systems (LMS) and social media provide a stream of data that can be mined and analysed for research purposes (Leonardi & Vaast, 2017). In the use of social media platforms, there are several types of information that can be extracted and analysed; for instance, the number of messages posted on each platform, reporting of students’ login times, or total time spent online are common numeric data, but such types of information in themselves are not sufficient to address research questions fully, as qualitative researchers tend to study a particular topic in depth with a focus on the content and the categorisation of the interactions among students. Collecting the actual messages or posts that are sent by students provides the potential to establish indicators of more complex concepts such as knowledge construction (Cacciamani, Perrucci, & Khanlari, 2018; Rourke, Anderson, Garrison, & Archer, 2001), sense of community (Garrison, Anderson & Archer, 2000; Lim & Richardson, 2016), learning presence (Shea & Bidjerano, 2010), creativity (Dawson, McWilliam, & Tan, 2011), and self-regulated learning (McLoughlin & Lee, 2010; Won, Wolters & Mueller, 2018). However, with large sizes of online learning groups, the process of capturing, managing and analysing students’ posts or online interactions on social media could generate massive amounts of data, particularly with open social networking platforms such as Twitter. This can make the process more complicated if the researcher intends to analyse the density of group interaction strength and the diversity of connections between group members, even with the aid of electronic data management tools, such as Nvivo for

thematic analysis or NetFlow for social network analysis. This is because such social media platforms are public environments and the participation is voluntary in nature, so in some platforms the number of participants cannot be managed and groups cannot be closed off from other users or people with similar interests.

Thus, there is a need to find some way of filtering or “cleaning” the data extracted from social media such that some members may be excluded from data collection and irrelevant data can be ignored when the richness of the thread of dialogue is revealed (McKenna, Myers & Newman, 2017). This study is based on WhatsApp conversations from the dialogue between the members of two distinct online communities, because these groups were secure online environments and the numbers of participants were more stable than on other platforms. The findings of the social network analysis were then used to select a sample of three weeks of WhatsApp interactions as a way to narrow down the volume of data.

6.4.2. Trustworthiness of data

One key difference between the qualitative data gained from interviews and that taken from social media platforms is that the researcher can influence the content of interviews, as they tend to direct the conversation with focused questions or topics, whereas social media data represent user-generated content. That means that social media data may not contain the specific points the researcher is looking for, or there may be questions about the trustworthiness and validity of the data. Due to the lack of control and of awareness about the origin of the data, there is potentially much more irrelevant data that requires filtering and/or important data may be missed.

The use of social media data might exclude some group members from the study who prefer to just observe the online learning discussions, or are limited participants, although they still learn and gain advantages from these discussions. Different people exhibit different kinds of behaviour on social media platforms; for example, “lurking” describes participants who adopt passive behaviours – they listen to, observe, and perhaps record the “conversations”, but do not engage with the other participants (Dawson & Siemens, 2014). Thus, the potential of excluding some people or their behaviours from a study means that the use of social media alone cannot be relied upon for a particular research project.

The trustworthiness of data can also be affected by anonymous participation, such as people using nicknames on social media platforms: it may be difficult to ensure the identity of the author of a post, which can lead to uncertainty regarding whether data can be trusted or not. Some evidence suggests that anonymous use, while offering users a high degree of privacy, at the same time gives them the chance to “misbehave” on social media, such as posting inappropriate, aggressive or illegal content, without fear of retribution or consequences (Tsang, Au, Kapadia, & Smith, 2010).

The use of text as a mean of interaction on most social media applications is another challenge related to the trustworthiness of data, because this communication often lacks visual cues and might contain new sorts of digital icons that need to be analysed in different ways. Many face-to-face communication cues (facial expressions, encouraging sounds, gestures, etc.) may be absent or replaced by symbols or emoticons in text-based communication. The role of these cues is vital in supplementing the meaning embodied in the transcripts and explaining the words written,

and they could tell the researcher more about their behaviour and how they were open and dynamic at the time of the interview (Myers & Newman, 2007).

Thus, the new digital cues that participants tend to use in text-based communication to convey their emotional meanings, such as emojis, capital letters, or even particular digital icons used to convey information, such as YouTube clips, web-page links or a tweet, or agree or like icons to support a post, need to be taken into account when analysing text-based data obtained from social media. It has been suggested that there is a need to theorise in relation to these social media-related icons (or language), given that they contain a wealth of related information (Seargeant & Tagg, 2014).

6.5. Implications of findings

6.5.1. For researchers

This study has focused on the development of online learning communities on social media. Although this study is limited, the proposed theoretical framework by which it is underpinned, the design of the data collection tools, the methods applied for the analysis, and the findings themselves could provide other researchers with suggestions for studying the dynamic process of developing formal and informal online learning communities on social media platforms.

Most previous studies on online learning communities are based on a limited number of theoretical frameworks or models for studying the concept of online learning communities, such as Col (Garrison et al., 2000), CoP (Wenger, 1999), and FOLC (Blayone et al., 2017). This study introduces a holistic framework that can be used to address online learning communities from three angles: individual, interaction, and group. Other researchers could apply or redefine this framework based on

their studies, compare this framework with other models, or even negotiate their research findings using the theoretical assumptions offered by this framework.

Based on this theoretical framework, the study used interviews with participants to examine the sense of online learning community on the “individual level”, including two aspects: social presence and self-regulated learning approaches. Therefore, this study created an interview schedule for learners and another one for the teacher/leader, designed in the light of social presence theory and the self-regulated learning strategies that the members used in their learning processes when participating in online learning communities on social media. Moreover, these interview schedules were designed according to Arthur and Nazroo’s (2003) recommendations, consisting of four sections: introduction; opening questions; core in-depth questions, and closure. Other researchers in the same field could use these interview schedules to guide their interviews or could even modify their contents to suit their own research needs.

In addition to the interview schedules, this study has developed a coding scheme to analyse the content of WhatsApp conversations. This was designed according to the proposed theoretical framework, with a number of coding schemes by previous studies, including those by Garrison et al. (2001), Rourke et al. (1999), Anderson et al. (2001), and Veldhuis-Diermanse et al. (2006), used to guide the design. This was done by modifying some of these coding schemes categories to make them suitable for the current research purposes. The inter-coder reliability of this coding scheme was acceptable, which means that other researchers could assess or compare this coding scheme with other schemes. Other researchers could also modify its

categories to make it suitable for other instant-messaging applications other than WhatsApp, or apply this scheme to similar studies.

This study has revealed that online learning communities are built and sustained on social media only while the members have the same learning needs, there is an active interaction between them, and they use convenient communication tools. Other research in this field could use these findings as an empirical basis to design a platform or a system for developing online learning communities, based on various features of existing social networking tools. In addition, these findings could be used as evaluation criteria to assess the success of online learning communities on social media in both formal and informal learning contexts, because they are based on two real learning groups, whose members have lived the experience and have related their views regarding the factors that they felt enhance their online learning communities.

6.5.2. For teachers

This study has confirmed that the role of the online moderator (the teacher of a formal learning group or the leader of an informal learning group) is critical in sustaining active interactions among community members over an extended period, alongside two additional factors: interaction with more-able peers, and the manifestation of a social-emotional atmosphere in the online environment. Indeed, the role of the online moderator as a facilitator of discourse can be comprehensive; offering opportunities for learners of different levels of achievement or ability to interact online, and also creating a welcoming, supportive atmosphere in the online learning community. Thus, it seems that the role of the teacher/leader in fostering active interactions is the key component, which can support or produce the other two factors. This section highlights many ways for e-moderators (teachers or group leaders) to make an

online learning community an inviting environment in which to learn and actively participate.

In order to enhance online interactions, this study recommends that the teacher should carefully select suitable communication tools and set the tone of interaction at the early stages of developing an online learning community on social media applications. In which the participants should know the timetable of live-discussions and the role of the teacher/leader in these online discussions. At the start of the process of creating the community, the teacher should make it clear that, although they will be observing the online communication closely, they will not necessarily take a leading role in the group's learning; setting expectations in this way will prevent the students expecting the teacher to respond immediately to all their queries (Kear, 2011). Also, this study has confirmed that the teacher's role of keeping the conversation going between members can be achieved through reflective and discussion posts that encourage students to think about other posts and negotiate them. Feenberg (1989) coined the term "weaving" to express the flow of online discussion and how it can be pulled together. Weaving students' responses together is a valuable way for the e-moderator to stimulate fresh threads of thought, produce new themes, and suggest alternative approaches. The value of an online discussion can be very high so long as concentration and motivation to sustain the interaction last. Weaving skills include negotiate wide-ranging views and providing summaries from time to time; however, there is no need to over-extend discussions. E-moderators should have closing as well as opening skills in order to properly stimulate and control online discussions. This study suggests posing reflective questions at key times, as well as asking participants to look back through the learning content a regular basis.

In order to foster the interaction between a learner and their more able peers, it is suggested that the teacher or online group leader should not fully dominate the online interaction. For example, if a learner posts a question, it is probable that another member may be able to provide a useful response. The teacher can also design e-learning activities that enable learners to become involved, contribute, and start to help each other to develop their skills or abilities. This study has found that designing enjoyable online activities, such as learning games and using audio messages to participate in the online learning activity, could create a fun environment and foster interaction among the students. In addition, to encourage interaction in formal learning settings, it can be helpful to link participation in the online activity to the module's assessment; however, this requires the teacher to produce well-designed learning activities and to carefully consider how the students' contributions will be managed and assessed.

Teachers or group leaders can also take steps to create welcoming online learning environments that encourage members to take part in the online discussion through promoting social and emotional engagement. The study indicated that teachers can play a major role in modelling the style of interactions among online learning community members through careful phrasing, which can be supplemented by emoticons or smileys that convey emotional meanings, and can encourage friendly, caring, and casual contributions. E-moderators can also foster the social aspects of their online learning group by sharing a little of their personal lives with the learners, recommending that the learners introduce themselves to the online community, providing personal information, and encouraging the group members to show their real pictures on their profiles or write something about their hobbies or interests. This can

lead the group members to get to know each other better and can increase the social element of the online community.

6.5.3. For students

This study has revealed that online learning communities are built and sustained on social media only when the members have the same learning needs, there is an active interaction between them, and they use convenient communication tools. Based on these three factors, this section provides some advice to learners who are members of online communities in order to help them benefit as much as possible from networked learning within a community of people who hold similar interests.

A learner should identify their learning need as the first stage of creating or joining an online learning community, then select the most suitable social networking tools based on those in which they are interested and with which they are familiar. Then, they need to start to search for people with similar interests; at this stage some social networking applications can offer links to communities of people with the same interests or suggest other users with similar profiles to follow or form friendships with. After connecting with people with common interests or developing the initial stage of an online learning community, the learner must understand the value of working together online and how each member can contribute to group working. By this time, the participants should also have started to get to know each other and should gradually come to trust each other and feel that they belong to this virtual community. This study has confirmed that a sense of belonging is fostered through active interaction among community members. In order to maintain active interaction between peers, it is suggested to set up automatic notifications in all the communication tools used to notify users of new contributions from the learning community. This can help the

learners to remain alert and updated about all important posts or learning resources and could boost them to instantly read and comment on others' posts. It is also recommended that learning content should be organised well on mobile devices, based on learning topics or dates, to address the problem of information overload.

This study has also emphasised the role of socio-emotional factors, which enhance the level of online interaction among community members. It has been revealed that members who share more personal and social stories with their group tend to receive more comments and replies from the other community members. Thus, it is recommended that group members should show their real personalities through displaying their real picture, lifestyle and interests on their profiles and also through sharing their projects and personal experiences in the online discussion. This can help to make the community more social and friendly and adds the benefit of a special cultural experience belonging to the group.

6.5.4. For teaching and learning change

This section highlights other factors that may inform the development of formal learning and teaching practices. A multitude of elements of formal learning practices could change with the introduction of online learning communities on social media, namely changes in the spaces and structures of learning, in teachers' roles, in learners' roles, and in the design of learning content and curricula.

The case studies in this research included participants who were engaged in building online learning communities, creating and developing their online learning content, and taking part in online collaborative learning activities. Inevitably, not all members participate to the same degree. Participations were characterised as (dis-

cussion; reflection; metacognition; affective language; unrelated topics including personal or social story to maintain social connections). The study illustrates how participation in online learning communities can blur the lines between self-directed, intentional learning and unintentional, incidental and practical learning. This suggests that adopting social networking technology for building online learning communities has the potential to disrupt the boundaries between sites where learning takes place. It can empower learners through offering a wide range of formal and informal learning interventions, opportunities to participate in networked communities, and access to online resources to support knowledge construction and collaboration. The utilisation of information technology in classrooms can become a key element of instruction. What remains to be established in educational systems is a system for developing online learning communities based on familiar and common tools, such as social networking applications, as this could have potentials for self-directed or unplanned learning opportunities of varying degrees. Thus, this study recommends adopting informal learning practices (such as online learning communities on social media) in formal institutions to allow for the emergence of new pedagogies, where control begins to shift from the teacher to increasingly self-directed learners.

With the adoption of online learning communities in formal education systems, the roles of teachers will not only change, but may become limited or even unnecessary in some circumstances. The process will involve users moving from a learning environment controlled by the teacher and governed by an institution's policy to an environment where they direct their own learning, find their own information, and create knowledge by communicating with networks of more knowledgeable people. In these communities, the learners' personal interests and preferences are the main drivers for their engagement with learning, rather than institutional requirements and

teachers' choices. Teachers will need to take on a role as e-moderators, who model and direct the ways of exploring and developing arguments. A dilemma could arise regarding when to correct misunderstandings that appear in the online learning community; the teacher may wish to avoid to "putting down" participants, whilst not allowing incorrect perceptions to pass by without correction. The key role of the teacher in this case appears to be summarising effectively, providing clarification, and removing the original cause of the misunderstanding. It is also recommended that e-moderators (the teachers) themselves should always show a little doubt about their own responses and invite further comment (Salmon, 2013).

This study argues that the use of a number of different platforms to build an online learning community can offer different opportunities and learning activities to the community members. In this sense, each space or platform can be considered to have its own situated curriculum. For example, using an instant messaging space such as WhatsApp can offer extended discussions of course-related issues or preparation for a test, group study, or even instant sharing of course materials. While the use of a microblogging space such as Twitter can offer bite-sized learning content and quick module reminder points. Thus, there is a need to produce new forms of the course materials used in formal education systems, such as books, articles, and even PowerPoint slides, to make them digitally manageable and distributable over the social media networks, and to enable them to be shared among the community members. It is suggested that learning materials should be offered to learners over time in bite-sized chunks. This can be justified based on the fact that retention of new information reduces quickly unless the information is revised in some way to prevent it from being forgotten. It could also support the transition from knowledge-consuming to knowledge-sharing and -reproducing activities.

We have discussed how learning in online learning communities might be incorporated into students' overall learning ecology, and how current institutionalised approaches might shift to accommodate such change. However, there are some limitations of applying and researching this topic, especially in formal learning settings. The next section will discuss these limitations in more detail.

6.6. Limitations of research

Although this study provides valuable insights into developing online learning communities within the two most commonly used social media platforms (i.e., WhatsApp and Twitter), some limitations of the research must be acknowledged. First, the data were gathered from a relatively homogeneous demographic group: for the formal learning group, only using the female campus and the students were all focused on one particular area of knowledge (college students working on the same academic module). For the informal learning group, the members were all living in the same country (Saudi Arabia) and had similar backgrounds and cultural insights. Working with students from other areas and cultures could influence members' interactions and the structure of the groups and there it could generate different results. Caution is thus necessary when considering extending these results to a broader population or similar cases.

Also in this study I used my friends as the leaders of learning groups and that could influence the validity of the data collected from them. To minimise this influence, I asked them to support their answers with examples and I gave them their interviews transcripts to reflect on the main points generated from the interviews and to be sure about the validity of their responses. Also their interactions with their students could be influence as they already know that their online conversation will be

analysed such concerns could influence how communities are formed, changed, or developed.

The study considers developing online learning communities within a combination of only two social media platforms (WhatsApp and Twitter), based on the participants' preferences. However, there are several benefits of other social media technologies that are used in online learning communities and some may differ in their influence on the success of the community. Thus, different findings could have emerged if the communities had adopted more than two applications, or used more trendy social media such as Instagram or Snapchat, or more academic platforms such as LinkedIn.

This study focuses on the role of using different social media tools in developing online learning communities but did not consider the nature of social networking participation. This makes the findings regarding the roles of WhatsApp and Twitter seem separate, while the participants were actually using them both at the same time and for the same learning purposes. It is known that users' participation habits and profiles are different between one social networking application and another. At any one time a member may be a central participant in one platform's community but a peripheral participant in another, and throughout the time they can move back and forth between the core and the periphery. All participation, even at the periphery, is considered legitimate learning. Moreover, the user preferences of various social networking applications change over time; as quickly as users can stick to one trendy social networking application, they can just as quickly move on to another with no advance warning. It is therefore difficult to guarantee the sustained success of such social-networking-based learning communities. However, I noted at the end of this study that it could be very useful if the study adopted an official interface for each

learning community. An online community interface may work as a central web address to consolidate a registration process to a number of social networking platforms, and can provide support information such as a general description of the community and its e-moderators, as well as the suggested course content and schedule of debates and which platforms will be used for each function. A key point is that a good interface design helps users to resolve technical problems that may arise when using online learning platforms (Liu, Chen, Sun, Wible, & Kuo, 2010). Thus, It is crucial that instructors, the group leader or the researcher should adopt the proper pedagogical and technological strategies when designing an online learning community.

6.7. Recommendations for future research

The current study focuses on the factors that enhance the development of online learning communities on social media but did not consider other determinants that could influence the sustainability of social media communities or the problems that could influence their success. Further research should take into account other factors influencing community formation on social media such as determinants of members' participation levels and hindrances to interaction. The characteristics of learning communities that could impact attitudes regarding social media in education should also be examined, and the maintenance of these learning practices also needs to be investigated. Such topics could address substantive issues such as how communities are formed, change, or cease to exist online.

In the formal learning sector, the issue of what role teachers and instructional institutions would play if learners themselves were to develop and control their own online learning communities need to be studied in some depth. This could provide

teachers with different instructional scaffolds that could be adapted to specific circumstances, and could suggest ways of improving communication within the communities.

For the informal learning sector, further research is needed to investigate the socio-technological affordances that can guide learners to develop the necessary skills for learning in networked and highly distributed environments such as online learning communities. The relationship between students' learning styles and learning satisfaction in such learning environments must be explored. Studying the processes by which learners establish member identities in the framework of an online community or assume a particular role within the group could also provide a useful understanding of how to develop life-long learning styles, especially when learning within a community.

This study has focused on two cases of online learning communities to identify the role of social media in their formation; however, the interplay between experienced members and newcomers is an important dimension that is lacking in this study. More attention must be given to ways in which the learning of experienced or long-standing members differs from that of newcomers to a group. Valuable insights may also be gained from comparing snapshots of the same member at different stages of a community's development or of different communities that are at the same stage of development.

6.8. Summary of the chapter

This chapter has concluded the thesis by offering a brief review of the whole research. It started by restating the research purposes that were demonstrated in the two research questions, then it provided a brief presentation of the research design,

data collection and analysis procedures adopted in this study. Some problems arose during conducting the study, such as identifying the study population, sampling, determining the samples for content analysis, and the difficulties of conducting social network analysis on WhatsApp discussions; however, I presented the solutions I applied to overcome or minimise these problems. Three contributions to this field of knowledge were discussed. A theoretical contribution was seen in the proposed theoretical framework, which provides new insight for examining online learning communities from an integrated viewpoint including individual, interactional and group perspectives. The practical contribution was represented by the new empirical insights that this study may add regarding the roles of multiple social networking platforms in developing online learning communities, when these platforms are selected and adopted by the group members based on their needs and preferences. The methodological contribution is impeded in the new ways that have been adopted to apply social network analysis on WhatsApp conversations; especially for calculating In- and Out- degrees for each participant. Another methodological contribution was the way devised to select samples of the most three active and connective weeks for each WhatsApp group for conducting the content analysis. Although this study has some limitations, such as highly homogeneous demographic groups and the consideration of just two applications (WhatsApp and Twitter) as platforms for interaction and learning, the theoretical framework underpinning the study, the design of the data collection tools, the methods applied for data analysis, and the findings could provide other researchers with suggestions for studying the dynamic process of developing formal and informal online learning communities on social media. Some advice and recommendations were presented for both teachers and students as community members,

as well as regarding changes to learning and teaching practices. Finally, it was recognised that this study has focused on the factors that positively influence building online learning communities on social media; however, negative factors that could affect online community success, alongside the issue of what role teachers and instructional institutions would play if learners themselves were to develop and control their own online learning communities, should be considered in more depth by future studies.

Appendices

Appendix A: Participating Form

نموذج للمشاركة في بحث حول دور وسائل التواصل الاجتماعي في بناء المجتمعات التعليمية

Participating Form on a study about the role of social media in developing online learning community



السلام عليكم ورحمة الله وبركاته
تقوم الباحثة باعداد دراسة حول دور وسائل التواصل الاجتماعي في تطوير المجتمعات التعليمية. لذلك انا مهتمة بعدد من مجموعات التعلم على وسائل التواصل الاجتماعي, و تعد مجموعة التعلم عبر الواتسب هي واحدة من المجموعات التي اقوم بدراستها. ارجو التكرم بالمشاركة في هذا البحث اذا كنت مهتم باستخدام ادوات التواصل الاجتماعي لغرض التعليم او التعلم ضمن مجموعات. هذا الاستبيان يحدد مدى رغبتك في المشاركة في هذا البحث, كما أنه يجمع بعض البيانات الوصفية الخاصة بك إلا ان هذا المعلومات ليست اجبارية ويمكنك تجاهلها.

يسعدني مشاركة ارائكم واستفساركم على البريد الالكتروني
Faaa204@exeter.ac.uk

Dear Participants

I am conducting a study about the role of social media on developing online learning communities. I am dealing with numbers of online learning groups, this WhatsApp group is one of them. I invite you to participate in this research if you are interested in using social media (Facebook, Tweeter, LinkedIn, WhatsApp or any application you use) for teaching or learning within a group. This survey is aimed to measure your willingness to participate in this study, also it is used to collect information about your demographics and Background information, however, this data is not mainly required and you can skip them if you want.

I am glad to answer any queries at the email address: faaa204@exeter.ac.uk.

Many thanks,
Fawzeya Alghamdi

1. Do you agree to participate in this study by adding the researcher as a member in your WhatsApp learning group? *

هل انت موافق على المشاركة في هذا البحث من خلال اضافة الباحثة كعضو في المجموعة التعليمية عبر الوتس اب؟
Mark only one oval.

Yes

No After the last question in this section, stop filling out this form.

2. Do you agree to participate in an interview with the researcher? *

هل انت موافق للمشاركة في مقابلة مع الباحث ؟
Mark only one oval.

Yes

No

3. If 'yes' please provide your contact details, ex: phone number or email

اذا كنت موافق على المشاركة في المقابلة أرجو تزويدي بوسيلة الاتصال المناسبة لك ايميل او رقم الهاتف

4. If you cannot meet me face-to-face, Please provide your Skype name

ارجو تزويدي باسم حسابك على اسكايب اذا كنت لا تستطيع مقابلي مباشرة

الرجاء الاجابة على الاسئلة التالية المتعلقة بمعلوماتك الوصفية ومدى استخدامك لوسائل
التواصل الاجتماعية في التعلم -اختياري.

Please answer the following questions regarding your demographic data and your academic use of social media (optional)

5. What is your name or nickname? ما هو اسمك او الاسم المستعار؟

6. What is your gender? ما هو جنسك؟

Female

Male انثى

ذكر

7. How old are you? كم عمرك؟

8. What is your subject-area discipline? ما هو تخصصك الاكاديمي؟

- Science علوم
- Language Art لغات
- Computer science علوم الحاسب
- Social studies دراسات اجتماعية
- Education تربية
- Administration ادارة
- Other:

9. What is your favourite social media application do you use with your students?

ماهي وسيلة التواصل الاجتماعية المفضلة لديك؟

- Twitter
- Facebook
- WhatsApp
- Snapchat
- LinkedIn
- Instagram
- Other: _____

10. How long have you been a member in that WhatsApp group?

كم مدة انضمامك لهذه المجموعة التعليمية؟

- Less than 2 months اقل من شهرين
- 2-5 months شهر
- More than 6 months أكثر من ستة اشهر

11. Have you joined to other online learning groups before? هل انضممت لمجموعات تعلم عن طريق

الانترنت قبل ذلك؟ *Mark only one oval.*

- Yes
- No

12. If your answer is "Yes", how many learning groups do you have? and for what purposes?

اذا كانت الاجابة نعم، كم عدد المجموعات التعليمية التي انضممت لها؟ وماهي اسباب انضمامك لها

13. How often do you use social media for educational purposes?

ما هو معدل استخدامك لوسائل التواصل الاجتماعي لأغراض تعليمية

- Daily. يوميا
- Weekly اسبوعيا
- Monthly شهريا
- Rarely نادرا
- Never ابدا

14. How often do you use social media for educational purposes?

ما هو معدل استخدامك لوسائل التواصل الاجتماعي للترفيه أو لأغراض شخصية

- Daily. يوميا
- Weekly اسبوعيا
- Monthly شهريا
- Rarely نادرا
- Never ابدا

Powered by
 Google Forms

Appendix B: Demographic data of case 1

Demographic data of case 1 (formal learning group)

Participating Form (Responses Google form)

	Timestamp	Do you agree to participate in this study by adding the researcher as a member in your WhatsApp Learning group?	What is your gender?	How Old are you?	What is your subject-area discipline?	What is your Favourite social media application do you use with your students?	Have you joined to other online learning groups before?	How often do you use social media for educational purposes?	How often do you use social media for educational purposes?
1 * Teacher	12/7/2016 9:14:02	Yes	Female انثى	35	Education تربية	Twitter, WhatsApp	Yes	Daily. يوميا	Daily. يوميا
2	13/7/2016 10:22:51	Yes	Female انثى	23	Education تربية	WhatsApp	Yes	Daily. يوميا	Daily. يوميا
3	13/7/2016 12:29:47	Yes	Female انثى	20	Education تربية	WhatsApp Snapchat, Instagram	No	Rarely نادرا	Daily. يوميا
4	13/7/2016 12:48:24	Yes	Female انثى	22	Education تربية	WhatsApp	Yes	Daily. يوميا	Daily. يوميا
5	13/7/2016 12:54:47	Yes	Female انثى	22	Education تربية	Facebook, WhatsApp	No	Weekly اسبوعيا	Daily. يوميا
6	13/7/2016 12:56:12	Yes	Female انثى	22	Education تربية	Twitter, WhatsApp , Snapchat	Yes	Daily. يوميا	Daily. يوميا
7	14/7/2016 12:50:20	Yes	Female انثى	21	Education تربية	WhatsApp , Twitter	Yes	Daily. يوميا	Daily. يوميا
8	14/7/2016 13:02:38	Yes	Female انثى	23	Education تربية	WhatsApp , Twitter	Yes	Weekly اسبوعيا	Daily. يوميا
9	14/7/2016 13:06:04	Yes	Female انثى	22	Education تربية	WhatsApp , Snapchat	Yes	Weekly اسبوعيا	Daily. يوميا
10	14/7/2016 13:20:31	Yes	Female انثى	24	Education تربية	WhatsApp , Twitter	No	Daily. يوميا	Daily. يوميا
11	14/7/2016 13:34:57	Yes	Female انثى	22	Education تربية	WhatsApp , Instagram	No	Daily. يوميا	Daily. يوميا
12	14/7/2016 13:44:39	Yes	Female انثى	20	Education تربية	WhatsApp , Snapchat	No	Daily. يوميا	Daily. يوميا
13	14/7/2016 16:21:22	Yes	Female انثى	23	Education تربية	WhatsApp	Yes	Daily. يوميا	Daily. يوميا
14	14/7/2016 16:44:00	Yes	Female انثى	24	Education تربية	WhatsApp Snapchat, Instagram	No	Daily. يوميا	Daily. يوميا
15	15/7/2016 9:32:04	Yes	Female انثى	22	Education تربية	WhatsApp	No	Weekly اسبوعيا	Daily. يوميا

16	15/7/2016 11:35:36	Yes	Female انثى	20	Education تربية	Twitter, WhatsApp , Snapchat	Yes	Daily. يوميا	Daily. يوميا
17	15/7/2016 19:46:33	Yes	Female انثى	22	Education تربية	WhatsApp , Instagram	Yes	Daily. يوميا	Daily. يوميا
18	15/7/2016 17:06:15	Yes	Female انثى	21	Education تربية	Twitter, Facebook, WhatsApp , Snapchat, Instagram	Yes	Daily. يوميا	Daily. يوميا
19	15/7/2016 12:43:17	Yes	Female انثى	20	Education تربية	WhatsApp , Snapchat, Instagram	Yes	Daily. يوميا	Daily. يوميا
20	16/7/2016 11:44:07	Yes	Female انثى	22	Education تربية	WhatsApp , Twitter, Snapchat	No	Weekly اسبوعيا	Daily. يوميا
21	16/7/2016 14:32:04	Yes	Female انثى	21	Education تربية	WhatsApp	No	Weekly اسبوعيا	Daily. يوميا

Appendix C: Demographic data of case 2

Demographic data of case 2 (informal learning group)

Participating Form (Responses Google form)

	Timestamp	Do you agree to participate in this study by adding the researcher as a member in your WhatsApp Learning group?	What is your gender?	How Old are you?	What is your subject-area discipline?	What is your Favourite social media application do you use with your students?	Have you joined to other online learning groups before?	How often do you use social media for educational purposes?	How often do you use social media for educational purposes?
1	3/5/2016 8:44:03	Yes	Male ذكر	24	English	Twitter, WhatsApp, Instagram	No	Daily. يوميا	Daily. يوميا
2	3/5/2016 8:51:56	Yes	Female انثى	23	High school ثانويه	Twitter, WhatsApp, Snapchat	No	Daily. يوميا	Daily. يوميا
3	3/5/2016 9:19:47	Yes	Female انثى	18	High school لم اخرج	WhatsApp, Instagram	No	Rarely نادرا	Daily. يوميا
4	3/5/2016 10:48:24	Yes	Female انثى	22	Language Art لغات	Twitter, Facebook, WhatsApp, Snapchat, Instagram	Yes	Daily. يوميا	Daily. يوميا
5	3/5/2016 12:54:47	Yes	Female انثى	18	High school طالبة ثانوي	WhatsApp, Snapchat, Instagram	No	Weekly اسبوعيا	Daily. يوميا
6	3/5/2016 12:56:44	Yes	Female انثى	22	Language Art لغات	WhatsApp, Twitter, Snapchat	Yes	Daily. يوميا	Daily. يوميا
7	4/5/2016 12:57:26	Yes	Male ذكر	21	Language Art لغات	WhatsApp	No	Daily. يوميا	Daily. يوميا
8	4/5/2016 13:00:38	Yes	Male ذكر	24	Administratio ادارة	WhatsApp, Twitter	Yes	Weekly اسبوعيا	Daily. يوميا
9	4/5/2016 13:03:54	Yes	Female انثى	19	English language.	WhatsApp, Snapchat	Yes	Weekly اسبوعيا	Daily. يوميا
10	4/5/2016 13:20:31	Yes	Female انثى	24	Language Art لغات	WhatsApp, Twitter	No	Daily. يوميا	Daily. يوميا
11	4/5/2016 13:34:57	Yes	Female انثى	19	Language Art لغات	WhatsApp, Instagram	No	Daily. يوميا	Daily. يوميا

12	4/5/2016 13:44:39	Yes	Female انثى	20	Language Art لغات	WhatsApp, Snapchat	No	Daily. يوميا	Daily. يوميا
13	4/5/2016 16:21:22	Yes	Male ذكر	25	Education تربية	WhatsApp	Yes	Daily. يوميا	Daily. يوميا
14	4/5/2016 16:44:00	Yes	Female انثى	24	Translation	Snapchat, Instagram	No	Daily. يوميا	Daily. يوميا
15	5/5/2016 11:32:04	Yes	Female انثى	19	Administratio n ادارة	WhatsApp	No	Weekly اسبوعيا	Daily. يوميا
16	5/5/2016 11:35:36	Yes	Male ذكر	20	Administratio n ادارة	Facebook , WhatsApp	Yes	Daily. يوميا	Daily. يوميا
17	5/5/2016 12:46:33	Yes	Male ذكر	23	Administratio n ادارة	Twitter, WhatsApp, Snapchat	Yes	Daily. يوميا	Daily. يوميا
18	5/5/2016 14:07:55	Yes	Female انثى	21	Computer scie nce علوم الحاسب	WhatsApp, Twitter	Yes	Daily. يوميا	Daily. يوميا
19	5/5/2016 12:43:17	Yes	Male ذكر	20	Science علوم	WhatsApp, Instagram	No	Daily. يوميا	Daily. يوميا
20	6/5/2016 11:32:04	Yes	Female انثى	22	Administratio n ادارة	WhatsApp	No	Weekly اسبوعيا	Daily. يوميا

Appendix D: Information sheet and consent form for formal learners



GRADUATE SCHOOL OF EDUCATION

Title of Research Project

The Role of Social Media in developing online learning communities

Who I am

My name is Fawzeya Alghamdi and I am interested in using technology for education. I am a PhD student at the University of Exeter now, and this is a part of my PhD study.

Details of Project

This study aims to develop a clear understanding of the role of social media in supporting online groups of learners to feel more connected to each other. It will investigate the influence of social media adoption on the community of learning in two different settings. The first is your group (also known as a formal learning group), as you use social media as an educational tool to interact with your teacher and peers in the module (). The second group is an informal learning group that uses social media to enhance their knowledge and develop their English language skills. The research project involves different methods: interview-conversations with students and teachers, online discussion forum, as well as classroom observations.

The following is a description of what data will be collected from you and for what purposes. Please read it carefully and sign if you are happy to participate in this study.

What your participation will involve

I would like to ask you to take part in a one to one interview-conversation with me and to be observed in seven lessons. Also, I will examine the learning group online discussion forum to identify the role of social media in developing online learning communities.

I anticipate that interview-conversations will take about 60 minutes. The conversation will be about your experience of using social media as a learning tool. I want to know how this experience may influence your feelings towards other group members (teacher and students) and the learning content. I would like to audio record this so we have a record of the information.

The observations will be conducted in seven different full sessions during the term to see how you interact with your colleague inside the classroom, and how you incorporate social media in learning activities. I will record some comments about the language you use and verbal and nonverbal signs. These comments will be kept as written notes in my files and will be seen by the researcher only.

Online discussions will be collected daily for an entire academic term (three months) as screenshots, to capture your interactions with the teachers and peers as texts and symbols. This means that when you delete a post, it will be still saved on my files, so please contact me in case you don't want it to be used in the research.

What I will do with the data

All information will be anonymised and effort will be made to ensure participants are not identifiable. In addition, all the information will be stored as secure material in my password protected Exeter university drive and will not be made available to anyone else other than my supervisors. After the PhD completed all this information will be deleted.

Your participation in this study is completely voluntary and you have the right to refuse to take part or answer any of the questions. You will have a chance to discuss any questions you have about the study with me.

Data Protection Notice

The information you provide will be used for research purposes only and it will be saved as a digital format on my passworded-protected Exeter university drive. My written notes on classroom observations will be kept in a secure place in my office. Your personal data such as your email address or nickname will be treated in the strictest confidence and will not be disclosed to any unauthorised third parties. The results of the research will be published in anonymised form, and collected data will be destroyed after that.

Title of Research Project

The Role of Social Media in developing online learning communities

I have been fully informed about the aims and purposes of this project.

I understand that:

There is no compulsion for me to participate in this research project and, if I do choose to participate, I may at any stage withdraw my participation.

I have the right to refuse permission for the publication of any information about me. Any information which I give will be used solely for the purposes of this research project, which may include publications.

If applicable, the information, which I give, may be shared between any of the other researcher(s) participating in this project in an anonymised form.

All the information I give will be treated as confidential.

The researcher will make every effort to preserve my anonymity.

.....

(Signature of participant) (Date)

.....

(Printed name of participant)

Contact Details

For further information about the research, data collection and how it is reported, please contact:

Fawzeya Alghamdi

Postal address: *Central Research hub, South Cloisters G43. St Luke's Campus. Exeter EX1 2LU* Email: *Faaa204@Exetre.ac.uk*.

If you have questions about the research you would like to discuss with someone else at the University, please contact:

Dr Judith Kleine Staarman (J.Kleine-Staarman@Exeter.ac.uk)

Dr Nasser Mansour (N.Mansour@Exeter.ac.uk)

Appendix E: Information sheet and consent form for the Teacher



GRADUATE SCHOOL OF EDUCATION

Title of Research Project

The Role of Social Media in developing online learning communities

Who I am

My name is Fawzeya Alghamdi and I am interested in using technology for education. I am a PhD student at the University of Exeter now, and this is a part of my PhD study.

Details of Project

This case study aims to develop a clear understanding of the role of social media in supporting online groups of learners to feel more connected to each other. It will investigate the influence of social media adoption on the community of learning in two different settings. The first is your group (also known as a formal learning group), as you use social media as an educational tool to support your teaching and interact with your students in the module (). The second group is an informal learning group that uses social media to enhance their knowledge and develop their English language skills. The research project involves different methods: interview-conversations with students and teachers, online discussion forum, as well as classroom observations.

The following is a description of what data will be collected from you and for what purposes. Please read it carefully and sign if you are happy to participate in this study.

What your participation will involve

I would like to ask you to take part in a one to one interview-conversation with me and to be observed in seven lessons. Also, I will examine the learning group online discussion forum to identify your role in encouraging students to participate in online activities on social media like Twitter.

I anticipate that interview-conversations will take about an hour and a half. The conversation will be about your experience of using social media as a formal teaching tool. I want to know how this experience may influence your relationships with your students. I would like to audio record this so we have a record of the information.

The observations will be conducted in seven different full sessions during the term to see how you interact with your students inside the classroom, and how you incorporate social media in teaching and learning activities. I will record some comments about the language you use and verbal and nonverbal signs. These comments will be kept as written notes in my files and will be seen by the researcher only.

Online discussions will be collected daily for an entire academic term (three months) as screenshots, to capture your interactions with students as texts and symbols. This means that when you delete a post, it will be still saved on my files, so please contact me in case you don't want it to be used in the research.

What I will do with the data

All information will be anonymised and effort will be made to ensure participants are not identifiable. In addition, all the information will be stored as secure material in my password protected Exeter university drive and will not be made available to anyone else other than my supervisors. After the PhD completed all this information will be deleted.

Your participation in this study is completely voluntary and you have the right to refuse to take part or answer any of the questions. You will have a chance to discuss any questions you have about the study with me.

Data Protection Notice

The information you provide will be used for research purposes only and it will be saved as a digital format on my password-protected Exeter university drive. My written notes on classroom observations will be kept in a secure place in my office. Your personal data such as your email address or nickname will be treated in the strictest confidence and will not be disclosed to any unauthorised third parties. The results of the research will be published in anonymised form, and collected data will be destroyed after that.

Title of Research Project

The Role of Social Media in developing online learning communities

I have been fully informed about the aims and purposes of this project.

I understand that:

There is no compulsion for me to participate in this research project and, if I do choose to participate, I may at any stage withdraw my participation.

I have the right to refuse permission for the publication of any information about me. Any information which I give will be used solely for the purposes of this research project, which may include publications.

If applicable, the information, which I give, may be shared between any of the other researcher(s) participating in this project in an anonymised form.

All the information I give will be treated as confidential.

The researcher will make every effort to preserve my anonymity.

.....

(Signature of participant) (Date)

.....

(Printed name of participant)

Contact Details

For further information about the research, data collection and how it is reported, please contact:

Fawzeya Alghamdi

Postal address: *Central Research hub, South Cloisters G43. St Luke's Campus. Exeter EX1 2LU* Email: *Faaa204@Exetre.ac.uk*.

If you have questions about the research you would like to discuss with someone else at the University, please contact:

Dr Judith Kleine Staarman (J.Kleine-Staarman@Exeter.ac.uk)

Dr Nasser Mansour (N.Mansour@Exeter.ac.uk)

Appendix F: Information sheet and consent form for informal learners



Title of Research Project

The Role of Social Media in developing online learning communities

Who I am

My name is Fawzeya Alghamdi and I am interested in using technology for education. I am a PhD student at the University of Exeter now, and this is a part of my PhD study.

Details of Project

This study aims to develop a clear understanding of the role of social media in supporting online groups of learners to feel more connected to each other. It will investigate the influence of social media adoption on the community of learning in two different settings. The first is a formal learning group, as the learners use social media as an educational tool to support their learning and to interact with each other in a particular module. The second group is your group "learning English", as you are a member in this informal learning group that uses social media to enhance their knowledge and develop their English language skills on Twitter. The research project involves different methods: interview-conversations with members from the group and online discussion forum.

The following is a description of what data will be collected from you and for what purposes. Please read it carefully and sign if you are happy to participate in this study.

What your participation will involve

I would like to ask you to take part in a one to one Skype interview-conversation with me and I will examine the learning group online discussion forum to identify the role of social media in developing online learning communities.

I anticipate that interview-conversations will take about 60 minutes. The conversation will be about your experience of using social media as learning tools. I want to know how this

experience may influence your feelings towards other group members and the learning content. I would like to audio record this so we have a record of the information.

Online discussions will be collected daily for three months as screenshots, to capture your interactions with the group as texts and symbols. This means that when you delete a post, it will be still saved on my files, so please contact me in case you don't want it to be used in the research.

What I will do with the data

All information will be anonymised and effort will be made to ensure participants are not identifiable. In addition, all the information will be stored as secure material in my password protected Exeter university drive and will not be made available to anyone else other than my supervisors. After the PhD completed all this information will be deleted.

Your participation in this study is completely voluntary and you have the right to refuse to take part or answer any of the questions. You will have a chance to discuss any questions you have about the study with me.

Data Protection Notice

The information you provide will be used for research purposes only and it will be saved as a digital format on my password-protected Exeter university drive. Your personal data such as your email address or nickname will be treated in the strictest confidence and will not be disclosed to any unauthorised third parties. The results of the research will be published in anonymised form, and collected data will be destroyed after that.

Title of Research Project

The Role of Social Media in developing online learning communities

I have been fully informed about the aims and purposes of this project.

I understand that:

There is no compulsion for me to participate in this research project and, if I do choose to participate, I may at any stage withdraw my participation.

I have the right to refuse permission for the publication of any information about me. Any information which I give will be used solely for the purposes of this research project, which may include publications.

If applicable, the information, which I give, may be shared between any of the other researcher(s) participating in this project in an anonymised form.

All the information I give will be treated as confidential.

The researcher will make every effort to preserve my anonymity.

.....

(Signature of participant) (Date)

.....

(Printed name of participant)

Contact Details

For further information about the research, data collection and how it is reported, please contact:

Fawzeya Alghamdi

Postal address: *Central Research hub, South Cloisters G43. St Luke's Campus. Exeter EX1 2LU* Email: *Faaa204@Exetre.ac.uk*.

If you have questions about the research you would like to discuss with someone else at the University, please contact:

Dr Judith Kleine Staarman (J.Kleine-Staarman@Exeter.ac.uk)

Dr Nasser Mansour (N.Mansour@Exeter.ac.uk)

Appendix G: Information sheet and consent form for the informal group leader



GRADUATE SCHOOL OF EDUCATION

Title of Research Project

The Role of Social Media in developing online learning communities

Who I am

My name is Fawzeya Alghamdi and I am interested in using technology for education. I am a PhD student at the University of Exeter now, and this is a part of my PhD study.

Details of Project

This study aims to develop a clear understanding of the role of social media in developing online learning communities. It will investigate the influence of social media adoption on the community of learning in two different settings. The first is a formal learning group, as the learners use social media as an educational tool to support their learning and to interact with each other in a particular module. The second group is your group “learning English”, as you create an informal learning group that uses social media to enhance their knowledge and develop their English language skills on Twitter. The research project involves different methods: interview-conversations with you and some members from the group, online discussion forum.

The following is a description of what data will be collected from you and for what purposes. Please read it carefully and sign if you are happy to participate in this study.

What your participation will involve

I would like to ask you to take part in a one to one Skype interview-conversation with me and I will examine the learning group online discussion forum to identify your role in encouraging learners to participate in online activities on social media like Twitter.

I anticipate that interview-conversations will take about an hour and a half. The conversation will be about your experience of using social media as an informal teaching tool. I want to know how this experience may influence your relationships with your group and learning content.

I would like to audio record this so we have a record of the information.

Online discussions will be collected daily for three months as screenshots, to capture your interactions with learners as texts and symbols. This means that when you delete a post, it will be still saved on my files, so please contact me in case you don't want it to be used in the research.

What I will do with the data

All information will be anonymised and effort will be made to ensure participants are not identifiable. In addition, all the information will be stored as secure material in my password-protected Exeter university drive and will not be made available to anyone else other than my supervisors. After the PhD completed all this information will be deleted.

Your participation in this study is completely voluntary and you have the right to refuse to take part or answer any of the questions. You will have a chance to discuss any questions you have about the study with me.

Data Protection Notice

The information you provide will be used for research purposes only and it will be saved as a digital format on my passworded-protected Exeter university drive. Your personal data such as your email address or nickname will be treated in the strictest confidence and will not be disclosed to any unauthorised third parties. The results of the research will be published in anonymised form, and collected data will be destroyed after that.

Title of Research Project

The Role of Social Media in developing online learning communities

I have been fully informed about the aims and purposes of this project.

I understand that:

There is no compulsion for me to participate in this research project and, if I do choose to participate, I may at any stage withdraw my participation.

I have the right to refuse permission for the publication of any information about me. Any information which I give will be used solely for the purposes of this research project, which may include publications.

If applicable, the information, which I give, may be shared between any of the other researcher(s) participating in this project in an anonymised form.

All the information I give will be treated as confidential.

The researcher will make every effort to preserve my anonymity.

.....

(Signature of participant) (Date)

.....

(Printed name of participant)

Contact Details

For further information about the research, data collection and how it is reported, please contact:

Fawzeya Alghamdi

Postal address: *Central Research hub, South Cloisters G43. St Luke’s Campus. Exeter EX1 2LU* Email: *Faaa204@Exetre.ac.uk*.

If you have questions about the research you would like to discuss with someone else at the University, please contact:

Dr Judith Kleine Staarman (J.Kleine-Staarman@Exeter.ac.uk)

Dr Nasser Mansour (N.Mansour@Exeter.ac.uk)

Appendix H: Interview Schedule for students/learners

Interviewee name: Code:

Date and time:

Introduction:

Social media and networks are changing the ways learners think about knowledge and learning and the ways they feel about their connectedness to the learning groups. This case study investigates the influences of adopting social media in a community of learning in two different settings: the first one is your group (formal learning group) in which you used social media as an educational tool to support your learning and interaction in your module, while the second group is an informal learning group using social media to enhance their knowledge and develop their English language skills.

The purpose of the interview:

This interview intends to gather information about your experience of using social media as a learning tool. I want to know how this experience may influence your feeling towards the group members (teacher and students) and the learning content.

This interview will take about two hours. Your participation is voluntary, so you can withdraw at any time. This interview will be recorded and used for research purposes. Only the researcher will hear the recording and your identity will not be revealed.

Warm-up questions:

- 1- What are your favourite social media applications to use? Why?
- 2- Do you use them for educational purposes? Give some examples.
- 3- I would like you to tell me about your experience of using social media in this module/learning English as a second language.
- 4- Have you joined any other learning groups on social media? If yes, tell me about them.

Core discussion:

Examining the sense of community on the Individual level

Social presence:

- 5- Do you prefer to use formal or casual language in this online learning group? Why?
- 6- Are you comfortable sharing personal details of your life outside class with your online learning group?

- 7- When you have a question, do you ask the whole group or do you try to ask particular members of the group through private messages? Why?
- 8- Do you think this group encourages you to discuss your ideas? If yes, how? If no, why?
- 9- How do you deal with group members who oppose or critique your comments? Do you try to discuss your ideas with them, or just ignore them?
- 10- Do you think social media has provided you with a chance to use expressions that reflect your feelings or emotions? How?
- 11- Do you think using emoji symbols is important for showing your feelings to your WhatsApp learning group? Why?

Self-regulated learning

Next, I am going to read you a list of statements about the strategies that students use to regulate their learning.

- 12- Please tell me how often, if at all, any of the following statements apply to yourself, and how your online group influences your strategies.

Strategies for student-regulated learning	Rate of performance (ex: always, rarely, never, before the test, when the teacher asks you to do it)	The role of your online group
Goal-setting and planning		
Seeking information		
Keeping records		
Peripheral structuring		
Rehearsing and memorising		
Seeking peer assistance		
Seeking teacher assistance		
Self-evaluation		
Reviewing assessments		
Reviewing your notes		
Reviewing textbook		
Other		

Examining the sense of community on the interaction level

This section will focus on how you have used the social affordances of WhatsApp and Twitter (e.g. following, making likes, retweeting, commenting on tweets, sharing media, using emoji symbols) to develop your interaction with other students in the group, the learning content, and your teacher.

Cognitive presence

- 13- What strategies do you use to answer any prompting questions in the online group?
- 14- How do you rate the content quality in the online learning group? Do you think that it is accurate and valid?
- 15- Do you think that you receive reliable feedback from the other participants? If yes, give examples. If no, why?

Teaching presence

- 16- From your experience, what do you think the role of the teacher is in developing and sustaining this online group?
- 17- Do you think the teacher is the main member of this online group? Why?
- 18- How do you think the teacher uses social media to facilitate students' online discussions?
- 19- Has using WhatsApp and Twitter in your learning enabled you to receive direct instruction from your teacher? How?
- 20- How do you express your agreement or disagreement with other group members' posts on Twitter? And in WhatsApp discussions?
- 21- Do you reply to other members when they mention your name or use the quote-reply feature on your previous post? If yes, what is your motivation?. If no, why?
- 22- Do you think that you receive reliable feedback from the other participants? If yes, give examples. If no, why?

23- Does your teacher divide the work or learning tasks between the members? If yes, please explain.

Examining the sense of community on the group level

Now I would like to ask you some questions regarding your view of the online group, and how it was formed.

24- Do you think that most of the other group members have interests and goals that are similar to yours? If yes, what are they? If no, can you give me some examples of their interests?

25- What were the motivations for creating this online group?

26- How would you define this learning group?

27- What are the most important elements that make you feel you belong to the group? (e.g. the module requirements, the group's intention, group identity, the variety of members' backgrounds, teaching presence, cognitive presence, social presence, confidence, group sustainability). And why?

28- Do you have a specific role or responsibility in this online group? If yes, what is it? And how was it allocated to you?

29- Who is responsible for designing and sharing learning activities in this group? What kind of learning activities have you participated in as a group?

30- When will you decide to leave this online learning community? (e.g. at the end of the term, after the final test, when the teacher leaves or asks people to leave). And why?

Summary:

Appendix I: Interview Schedule for the group's Teacher/Leader

Interviewee name: Code:

Date and time:

Introduction:

Social media and networks are changing the ways the learners think about knowledge and learning. This case study aims to develop a clear understanding of the role of social media in developing online learning communities, it will investigate the influences of adopting social media on the community of learning in two different settings: the first one is your group (formal learning group) as you used social media as educational tool to support your teaching and interaction with your students in module (250 IET), while the second group is an informal learning group use social media to enhance their knowledge and developing their English language skills.

The purpose of the interview:

This interview intends to gather deep information about your experience of using social media as teaching tools. I want to know how this experience may influence your relationship with students as well as students' feeling towards the group members (teacher and students) and the learning content.

This interview will take about an hour and a half. Your participation is voluntary, so you can withdraw at any time. This interview will be recorded and used for research purposes. The researcher only will hear the recordings and your identity won't be revealed, since all quotes will be used anonymously.

Warm-up questions:

1. Are you interested in using social media in your social life? What kind of application do you use and for what purposes?
2. What about using these applications in your academic career? How do you manage using such social application in the formal academic and social environment?

Core discussion:

Teaching Presence:

Now I would like to ask you some questions regarding your role in the developing of the online learning community.

3. Tell me about your experience in using social media as teaching tools?
4. What kind of application do you use in this module?
5. What is your plan to control and manage this community of learning?
6. How did you found students reactions on these social applications?
7. What kinds of learning activities do you use with your students?
8. What is your evaluation of your relationship with your students on social media? Do you think it can influence your real interactions inside the class? How?
9. What kind of strategies do you use to assess students on social media platforms?
Give me examples?

Summary:

Appendix J: Coding scheme for WhatsApp conversation analysis

Categories	Code Name		Description	Examples
1-Initiate conversation	Asking a question	I1	The participants raises a question to discuss it with the other group members.	Asking a direct question: Why? What? How? ...
	Proposing an action or an inquiry activity	I2	The participant asks to join in an online learning activity.	Playing a game, solving a puzzle or a problem.
	Sharing a resource to start a dialogue	I3	The participant shares interesting information with the group members related to the learning content, inviting them to think, evaluate, or predict results.	Posting a YouTube link, pictures, or documents.
2-Response (engage in the talk)	Answering the question	R1	The participant answers a question that has been raised question and gives reasons and justification for their answers.	Yes, no, my answer is...
	Asking more questions	R2	The participant asks further questions to clarify, or to invite others to consider the topic further.	What do you mean by ...? In which context?
	Supporting answers with resources	R3	The participant shares online resources to support their own, or other group members', answers.	See page number. See this link for more examples.
3-Discussion	Commenting on other contributions by providing more information	D1	The participant adds more details to other group members' replies, justification, or explanations.	I would also add... That's right X, because ...
	Agreeing with others' contributions	D2	The participant shares positive feedback to the other group members.	I agree with you / Correct
	Disagreeing with others' contributions	D3	The participant shares negative feedback on another group member's post.	I do not think that is true / I have another answer
4-Reflection	Connecting ideas with previous knowledge	C1	The participant connects an idea with previous knowledge, making comparisons or evaluations.	This is the same as the idea mentioned by...

				That's consistent with...
	Connecting ideas with wider contexts	C2	The participant tries to connect the idea with a wider context through giving examples.	Give examples.
	Summarising	C3	The participant tries to condense the discussion content into key points.	So, the main points were...
5-Metacognition	Set up a plan for learning	M1	The participant defines a plan of how to accomplish the learning tasks.	To achieve this aim we have to...
	Monitoring	The aim	Mo1	The participant monitors achievement of the learning aims. What we have achieved now?
		The time	Mo2	The participant monitors the time spent doing the tasks. Let's move on to the next topic.
		The plan	Mo3	The participant monitors the learning plan. What is the next stage?
	Guide direction of dialogue	keep the focus	G1	The participant tries to keep the dialogue focused on the key aspects of the topic. The main topic is...
		Finish the talk	G2	The participant finishes the discussion by providing closing statements. Thanks the participants.
		Raise a new topic	G3	The participant invites the group to consider a new conversational topic to finish the current thread, Ok, let's move to the next point/ idea/ question... How about the idea of...
6-Affective language	Greeting other members	A1	The participant welcomes other group members, or says goodbye as they leave. Welcome / See you later...	
	Expressing emotion	A2	The participant describes their own or other group members' feelings using words or examples. Are you happy? I'm upset...	
7-unrelated topics	Personal experiences	T1	The participant posts about his or her interests or personal stories. I used this application for...	

				My experience was...
	Social topics	T2	The participant shares social news or raises social topics.	Sharing a link to Aljandreea event news. Did you see the news yesterday?
8- WhatsApp affordances	Direct messaging (mentioning a member with @, or using quote-reply)	W1	The participant replies or directs their post to a specific member in the group.	
	Updating group name and picture	W2	The participant changes the group name or icon.	
	Technical help	W3	The participant asks for help with issues related to using WhatsApp.	How can I save your number? How can I change my status on WhatsApp?

Appendix K: Certificate of Ethical Approval



GRADUATE SCHOOL OF EDUCATION

St Luke's Campus Heavitree Road
Exeter UK EX1 2LU <http://socialsciences.exeter.ac.uk/education/>

CERTIFICATE OF ETHICAL APPROVAL

Title of Project: The role of Social Media in developing online learning communities.

Researcher(s) name: Fawzeya Alghamdi

Supervisor(s): Judith Kleine-Staarman
Nasser Mansour

This project has been approved for the period

From: 31/10/2016

To: 30/09/2019

Ethics Committee approval reference:

D/16/17/06

A handwritten signature in black ink, appearing to read 'P. Durrant'.

Signature: Date: 10/10/2016
(Dr Philip Durrant, Chair, Graduate School of Education Ethics Committee)

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