THE IMPACT OF THE INTERACTIVITY OF WEB 2.0 TECHNOLOGIES ON THE LEARNING EXPERIENCE OF STUDENTS IN HIGHER EDUCATION.

A thesis submitted for the degree of Doctor of Philosophy

By

Afaf Buqawa

Business School

Brunel University

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ABSTRACT

The use of Web 2.0 technologies in the field of learning is on the rise, yet there have been a limited number of studies of the impact of Web 2.0 technologies on learning. By their nature, Web 2.0 technologies increase the interactivity between users. Interactivity is considered to be a key to success in traditional classrooms. The purpose of this thesis is to determine whether the interactivity of Web 2.0 technologies has an impact on the learning experience of students.

The thesis investigated the use of Web Polls to provide interactivity inside the classroom and the use of Twitter to provide interactivity outside the classroom. Four studies were conducted, two involving Web Polls and two involving Twitter. Mixtures of methods such as qualitative and quantitative approaches were employed in the studies in order to triangulate the data, and the data from participants were collected via questionnaires and interviews. The primary purpose of employing triangulation techniques is to have more explanation and more understanding of the student behaviour from different points of view.

The responses to the four studies revealed that the use of interactivity of Web 2.0 technologies were more positive than neutral about the learning experience of students. Across these field studies, the interactivity inside the classroom had a greater effect on the learning experience of students. Overall, the research revealed that the perception of using interactivity of Web 2.0 technologies inside and outside the classroom was more positive than neutral about the credibility of the instructor, the engagement, the communication by students, and the motivation of students, and results in a positive attitude to the use of Web 2.0 for learning. The thesis suggests that the adoption of interactivity of Web 2.0 technologies has the potential to support learning in higher education.

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Buqawa, A. (2012). Enhancing the impact of the interactivity of Social Media in Higher Education to improve learning outcomes: Twitter for teaching. Business School Symposium, 27-28 March. London: Brunel Business School.

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CHAPTER 1: INTRODUCTION

1.1. Introduction

The purpose of this chapter is to provide an overview of Web 2.0 technologies, and to introduce them specifically in relation to learning. This sets the context for development of the Literature Review that is contained in Chapter 2. Chapter 1 then proceeds to set forth its problem statement, the gap, the components comprising this thesis, and an outline of the content of the subsequent chapters.

1.2. Overview of Web 2.0 Technologies

For approximately the last 20 years, the world has faced technological changes in different fields, such as business, health, economic and education. This is because of the appearance of information and communication technologies (ICTs) (Edward, 2012; Koh & Maguire, 2009; Castells, 2006; Boyer, 2002; Foray, 2004). In fact, information and communication technologies (ICTs) play an important role in some sectors in which they provided them with the tools to engage, communicate and innovate in order to sustain in this era (Sward, 2006). Beauchamp and Kennewell (2008) described three main purposes of the uses of ICT as follows:

1. The ICT as an object, the aim to study what is ICT.
2. The ICT as a tool to get an answer, the aim to communicate with ICT.
3. The ICT as a communication tool, the aim to communicate with other people through ICT.

With the introduction of the Web 2.0 technologies, there has been a paradigm shift from teacher and teaching to students and learning (Brown, 2012 cited Franklin & Harmelen, 2007), which has led to moving from 'teacher-centred' to 'student-centred' learning as described by Tomberg, Laanpere, Ley and Normak (2013) (Greenhow (2011) cited by Gibas & Grant (2013)). Moreover, the focus as described by Selwyn (2011) was on the users as 'producers and active' rather than their being 'consumer and passive'. In addition, Web 2.0 technologies help the users to create, navigate, communicate, share and collaborate, which gives them new learning opportunities through the social interaction (Merchant, 2009; Kuh, 2009). Active participation through these technologies (Selwyn,

2011; Merchant, 2009) was supported by one of the uses of ICT highlighted by Beauchamp & Kennewell (2008) that ICT is a communication tool through which to interact and participate. These tools, as highlighted by Song and Lee (2014), provide the people or learners with the venues to interact with different people 'anytime' and 'anywhere'. There is no unique description or explanation for Web 2.0 technologies.

Collis and Moonen (2008) refer to Web 2.0 technologies as:

> Starting in 2004, Web 2.0 became a collective term for a mass movement in society: a movement toward new forms of user engagement supported by Web-based tools, resources, services and environments. What are these Web 2.0 tools and services? The phrase Web 2.0 was first used in 2004, to refer to what is perceived as a second generation of Web-based services emphasizing online collaboration and sharing.
>
> (Collis & Moonen, 2008, p.94)

Prior to this, Howe (2006) provided a useful classification of what is termed 'four general types of processes within Web 2.0 applications' (p.60). These identify particular interaction methods within Web 2.0 tools, namely:

> ... for sharing user-contributed content ("You make it"); for evolving community-developed tagging and organizational schemes (folksonomies) and for large sets of user contributed content ("You name it"); for the development of content collections by the user community (crowd sourcing) ("You work on it"), and for finding not only objects but trends and overviews of contributions ("You find it").

 (Howe, 2006, p.60, cited in Collis & Moonen, 2008, p.94)

Web 2.0 technologies are sometimes referred to as social media in higher education (Gikas, 2013). Social media are the tools that are used for social networking, bookmarking and sharing videos and pictures (Greenhow, 2011). Social networking is a set of different tools such as Twitter, Facebook, Wikis, Blogs, etc. that are used for

engagement, interaction with peers, collaboration and participation (Greenhow (2011). Twitter, for example, gave people in 140 characters what is happening in the world instantly (Razzell, 2008). In the following section, Web 2.0 technologies in relation to learning are discussed.

1.3. Overview of Web 2.0 Technologies and Students' Learning Experiences

The fundamental categories of Web 2.0 technologies can be represented as follows: (1) student-centred design, where students are the producers of knowledge; (2) learner-instructor as colleagues, and (3) a shift from formal learning environment to informal learning environments (Huertas et al., 2007). There were five classifications of interaction in the formal and informal learning environment explored by Moore (1989) as: 'learner-learner', learner-instructor', 'learner-interface', 'learner-content' and 'learner-self' interaction (Sun & Hsu, 2012). The interactivity feature of Web 2.0 technologies fits well with the five classifications of the interaction in which it enhances the learning process for the learners (Bannan-Ritland, 2002).

Even though the use of Web 2.0 technologies among the student population was evidenced, Banner and Tynan (2007) observed a disconnection between students' take-up and their academic take-up of Web 2.0 technologies. Whilst there are many factors that shape the uses of Web 2.0 technology for learning, learning experience in particular has always been identified as the impetus behind the successful integration of technology and learning (Baird & Fisher, 2006).

Web 2.0 tools such as Twitter enhance the interaction between learner-instructor (Johnson, 2011) and learner-learner interaction in the learning environment (Ebner, Lienhardt, Rohs & Meyer, 2010). In 2007, Mazer et al. explored the fact that Facebook provides the teachers with the opportunity for learner-instructors interaction in which it was the venue for the student to upload the homework, find the announcements and connect with their tutor outside the classroom. In addition, Galagan (2010a) concludes that the use of Web 2.0 technologies are on the rise; he reported that 60 per cent have an account in Web 2.0 technologies and 91 per cent connect with their social media account

with the help of mobile phones. There were more than 190 million having a Twitter account (Costolo, 2010).

Educators in higher education looking for innovative methods to interact with their students in the learning process and to encourage them to be more active found Web 2.0 technologies were attractive and supported (Hughes, 2009). Active learning, as defined by Bonwell and Eison (1991), is anything that "involve[s] students in doing things and thinking about what they are doing". Accordingly, Zhao and Kemp (2012) defined it as "people learn from doing (experience) and interaction with each other". The active participation described by O'Reilly (2003) was cited by Boulos et al. (2007) as the "Architecture of Participation" (p.3). The focus of active learning is to provide the opportunity for the shy students and non-shy students to participate, collaborate, and share in the learning process (Meyers & Jones, 1993) and can be used inside classrooms to enhance student learning experiences (Bolliger, 2013). Moreover, Carnghan et al. (2011) linked the concept of participation with engagement and stated that the learners who participate and engage inside the classroom learn well (Blasco-Arcas et al., 2013). Participation through discussion and engagement in activities in the classroom helps the students to understand the topics and the course contents very well and this will reflect on the students' learning experience (Carnghan et al., 2011).

Engagement is an important factor in the learning experience, as highlighted by Welch and Bonnan-White (2012). According to Blasco-Arcas et al. (2013), engagement is the "perception of the student that results from his/her interaction with peers and teachers during the learning experience and generates involvement with the topic studied" (p. 104). Another definition by Kuh (2009), cited by Welch and Bonnan-White (2012): "the time and effort students devote to activities that are empirically linked to desired outcomes of college" (p. 327). Engagement contains different issues, such as involvement in the activities or engagement in the academic experience with peers either inside the classroom or outside the classroom (Kuh, 2009; Pascarell & Terenzini, 2005).

In previous years, there was a different type of student entering universities (Franklin & Van Harmelen, 2007; Oblinger & Oblinger, 2005). They thought and learned in interactive, nonlinear ways. Researchers, the media and youth workers have used a variety of names to identify the current generation, such as Digital Natives (O'Bannon & Thomas,

2014), Mosaics, Millennials, Net Generation (N-Gen), Navigators and the Y Generation. This generation is willing to explore, search and navigate. This trend has continued in recent years, as Ulbrich et al. (2011) contend:

> Members of the net generation use the web differently, they network differently, and they learn differently. When they start at university, traditional values on how to develop knowledge collide with their values. Many of the Learning techniques that have worked for decades do not work anymore because new students learn differently too. The net generation is used to networking; its members work collaboratively, they execute several tasks simultaneously, and they use the web to acquire knowledge.
>
> (Ulbrich et al., 2011 cited in Selwyn, 2011)

Web 2.0 technologies and students' learning experience are further elaborated upon in Chapter 2 of this thesis.

1.4. Problem Statement

With the new generation which possess different skills, as they are called 'digital natives', clearly they need different pedagogical methods that need to be studied. However, the concept of the digital natives is not researched with the extent to which it is needed. Specifically, according to Bennett et al. (2008) the digital native is an emerging term which needs to be explored, covering all of its aspects. Moreover, there are a large number of fields that are related to the digital technologies. Similarly, there are a number of fields that are affected by the technologies and how easy it to use new work practice effectively. Furthermore, with the invention of the new technologies, reforms for the related fields are also developing. As a result of the development in the technologies and related fields, users are also becoming smarter in using the new technologies to provide convenience in their work. Moreover, this is turning in to such reforms and developments that are adopted by every aspect of life and hence the new generation is becoming more familiar with the new technologies. Hence, they are provided with the title of the 'digital natives'. Additionally, they are performing their tasks in every form of life more conveniently with the usage of new technologies. So, there is the need to explore the impact of the technologies on the lives of the digital natives. In this regard, the most important field

which has remained unsuccessful in gaining the attention of the researchers is based on education. In term of the educational methods, students with different backgrounds and skills need learning environments that provide them with the tools and activities to interact, engage and motivate them in the learning process (Chen, 2003; Kirschner et al., 2004). The learning environment as defined or described by Alfred Rovai (2002) includes three main characteristics: the location, learning and learning community (p. 34). A learning community is the driver force for learning, in which a group of students have common attributes. These attributes lead to collaboration and participation in the learning process through the use of Web 2.0 technologies (Zhao & Kemp, 2012). In addition, through the engagement and participation on one of the tools of the Web 2.0 technologies, this enhances the learning experience of the students in the learning community (Zhao & Kemp, 2012). With this support from the Web 2.0 technologies, the learners can generate, share, and create knowledge between them (Selwyn, 2007, p. 15).

The role of learners has changed, as explored by McGee and Diaz (2007), from passive to producer in a classroom using the Web 2.0 technologies. They contended that they are "information producers who reflect their instructor's knowledge" (p.9) (Brown, 2012; Tomberg, Laanpere, Ley and Normak, 2013; Greenhow, 2011). This is moving from 'teacher-centred' to 'student-centred' learning (Gibas & Grant, 2013). These Web 2.0 tools enhanced, as stated by Safran et al. (2007), "collaborative aspects and active contribution to learning content" in which these tools improve the learning experience by providing students with an actively engaged environment. The user experience is viewed as an important component when ensuring the accomplishment of formal and informal learning, particularly when interacting with technology. Web 2.0 learning and online learning are both approaches that are known to share several common characteristics, despite the nature of Web 2.0 tools that offer alternative ways to connect and enhance collaboration for people inside as well as outside the learning circle; thus promoting the co-creation of knowledge from an informal approach of learning (Selwyn, 2007).

According to Blasco-Arcas (2013) and Palloff and Pratt (2005), interaction was considered as an important factor in the formal learning and informal learning, the interaction between faculty and interaction with peers. The interaction with peers refers to the communication between peers in certain topics for social or personal aspects (Blasco-Arcas et al., 2013; Cho et al., 2007) and, on the other hand, the interaction with

faculty refers to the interaction for academic purpose for feedback, questions and exams etc.. This is a key point – when the communication and interactivity improve inside or outside the classroom, this will enhance the learning experience (Blasco-Arcas et al., 2013; Bannan, 2002; Erickson, 2003). However, there are barriers to the interaction between learner-instructor in the formal learning environment, such as the old-style environment not being flexible, a short time or fixed schedule and shy students (Blasco-Arcas et al., 2013).

Moreover, Leung (2003) stated that "frequent students and faculty contact in and out of class is the most important factor in student motivation and involvement". Such a lack of interaction will affect the students' learning experience. In addition, Draper (2004) contended that 'the lack of interactivity has been diagnosed as one of the major pedagogical issues facing many educational institutions'. Further discussion of interactivity and its relationship to learning in higher education is contained in Chapter 2.

1.5. The Gap
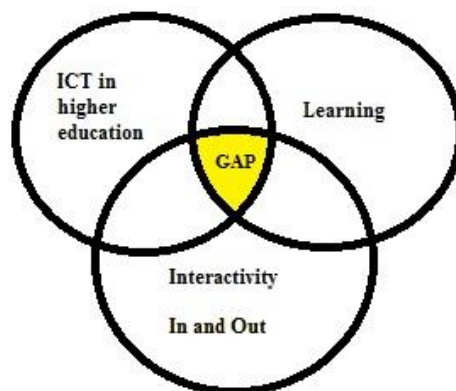
Figure 1 The Research Gap

Figure 1 illustrates the research structure. The circle on the left represents the literature in the field of Information and Communication Technologies (ICT) in higher education. The circle on the right represents studies of elements of the learning process in education such as definition, environment and theories. The lower circle highlights what has been studied

in the field of interactivity in higher education. The intersection describes the common literature on the impact of ICT technologies in higher education and its effect on the learning process. The intersection (gap) is the research contribution of this thesis to the academic field, which is the impact of interactivity of Web 2.0 technologies, inside and outside the classroom, on the learning process in higher education. It has been created to identify the gap in the knowledge, which was found when reviewing the literature. More elaboration on this figure will be found in Chapter 2.

It is argued that Web 2.0 platforms offer flexibility in learning, easier access to knowledge across time and space and extensive information sharing and collaboration facilities (McLoughlin & Lee, 2007) and that Web 2.0 technologies challenge the traditional classroom, learning and conventional learning concepts and pedagogies (Dron, 2006). Web 2.0 technologies offer opportunities to the learner to independently share information and engage in interactive learning instead of depending on teachers and classrooms (Downes, 2005). Many universities in the developed countries have adopted Web 2.0 technology because they believe that Web 2.0 offers the opportunities for interactive learning that can improve the quality of education and enhance diversity in terms of skills and experience (Alexander, 2006). Nevertheless, it is argued that educational institutions have not capitalised on the potential advantages offered by these technologies. According to the findings of the Committee of Inquiry into the Changing Learner Experience (2009), there are different factors that have impeded learning opportunities and these include purposeless use of the technologies and lack of awareness on behalf of teachers, students and administration. Moreover, the use of Facebook and other such technologies requires levels of independence and motivation that all the current generation of students may not have (Väljataga and Fiedler, 2009). Similarly, the messages are in the form of texts, and thus the Web 2.0 technologies exclude non-verbal aspects of a message. Consequently, there is a lack of rich and in-depth information and this results in making it difficult to share and transform thoughts and ideas (Väljataga and Fiedler, 2009). Therefore, there is a need of further exploration into whether or not the interactivity of Web 2.0 technology enhances the learning experiences of students in higher education.

Indeed, recently, the use of Web 2.0 technologies in higher education has attracted the attention of researchers. There was ongoing argument between researchers as to whether

Web 2.0 technologies support or replace the formal learning process in higher education (Selwyn, 2011) and whether the potential of Web 2.0 technologies motivates or engages the learners in the learning process and their point of view regarding the use and barriers of Web 2.0 technologies in future classes (Selwyn, 2007). Communication (learner-learner interaction) and instructor credibility (learner-instructor interaction) are important factors that affect the students' learning experiences (Blasco-Arcas et al., 2013; Cho et al., 2007; Palloff & Pratt, 2005; Endo & Harpel, 1982). Moreover, Liburd and Christensen (2013) cited by Brown et al. (2014) argued that "Web 2.0 technologies can help increase the depth of learning by increasing interaction". In addition, what is the impact of the interactive technologies on student learning experience (Blasco-Arcas, 2013; Garcia et al., 2013; Hennessy et al., 2007; Kennewell et al., 2008)? Moreover, more empirical studies are needed to study the impact of the Web 2.0 technologies in the learning process (Song & Lee, 2014; Brown, 2012; Zhao & Kemp, 2012). According to Wheeler and Wheeler (2009), "the growing challenge for many academics will be to discover how universities can harness the power of such informal tools within the formalised structures of the institution." Consequently, this thesis studied most of the arguments that are highlighted by the authors above in order to have an understanding about the potential of Web 2.0 technologies inside and outside the classroom in higher education for the learning process and its impact on students' learning experience. More elaboration on this will be found in Chapter 2 Literature Review and Chapter 3 Conceptual Framework.

1.6. The Research Question

"Does the interactivity of Web 2.0 technology enhance the learning experiences of students in higher education?"

1.7. Research Aim

The aim of this thesis is to determine whether the interactivity of Web 2.0 technologies inside and outside the classroom can be used to enhance the learning experience of students in higher education.

1.8. Research Objectives

This thesis seeks to examine the research question regarding the interactivity of the Web 2.0 technologies on students' learning experience. In order to answer this question, these objectives were set:

- Review the basic concepts of ICT.
- Focus on the literature that describes the experience of applying the Web 2.0 technologies in higher education.
- Develop a conceptual framework.
- Carry out a questionnaire survey and interviews to find out the impact of Web 2.0 technologies on students' learning experience.
- Gather and analyse data using quantitative and qualitative methods.
- Interpret the results.
- Derive a set of recommendations that would help future policy making.

1.9. Research Methodology

The thesis adopted replicated mixed methods field studies in which the participants were involved in the process of evaluating their own experiences of using a new technology with a view to improving it. Triangulation mixed methods provide this thesis with the advantages from the two methods which were used, questionnaires and interviews, as well compensating for the disadvantages of both methods (Creswell, 2007). This procedure will enable the thesis to collect the data from different methods in order to get more insights and understanding and then integrate the results into the final interpretation (Creswell, 2007).

1.10. Thesis Components

In this thesis, Figure 2 indicates the components comprising the structure of the research.
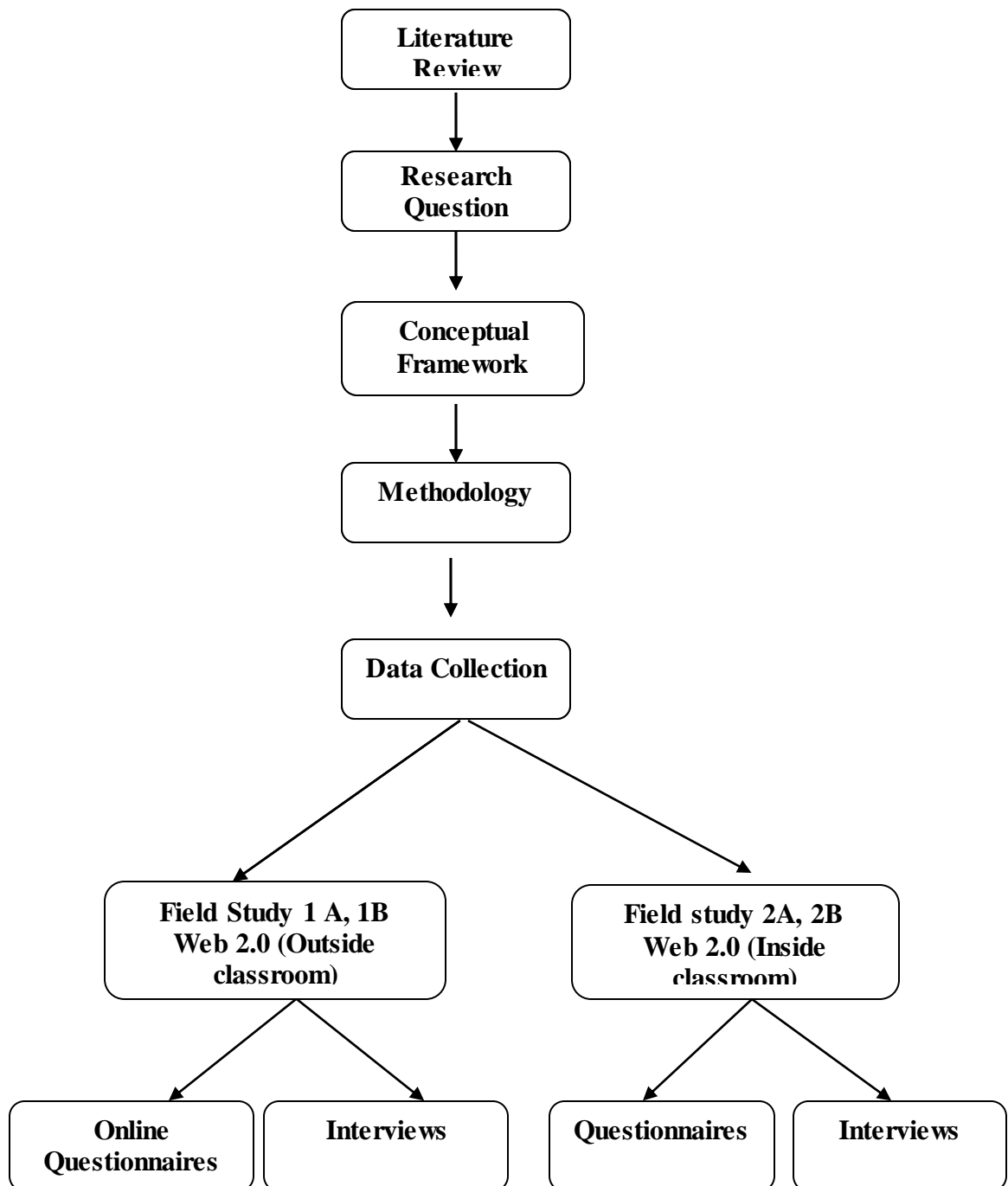
Figure 2: Components of the Research Thesis (Source: Research Author, 2012)

1.11. Outline of Chapter Contents

Chapter 1- Introduction

This chapter includes an introduction that provides a general overview of Web 2.0 technologies and learning in higher education. This introduction is followed by the statement of the problem. In addition to the research question, aim, objectives, methodology, research structure and the research layout is detailed.

Chapter 2- Literature Review

This chapter presents the relevant literature surveyed in the field of Web 2.0 technologies and theories of learning such as constructivism, construction and connectivism. Furthermore, it surveys the literature of the impact of Web 2.0 in higher education.

Chapter 3- Conceptual Framework

This chapter presents both the conceptual framework of the research and the research hypothesis that was generated from the literature reviewed.

Chapter 4- Research Methodology

This chapter presents the research strategy that includes the development of the questionnaire design, sample selection and data collections methodology; also the statistical analysis methods will be explained in this chapter.

Chapter 5- Research Findings and Analysis (Interactivity outside the classroom)

This chapter contains explanations and the proposed statistical analysis of the data to be collected from the questionnaires and interviews.

Chapter 6- Research Findings and Analysis (Interactivity inside the classroom)

This chapter contains explanations and the proposed statistical analysis of the data to be collected from the questionnaires and interviews.

Chapter 7- Discussion and Conclusion

This chapter presents the discussion of the results, conclusions to literature review and the research findings, with suggested recommendations for further research opportunities.

1.12. Conclusion

Chapter 1 has provided a general overview of the concept of Web 2.0 technologies and their relationship to student learning. This has established the context for the review of the literature in Chapter 2. After providing a Problem Statement, the chapter concluded with an indication of the individual structural components of the thesis, and supplied an outline of the content of the subsequent chapters.

Chapter 2 is a critical review of the relevant literature in the light of pertinent contextual issues.

CHAPTER 2 LITERATURE REVIEW

2.1. Introduction

This chapter presents the significant literature in the field of interactivity, Web 2.0 technologies and theories of learning and investigates the relationship of pedagogy and Web 2.0 technologies in higher education on student learning. Moreover, the chapter will explore Web 2.0 technologies' characteristics, the rationale of Web 2.0 technologies in learning and the theoretical foundation of this research.

According to Sims (2003), five major areas should be considered when measuring the interactivity, such as 1: Educational psychology; 2: Theory and research; 3: Technologies with flexible online environment; 4: Communication and collaboration and 5: Designing or maintaining a learning environment. These five areas were considered in this thesis as a road map to measure the interactivity.

The first of these elements is based on generative or constructive perspective that focuses on learning instead of teaching, such as reflective thinking, anchored instruction, and situation learning. Thus, according to Sims (2003), one of the measures of the success of learners is to understand how they develop deep learning and meaningful engagement with the course participants, learning activities and course content.

The second element of the model presented by Sims (2003) is drawn from the research and practice on interactivity and educational psychology. Sims (2003) suggests that effective interaction is multi-dimensional and it depends on the ways in which teaching strategies and learning activities are implemented. The third element of the Sims' (2003) model is technologies with flexible online environment. Sims (2003) argues that the extensive literature on human-computer interaction and its links with the interactivity emphasise the importance of the ways in which students engage and manage their activities relevant to online learning. Sims (2003) argues that interactivity should not be restricted to how human-computer interactions affect the learning psychology; rather, context of learning is imperative to understand interactivity. To support his argument, Sims (2003) draws on Laurel's (1991) notion of computers as theatres (a metaphor to understand human-computer interactions). In this way, Sims (2003) argues that if the context is constructed as a play, the role of the learner in this play will be important to

focus on understanding learning outcomes. The fourth element of Sims' (2003) model is communication and collaboration within the learning environment using different flexible technologies. Sims (2003) proposes that due to an enhanced availability of online learning environment, collaboration and communication are important. This requires the implementation of suitable network infrastructure as well as the assurance that the environment is designed and maintained in a way that is consistent with the institutional policies and operations. This informs the fifth element of the Sims (2003) model.

In this chapter, three areas of Sims' (2003) interactivity framework will be covered as follows: the theoretical aspects areas which consider the research on the interactivity; Web 2.0 technologies and the learning theory will be covered in the following sections.

2.2. Interactivity of ICT in Higher Education

The current trend in the United Kingdom is to put resources into the use of information and communication technology (ICT) in the field of education. Research by DfEE (1998a) has shown that ICT provides learners with an interactive experience. Furthermore, characteristics of ICT such as speed, •automaticity, capacity, range, provisionality and interactivity have been identified as essential tools for the learning experience, as supported by Kennwell (2004), whose studies found that interactivity was an important factor in learning.

One of the key elements of the theory of connectivity is interactivity, the concept that seems to convey a clear meaning on an intuitive scale; however, it is a broad and contested concept that suggests eluding straightforward definition. The literature offers a number of explanations of the notion of interactivity and it seems hard to find consensus amongst these differing definitions and explanations of the concept (see Quiring and Schweiger, 2008; Johnson et al., 2006; Betrancourt, 2005; Yun, 2007). One of the reasons for differentiated accounts of interactivity is that the term is used in a range of different fields, including marketing, information technology, advertising, communication and so on. A sociological perspective presents the definition of interactivity in terms of adaptation of behaviour of two or more people who are in a relationship with one another. "Interactivity is the relationship between two or more people, who, in a given situation, mutually adapt their behavior and actions to each other" (Jenson, 1998, p.188). This concept, however, ignores the role of the technological artefacts in terms of the interaction between people

and technology and the role that technology plays in establishing and maintaining interactions and relationships amongst people fragmented across time and space. The notion of interactivity posited by computer-mediated interactions approaches can be understood in the words of Sims (1997, p. 159) as an "interactivity can be viewed as a function of input required by the learner while responding to the computer, the analysis of those responses by the computer and the nature of the actions by the computer" (p. 159). According to Heaslip et al. (2014), interactivity can be measured through 1) students' involvement in the class, 2) students' engagement in the class, 3) students' participation in the class, 4) students receiving feedback from instructors and 5) students' self-assessment. Also, Siau et al. (2006) described the interactivity as the "active involvement and participation of students in the classroom" (p.400).

Moreover, Kiousis (2002) defined the interactivity as

> "the degree to which a communication technology can create a mediated environment in which participants can communicate (one-to-one, one-to-many and many-to-many) both synchronously and asynchronously and participate in reciprocal message exchanges" (p. 379).

The thesis used the definitions of interactivity provided by Bannan-Ritland (2002) as follows:

"1) interactivity defined as active involvement of learners; 2) interactivity defined based on the patterns of communication among learners/instructors; 3) interactivity defined as instructor-learner communication; 4) interactivity considered as social, cooperative, or collaborative exchanges; and 5) interactivity viewed as a range of instructional activities and technologies". (Bannan-Ritland, 2002, p.167; cited in Siau et al., 2008, p.398)

These definitions of interactivity, despite obvious differences and coming from different fields, share some common ground. These include the elements of interaction between two or more people and there is an element of reciprocity in these interactions. As suggested by Johnson et al (2006), reciprocity initiates required and responsive reaction and the responsiveness of the actions and reactions are relevant and related and consequently support and maintain continuity of interactions.

As such a concept of interactivity when applied to the learning concept, learning cannot be viewed as a straightforward information transfer process. Rather, interactivity proposes that learning involves active engagement of students in learning. This kind of learning notion is not new. Many researchers such as Renkl and Atkinson (2007) and Piaget (1969) have also proposed this kind of concept of learning through constructivist approaches. Nevertheless, the focus of connectivity on interactivity is also mediated through technology that has not been the focus of previous theories of learning including cognitivism and behaviourism.

Based on Sims' (2003) description of interactivity, an important mediated technology is needed to enhance the interactivity in learning. A British Educational Communications and Technology Agency (BECTA, 2008) report found that there was limited research on the use of Web 2.0 technology in learning. It stated that:

> There is a particular urgency to understand more at this level because it seems that Web 2.0 practices are not widespread within the educational system. It is encouraging that individual innovators and some whole institutions are making progress with an obviously promising technology. But one thing that must be better understood is how the transformation possibility of Web 2.0 practices are realised.
>
> (Crook et al., 2008, p.55)

2.4. Web 2.0 Technologies and Learning

Technological changes have provided new ways of how to use the web. These changes include speed, access and new applications on the web which enhance user involvement. Information technology (IT) has become a significant part of any organisation. According to Koh & Maguire (2009), information and communication technologies (ICTs) have helped organisations to increase their operational efficiencies through organisational practices and processes. In today's competitive and changing business environment, technological tools and artefacts are now an essential part of organisations (Sward, 2006).

In the past few years, Web 2.0 has gained much attention of the researcher (Siemens, 2008; Zimmer, 2007). The definition of Web 2.0 could not find consensus in the literature.

Nevertheless, these definitions of Web 2.0 are not exclusive and propose a common theme about it that suggests that Web 2.0 is the web's social use that facilitates collaboration amongst people for creating knowledge and content and sharing them online. Web 2.0 is argued to have emerged to play a significant role in transforming learning (Siemens, 2008). Web 2.0 services, platforms and technologies that are available to be used in learning include Wikis, Blogs, Microblogs, Social networking sites, media sharing and artefacts.

Web 2.0 platforms offer more than just retrieval of information. These platforms and technologies actively engage users in the creation of knowledge by allowing them to offer feedback, comments, social bookmarking, tagging and so on (Dron, 2006). These platforms offer the users a freedom for creation of content and offer open spaces to collaborate, agree, debate and discuss different ideas. Such features of Web 2.0 differentiate them from the traditional technologies in terms of creation and sharing of content and knowledge (Hargadon, 2008). Different characteristics of Web 2.0 include Folksonomy (resource for users to collectively find and classify content), rich use experience (emergent information that allows users to provide input and is responsive to this input), mass participation, long tail (demand-based services in which realisation of profit is through monthly subscriptions) and software as service (Hargadon, 2008; McLoughlin & Lee, 2007; Dron, 2006).

Web 2.0 platforms are argued to be beneficial in many ways and these include cost reduction, flexibility in terms of choosing technologies, participation and learning, easier access to knowledge across time and space and extensive information sharing and collaboration facilities (McLoughlin & Lee, 2007). Moreover, these platforms offer a huge space for sharing experiences with ease. The responsiveness to the users' feedback and inputs of these platforms can contribute to the change in traditional way of learning concepts and pedagogies (Dron, 2006). Students can take initiatives and show responsibility to explore new ideas and innovative solutions to the existing issues in different fields by working in a constructive and cooperative way through these Web 2.0 platforms. Web 2.0 offers teachers a chance to put more responsibility on students to initiate debate and dialogue on different societal, political, economic and organisational issues.

Web 2.0 technologies provide users with opportunities to share information and engage and interact with other users. This development and the increase in user participation have led to the demand for new methods or tools to navigate the web in order to increase knowledge and enhance the learning experience. These changes are described by Downes (2005) as a transfer "from being a medium, in which information was transmitted and consumed, into being a platform, in which content was created, shared, remixed, repurposed, and passed along". Merchant (2009) highlighted the four characteristics of Web 2.0 technologies, as shown in Table 1.

Table 1 Four characteristics of Web 2.0 technologies (Source: (Merchant ,2009))

1. "Presence" – Web 2.0 tools provide the users with the facilities to have an account under Twitter, Facebook and Blogs, in which the followers can follow and interact with each other through these technologies. The users are actively engaged via uploading videos, pictures, events, information etc.
2. "Modification" – Web 2.0 tools allow the users the opportunities to modify their website page and account with more information and pictures.
3. "User-generated content" – Web 2.0 tools provide a user-centred environment, where the users are the producers of the contents. For example, Wikis help users to generate the contents in order that the interested users interact and collaborate in the topic.
4. "Social participation" – Web 2.0 provides the users with the tools so that they can participate in different activities through them. According to Carnghan et al. (2011), "the more the users participate the more they are engaged".

There are a number of universities and higher education institutions that are using and exploring the venues for improving the use of Web 2.0 technologies in their education institution. Against the backdrop of a saturated market, it is not necessary that institutes for higher education compete to increase the number of students. A 22% increase of

applications is reported by UCAS (PR Web, 2010), against the same period in 2009. Rather, there is a need to change the learning approach, compete in quality and adapt new technologies that offer opportunity for interactivity. The strategic intent of educational institutions should be to improve quality and receive funds by competing on quality in terms of quantity. In this regard, the use of Web 2.0 offers the opportunities for interactive learning that can improve the quality of education and enhance diversity in terms of skills and experience. Web 2.0 enhances the students' involvement and thus offers them a chance to show responsibility and initiative for learning (Alexander, 2006).

However, regardless of the evident potential of Web 2.0, educational institutions are argued to not have benefited from and used these technologies. The Committee of Inquiry into the Changing Learner Experience in March 2009 published its findings that brought to the fore a few important areas to improve:

- The report finds that higher education institutions are using Web 2.0 but without purpose and its use is just an alternative to the traditional technologies.

- Moreover, the students and teachers are not aware of the benefits Web 2.0 can offer in terms of learning of the students.

- Teachers and students do not have the knowledge of using Web 2.0 in education and how it can be better used for improving the quality of interaction and learning.

- In essence, there is no intent on the part of the universities' administration to exploit the features of this technology for better learning.

Lancaster University provides an example of the lack of use of Web 2.0. The Lancaster University Virtual Learning Environment (LUVLE) is an application that can improve the interactivity amongst students, teachers and so on. However, the service is flawed in terms of its usage and has shown no signs of development since its initiation in 2007-2008. Though the purpose may have been to enhance interactivity, it can be clearly seen that this service is operating largely as a source of resources, information and instructions to the learners. That is its use as just supporting the instructor-led information transfer approach to learning and it is a Web 2.0 without any strategic benefit for the students and university.

The use of Web 2.0 can help the educational institutions and students to minimise the cost of education and improve the students' learning experience. By the use of such tools, it can be possible for both teachers and students to promote self learning in which it reduces the time and cost. Web 2.0 can improve the quality of interactions as students are often shy about participating and asking questions in the traditional learning sessions. There is a fear in their minds and sometimes the learners cannot pay attention in the beginning of the lecture because of initial feelings (Kasprisin et al., 2003). Now, due to Web 2.0, students are less hesitant and can get benefits from these technologies.

In higher education, the pedagogies related to student learning face challenges regarding the amplified usage of ICT by students (Edward, 2012). ELearning was used to enhance student learning and the learning process (Brown, 2005; Turneyet al., 2009). After the introduction of eLearning, transfer pedagogies such as Learning Management Systems (LMS) emerged whereby the teacher conveyed knowledge to the students in a teacher-centred learning environment. In contrast, the introduction of Web 2.0 technologies (e.g. Facebook, Twitter, Blog, Wiki, electronic Polls, YouTube and clouds) encouraged discussion, socialisation and collaboration among the users (Shih, 2013). This demonstrates a paradigm shift from "teacher-centred" learning to "student-centred" learning (Gibas & Grant, 2013), in which the knowledge is constructed by the learners through interaction with peers and instructors. This has led to the need to reconceptualise the learning experiences of students in higher education as argued by Salmon (2005). Gikas and Grant (2013) cited Billett (2002) who argues that learning occurs as a combination of formal learning and informal learning. Watkins and Marsick (1992) cited in Zhao and Kemp (2012) described seven features of informal learning as follows:

"1) learning from experience 2) the organization context 3) a focus on action 4) no routine conditions 5) the tacit dimension of knowledge 6) delimiters to learning 7) enhancers of learning" (p. 234).

Accordingly, Zhao and Kemp (2012) conceptualised the learning from the characteristics of informal learning as 'people learn from doing (experience) and interaction with each other'. This process of learning by doing has been defined as Active Learning by Bolliger and Armier (2013) and has been commonly used in higher education. Active learning can

be used inside classrooms to enhance student satisfaction, engagement and learning experiences (Bolliger & Armier, 2013).

Web 2.0 Technologies

Web 2.0 technologies encourage active learning. According to Zhao and Kemp (2012), Web 2.0 technologies are defined as

> the second generation of Web technologies which allows users to connect and interact with one another . (p .232*)*

McLoughlin and Lee (2007) illustrate Web 2.0 as

> a second generation, or more personalised, communicative form of the World Wide Web that emphasises active participation, connectivity, collaboration and sharing of knowledge and ideas among users.

Web 2.0 technologies, tools and applications offer educators the tools to engage learners within formal and informal learning environments in higher education. Chickering and Gamson (1987) anticipated seven principles for student engagement in higher education as follows:

(1) student/faculty contact; (2) cooperation among students; (3) active learning; (4) prompt feedback; (5) emphasising time on task; (6) communicating high expectations; and (7) respecting diversity.

Additionally, Kuh (2009) pointed out that engagement can be measured by implementing these seven principles in higher education. Tapscott (1998) emphasises the importance of technology for the tech-savvy or the net generation. Social media and Web 2.0 technologies are used exchangeably by the net generation and instructors in higher education (Gikas & Grant, 2013). Social media as described by Greenhow (2011) includes: 1. Social network sites (Facebook, Twitter, Linkedin, Ning and Myspace) 2.

Bookmarking, media sharing, collaboration development and content organization (Delicious; YouTube and Flickr; wikis and blogs and RSS feeds). Grosseck (2009) has presented examples of using Web 2.0 technologies in higher education, as shown in Table 2.

Table 2 **Models of integrating Web 2.0 technologies in HE (Grosseck, 2009)**

Web 2.0 Technologies	Educational Application
Blogging	• Online journals with information of interest • Gather different learners based on a common topic • Instant feedback from instructors or students in their writing, assignments and homework
Microblogging	• Community in educational environment; provide online discussion • Source of information and links that support the learning materials • Creating networks with peers and instructors for professional connection etc.
Wikis	• Organising the information from the users • Providing collaboration among the students • Supporting discussion and creating communities.
Social networking	• An announcement, community of practice, flexible online learning environments, links with people and creates accounts.
IM and Polls	• Real-time interaction between people using mobiles. It allows users to attach pictures and videos. Connects a group of people through a video conference. • Electronic polls enable the users to vote for elections, evaluate a course and assess instructors. The learners have the chance to voice their opinion with an online diagram.

Isman (2012) and Garcia et al. (2013) highlight the increasing use of Web 2.0 tools by instructors in higher education and the benefits provided by these technologies. For example, the Ning platform was used to provide social exchange in a blended learning environment. Rodrigo and Nguyen (2013) reported that 92 first year students and seven instructors from an Interior Architecture programme participated in this study. The Ning

network was used as an online studio environment that provided the latest activity, blog, photo gallery, comments events, individual user page and chat. The study found that 78% agreed that it helped their learning. 77% agreed that it supported their communication on the course. They conclude that social networks have the potential to affect student interaction and behaviours. Moreover, they found that social interaction increases the student's learning experience through participation. There are numerous literature reviews on the implementation of social media/Web 2.0 technologies such as Facebook, Twitter, blogs and polls inside and outside the classroom in higher education; they will be examined below.

Facebook

The use of Facebook for student learning has been investigated by many authors, with mixed results. Junco (2012) found that the use of Facebook resulted in a negative relation to student engagement and Suwannatthachote (2012) found no relationship between engagement of the group and the usage of Facebook. In contrast, there is a positive relation between engagement of the student and the Facebook use reported by Heiberger and Harper, (2008). Another study carried out by Barczyk and Duncan (2013) examines the use of Facebook as a supplement to four traditional business courses at two universities situated in California and Indiana, USA. The study found that students agreed that Facebook enhanced participation and is a convenient tool for enhancing discussion. Moreover, Irwin et al. (2012) found that Facebook could be a useful tool for learning. Facebook was used as a replacement for a Learning Management System, in a study by Wang et al. (2011). The findings report that Facebook was a successful substitute to the system of Learning Management for the course. Schroeder and Greenbowe (2009) formed a Facebook group in order to compare the use of Facebook and the system of Learning Management. The study found that the number of posts through the uses of Facebook was more than those in the Learning Management System. In addition, Li (2009) described the use of the virtual hours as a means for the the students and the instructors to communicate through the instant messaging of the Facebook function. There were traditional and non-traditional students enrolled on the undergraduate MIS course. The study concluded that there was no significant difference between the face-to-face office hours and the use of virtual office hours, while the students who used the virtual office

hours were more satisfied than students that were using the face-to-face office hours group.

It is, however, argued that learning styles of students are different and therefore, the use of Web 2.0 technologies such as Facebook cannot be generalised. Students can prefer a particular Web 2.0 technology in a particular context and can escape the use of technologies in other contexts. The use of Facebook in education can be affected by different factors, such as the background of the student, age, gender, ethnic origin, expertise, learning objectives and level of learning but not by learning theories (Bennett et al, 2008). It is argued that learners may be aware of the differences within and across the cultures and context and can exploit them. This presents a challenge for the teachers and educational institutions to use Web 2.0 with caution. Although the current generation can be seen as enthusiastic Facebook users, they may avoid using it for a purpose forced on them, that is, using it for the educational purpose. This may be seen as a change in the perception of using Facebook and this change may be resisted (Kennedy et al., 2009). This kind of observations has been highlighted by various other studies including Väljataga and Fiedler (2009) and Lohnes and Kinzer (2007). These studies show that net-generation learners are not able or willing to engage in an autonomous learning environment offered and needed by Web 2.0, including Facebook. The use of Facebook and other such technologies require a level of independence and motivation that all the current generation students may not have (Väljataga and Fiedler, 2009). The learners are not ready for the maturity and independence that are required for learning purposes using Web 2.0 technology such as Facebook and blogging (Caruso et al., 2005).

Twitter

Twitter is one of the applications of Web 2.0 technologies. It allows users 140 characters to create a message (Ebner et al., 2010; Hsu & Chin, 2012). From the learning standpoint, Twitter was used for communication between students and staff, getting feedback and motivation. Junco, Heibergert, and Loken (2010) explored the use of Twitter as a medium of social media and engagement of student. The study conducted for 14 weeks included two groups in which there are an experiment group and a control group. With the experiment group of 70 students, Twitter was used for discussion and asking questions, course and events announcements, learner-teacher connections, facilitating as a guide for students and connections with tutor, and arranging volunteer services among students.

With the control group of 55 students, Ning was used to offer the learners with the course information. The study reported that using Twitter for educational purpose increases the students' engagement and it enhances the engagement in the learning process for both instructors and students. Hsu and Ching (2012) used Twitter activities in an online course in a mid-size state university. The study consisted of 16 students and technology specialists, military personnel and corporate trainers. The activities were ongoing for nine weeks, designed to continue the learning of the students from the classroom into their everyday life. The study concludes that the students have a positive perception of using mobile microblogging activities for supporting their learning and connecting them with their peers. Moreover, Ebner, Lienhardt, Rohs and Meyer (2010) carried out a study to explore the use of Microblogs in a real-life setting in order to examine Microblogs in informal learning and process-oriented learning. The use of Microblog and MediaWiki helped to follow the students' improvements. The participants were 21 students who were full-time and 13 students who were part-time, divided into eight groups, and two lecturers, using the Microblogging for six weeks. The results revealed the use of Microblog was for private communication as well for learning. They conclude that the use of informal communication assists the informal learning. Another study was conducted by Elavsky, Mialan and Elavsky (2011) in which they studied the impact of using Twitter for feedback in a big class in a university setting. 240 students out of 300 students attended on most days. The result found that Twitter usage improves student impressions, involvement and interest in relation to the course.

Alexander (2006) noted that indeed the use of Web 2.0 technologies such as Twitter and Wikis are helpful in creating an environment of collaborative learning and involve students in thoughtful deliberations and reflection; however, it does not offer a guarantee of successful achievement of learning objectives. Kennedy et al (2009, p. 6) found that "simply matching a learning design with a technology is unlikely to guarantee student engagement". Furthermore, Kennedy (2009) revealed that the use of Twitter or a Wiki does not offer the diversity that a classroom offers. That is, a typical classroom contains lots of diversity in the form of comfort levels in using a particular technology, people and their preferences. Moreover, it is hard to assume that all the university students' intake has similar expertise in the use of technology and has similar habits relating to technology use. There are also variations within the net-generation as far as their learning preferences and demographic features are concerned. Thus, there is a grave concern that the focus on

Web 2.0 and designing a pedagogy and policy based on Web 2.0 technologies including Twitter and Wikis, may negatively affect a large number of students.

Even if students have expertise in using Web 2.0, assuming that they are equally interested in, and comfortable with, the use of technology may leave many students with achieving less than what they expected. Väljataga and Fiedler (2009, p. 64) sum up their findings as

> It was obvious that most students were not ready to take initiative and responsibility for their own learning. The main reason seemed to be a lack of experiences and rationale in this regard.

Thus, despite offering spaces for interaction, discussion and collaborative learning, Twitter is also argued to have deficiencies that can hinder learning. Learning does not only involve gaining subject knowledge and becoming better in reading and writing; rather, in the current era of globalisation, learning is also meant to learn into diverse environments in term of language, ethnic and religious background, culture and so on (Väljataga and Fiedler, 2009). This kind of argument is not particularly about Twitter. Instead, most of the Web 2.0 technologies and platforms do not offer opportunities of diverse learning that suit the nature of current business and academic worlds.

Blogs

With the technological changes, Blogs have a variety of applications. The use of blogs in the classroom to enhance learning has been considered by several authors. Zhang (2013) considers the impact of blogs and proposes a model for their design which optimises their benefits. Zhang's study investigated the aspects that affect the use of weblogs in education and what makes their use successful. WordPress was the platform picked to create the classroom blog in this study. On completion of the course, 128 students out of a total of 146 participants completed a survey about their experience. The results reported that there is a strong correlation between the net benefits and the information quality and system quality. Furthermore, the study concludes that, in order to be an efficient learning tool, classroom blogs must be user-friendly and contain quality information related to the topic in order to engage the students in the classroom. Furthermore, Tomberg, Laanpere, Ley and Normak (2013) designed a blog called Lepress to create a personal learning

environment for the student in which the teacher can manage the assignments and learning assessments. Thirty-seven teachers from Estonian K-12, vocational and higher education participated; seven of them had used Lepress before the rest were trained to use it for six months. A questionnaire was used to determine the teacher perception towards the teacher control between Lepress and without Lepress in a blog-based environment and the usability of Lepress. The study found that Lepress was perceived as being easy to use and aided their control over learning activities by adding additional attributes to personal learning environments. Also, research by Harrison (2011) revealed that blogs support student learning and improve their engagement. The result of the exploratory case study of using blogging activities conducted by Deng and Yuen (2013) highlighted the potential of academic blogs and showed that blogs enhance user participation. In addition, Lou, Kao, Yen and Shih (2013) adopted a quasi experimental approach to investigate the efficiency of using students' blog-assisted life education to learning and students' attitudes after experiencing it. In the study, 29 students were distributed into seven groups; the students posted their opinion in the blogs to communicate with each other, with the teacher tracking the communication between the seven groups. Qualitative data through questionnaires was administrated and qualitative data through interviews before and after the experiment, learning sheets and a portfolio evaluation. The research found that the use of students' blog-assisted life education enhance the students' attitudes and their learning. They concluded that students' blog-assisted life education enhances learning effectiveness. Garcia et al. (2013) conducted a study on the role of staff and students using blogs within a connectivist-learning model, as shown in Figure 3. A case study was carried out of students using blogs for an illustration course in Plymouth College of Art for three weeks. The study reported that the role of students and academic staff changed as a result of using the blogs, which is consistent with the connectivisim learning theory, but not completely so. From this case study, the usage of blogs had a positive effect on learning through the principle of connectivist-learning.

Duffy and Bruns (2006) argued and found that blogs have significant potentialities to be used in higher education. The blogs help teachers to reflect on trains of thoughts relevant to learning and other professional challenges they face in their academic careers, teaching methods and pedagogies, teaching experiences and resources descriptions (Duffy and Bruns, 2006). Blogs helps teachers offer teaching tips to other academics and on how to improve the use of a particular technology. Blogs also facilitate sharing of unit-related

information, including assignments, events, calendars and so on. Blogs are also the sources of helping students with offering a guideline on how to best attempt a question, an assignment and a project (Duffy and Bruns, 2006). However, Duffy and Bruns (2006) revealed that blogs cannot be used with homogeneity across each and every learning activity; rather, blogs are more useful in some learning activities than in others. For instance, Duffy and Bruns (2006) found that blogs help the students to accomplish more in their group projects than in individual projects, as through blogs students initiate discussions on some important aspects of their group projects. Consequently, the blogs brings in critical thinking on the topic under discussion. In this way, blogs develop critical thinking amongst students and improve their writing and argument development skills, as they endeavour to use sophisticated design elements and language. Thus, in essence, the blogging develops in the students some important features that help them succeed in higher education. These features include collaborative, communicative, critical and creative skills that help them perform better in professional and scholarly contexts. Thus, it can be concluded that blogs offer a huge potential to be used in higher education, as they help both students and teachers through the provision of a collaborative platform to engage in a range of different education- related activities. However, the use of blogs carries certain disadvantages as well and therefore the educational activities cannot solely rely on blogs.

Some of the disadvantages have been revealed by Poortman and Sloep (2005), who argued that blogs are an asynchronous communication source. That is, the response on a message delivered through a blog can be delayed and these responses are not direct. As a result, interaction and resulting learning are slowed down, and thus late responses can harm the progress of teaching, learning and projects. As teachers and students try to be formal and make use of sophisticated language, lack of confidence in writing skills and lack of argument development skills can discourage the students from engaging in discussions through blogs (Poortman and Sloep, 2005). Moreover, the messages of blogs are in the form of texts, and thus the blogs exclude non-verbal aspects of a message. Consequently, there is a lack of rich and in-depth information and this results in making it difficult to share and transform thoughts and ideas.
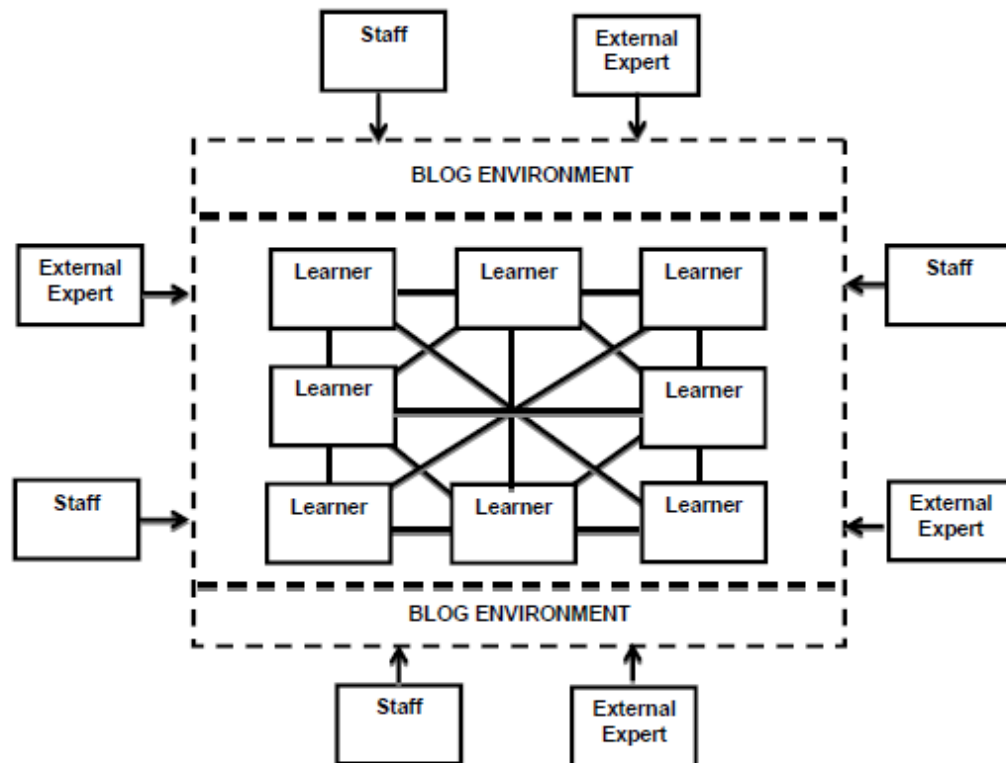
Figure 3 Connectivist education blog model (Source: Garcia et al. (2013))

Polls/Electronic Voting

Electronic Voting, as defined by Vlachokyriakos et al (2014) is 'the use of technology to facilitate consensus by allowing voters to express their consent or dissent, during or after a process of decision making' and they stated that the electronic voting systems need more research to study whether these systems bring about participation (Cindio and Stortone, 2013; Coleman and Moss, 2012). In addition, Cochrane (2014) includes Web 2.0 polls in his framework, as shown in Figure 4. Vlachokyriakos et al (2014) highlights the methods of electronic voting systems such as social media polls, online scheduling, shareholders' meetings and local binding elections. They proposed four design categories for poll participation including eligibility, fairness, secrecy and expression in designing a poll, as shown in Figure 5. Vlachokyriakos et al (2014) used the Ballotshare system as a poll

design for 18 participants, including staff and postgraduate students, to vote in a poll on social activities and other decisions. Five polls every week were created.
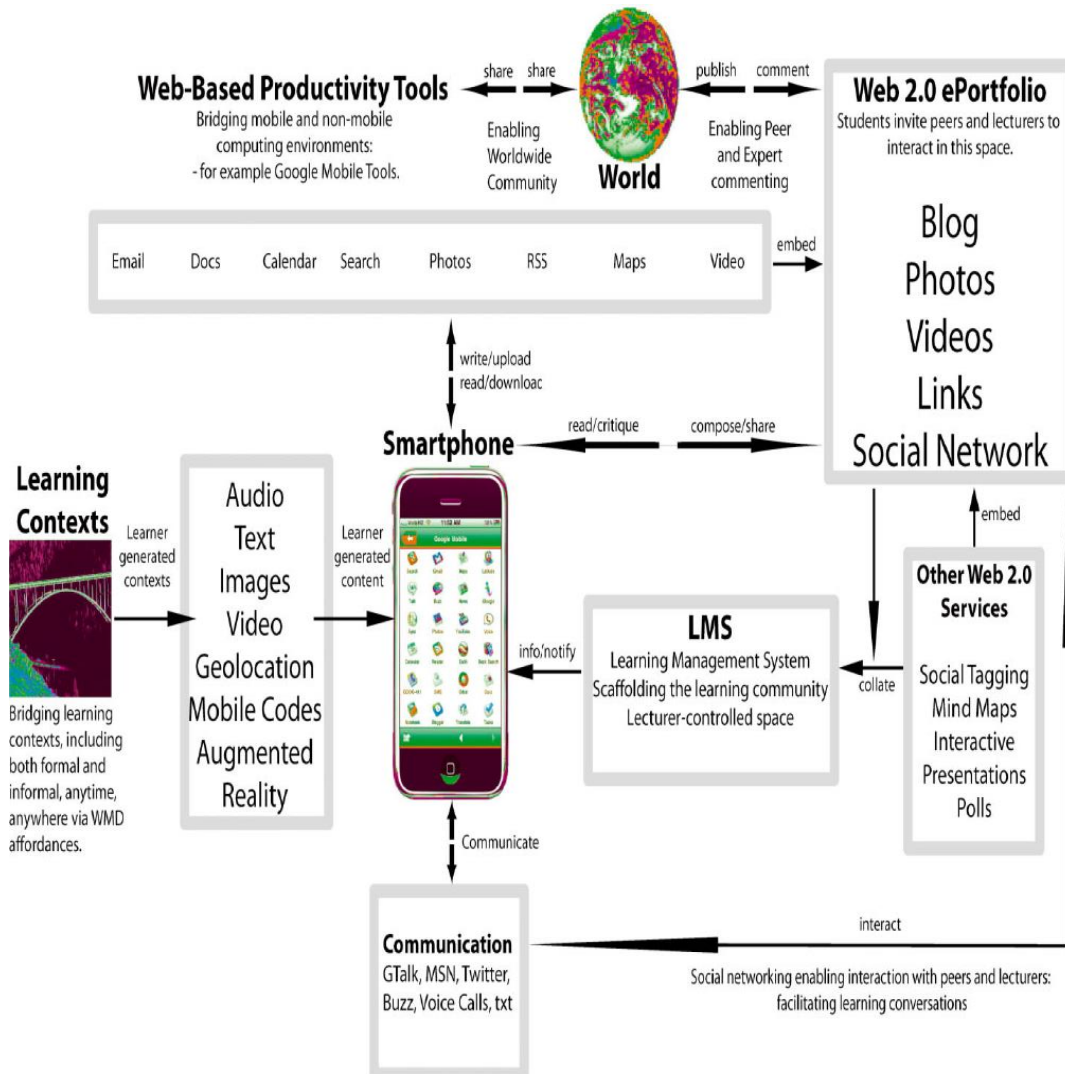
Figure 4 Mobile Web 2.0 framework (Source: Cochrance (2014))

62% of the participants agreed that their participation in polling was significant in decision making. Also, the voting system provided a democratic process that involved the participant in an interactive environment. The study concluded that the potential of electronic voting is still not fully explored. Moreover, Colazzo et al. (2010) summarise the purpose and the usefulness of using self-assessment tests (polls/online-questionnaire/survey) within an online community (virtual community) or e-learning environment. A poll offers a single question and provides the users with a graphical

display. Surveys can use several questions to collect opinions from users. The study concludes that using these applications in an online community provides links between different communities and a spread of services among these communities.

Shan et al. (2009) developed a mobile learning system that can provide a live broadcast between the classroom and distance learning students through the mobile devices. This system allows the students to receive the information when and where they choose. In addition, this system facilitates the student with instant messages and polls. With these characteristics students were able to ask frequent questions in real time. Overall, students felt comfortable and happy with the use of interactive mobile learning in their classes. In addition, Cheok et al. (2008) created software called Blogwall for art and poetry, using SMS for interaction poetry. Polling was used to ask questions in order to obtain students' opinions. The study concludes that Blogwall provides a social and engagement experience. Examples of voting systems are ClickOn, eClicker, Poll Everywhere and VotApedia. Moreover, Dunn et al. (2013) conducted a case study at the University of the Sunshine Coast in Australia, to find out the impact of VotApedia on student engagement and learning and their perception of the use of VotApedia. VotApedia was used in the classroom to ask questions two to three times. 146 out of 731 participated in the survey. The results were that 88.7% agreed that the lecturer should continue using VotApedia in the classroom and 79.7% agreed that it enhanced the overall value. In addition, 71.1% agreed that they enjoy using VotApedia and 72.5% agreed that it enhanced their learning. A survey was carried by Brown et al. (2014) to investigate the willingness of students to use i>clicker, Poll everywhere and Top Hat in the classroom for engagement. The study was conducted at Iowa University and 413 out of 501 completed the survey. The results were that 81.9% had used an i> clicker in the past and 72.3% agreed it improves participation. The study concluded that students like to use these systems; some students are too shy to answer open questions but they are willing to use electronic voting since it is anonymous and increases student engagement and learning in the classroom (Cochrane, 2014).
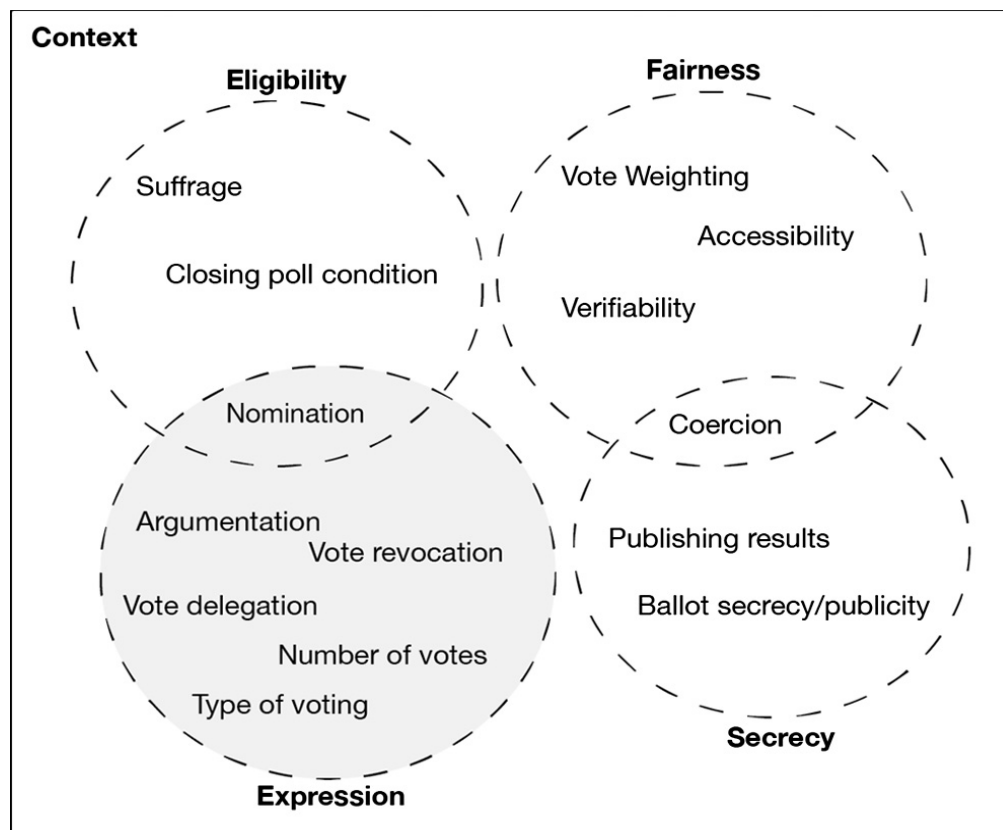
Figure 5 The design space of voting for participation

Wikis

Wiki was developed by Cunningham in 1994 for internet usage. According to Leuf & Cunningham, (2001), the main function of the Wiki is to support users' engagement in a combined and social environment. By the use of this very useful feature, users can "visit, read, re-organize, and update" (Augar, Raitman, & Zhou, 2004).

The most useful feature of the Wiki technology is in enabling the user to control his data and realise the collective intelligence that can be tied together on the Internet. O'Reilly (2005) explains that through the use of this valuable tool, many are attracted as it can be used for transformative information. Wiki is a very useful tool because of its ease of operation and interaction for communication and widespread collaborative authoring (Ben-Zvi, 2007). There are various methods available to communicate in Wikis on which users rely. Out of three main communication methods, this is known as one of the primary tools that has the feature of social application. The remaining two communication

methods are used for one-to-one communication. According to Minocha et al. (2007), these methods include e-mail and messengers. It also includes web pages and blogs that are nowadays very popular. In addition, there are many-to-many communication method offers the users the collaboration, interaction and shared authoring.

The categories and types of processes that are used in Web 2.0 technology include, for example, Wiki as changing ways of communication with knowledge (Howe, 2006), These categories include: "you make it, you name it, you work it, and you find it" (p.60).

'You make it' describes that it is about sharing of information in which the user contributes new knowledge, while 'You name it' is about the folksonomies where tags are developed by the contributors for information. 'You work it' is related to the method by which users collaborate to gather the knowledge. 'You find it' is suggestive of a collection of findings and overviews of other contributors. The user can interact with knowledge in Wikis, so it strengthens the collective authoring function.

Robinson (2006) asserts that Wikis are also known as "an effective tool for educators". Students are able to work together in a space that is immediately updated (Bold, 2006). In the classrooms, the Wiki is used very commonly as a computer supported combined environment. Wiki is very appropriate for all level of students and teachers because of its simplest features. It may also be used to support the teamwork between students as it allows them to read and edit each other's work. Students are encouraged to review each other's work by the use of Wikis. According to Ben-Zvi (2007), it also reflects on and examine students contribution as group not as separate work. Every time a wiki is edited, a note is made about the changes that were made; it also describes the information of the person who made those changes. On any edit, the signature of the user can also be placed (Augar, Raitman, and Zhou, 2004). In addition, Wikis can support the continuous discussion on the topics during the academic year.

Various studies on the impact of wikis are documented in the online learning environment, mostly in the preparation for the course. O'Shea, Baker, Allen, Curry-Corcoran, and Allen (2006) carried out research in a first-year student for education course about the usage of Wikis as an assignments tool. As with the adoption of new technology, students hesitated initially but they showed positive response in using the wikis. Canole, deLaat, Dillon, and Darby (2006) concluded that by the Web 2.0

technolgies, like Wikis help the students to revise and create new knowledge. Graduate students point out that Wikis promote group learning and teamwork (Carpenter & Roberts, 2007; Harris & Zeng, 2008). Coutinho and Bottentuit Junior (2007) also found that Wikis enable the student for their learning.

Foley and Chang (2006) concluded that wikis could also be used in education for professional development. This research work found that role of users and contributors from editors could utilize Wiki as development tools for the pre-service and in-service teachers.

Bering Strait School District in Alaska had an Open Content Initiative application that is used for professional development of wikis in the school. Standard-based curricula are promoted and content resources for the teachers are also promoted by the utilisation of wikis. More than 10,000 pages are in Wikis and it is growing continuously. ("Have You Been Wikified", 2008).

Canole, de Laat, Dillon, and Darby (2006) reported that by the misuse of the Web 2.0, or by inappropriate support provided by the instructors, students were frustrated Many inconsistent feedbacks about the usage of Web 2.0 technologies also include wikis (Zurita, 2006). These inconsistencies were about issues that were technical in nature. Other issues were from the side of instructors to manage group work, and delivery of the instructions to the students. Zurita (2006) explains that most students preferred teacher-centred rather than student-centred course in which the student have to produce information for the course with their peers using Wiki. Students are not interested in Web 2.0 technology, inclusive of wikis (Cann, et al. 2006). The reason behind this absence of interest is a perception that this technology is a superficial activity and not an activity to be considered for assessment.

2.4.1. Rationale for Using Web 2.0 Technology in Learning

The recent rise in the use of Web 2.0 technology has led to an increase in the number of literature reviews investigating the potential of Web 2.0 technologies in the learning process. This research has identified certain factors that influence the rationale for using Web 2.0 technology in learning. These factors are:

1. Digital Natives' skills

2. Paradigm shift from teacher-centered to student-centered

3. Interactivity inside and outside the classroom.

Supporting Digital Natives' Skills

Higher education policy makers need to consider the needs of the new generation of learners. These learners are referred to as Millennials (Strauss and Howe, 1997), Net Generation (Tapscott, 1997 and Oblinger and Oblinger, 2005) and Digital Natives (Prensky, 2001). Tapscott (1998) defines the Net Generation thus:

> This wave of youth coincides with the digital revolution which is transforming all facets of our society. Together these two factors are producing a generation which is not just a demographic bulge but a wave of social transformation…And at this moment, tens of millions of N-Geners around the world are taking over the steering wheel. This distinction is at the heart of the new generation. For the first time ever, children are taking control of critical elements of a communication revolution. (pp. 22-26).

According to Tapscott, this generation has specific characteristics which mean they think differently and they are natural collaborators who enjoy interactive learning (p.129). Futhermore, Prensky (2001b, p.6) argues that within the era of digital technologies, and considering the skills that Digital Natives have, instructors have to adopt new methods to facilitate the learning process. Moreover, he claims that technology has changed the brains of Digital Natives. Leisure activities with digital technology equip learners with well-developed skills that have been ignored in the learning process (p. 442). Consistent with a study by Thompson (2013), Web 2.0 technology provides learners with interactive activities, which supports Prensky's claims that Digital Natives prefer learning through engaging in activity, collaboration, the need for instant feedback and the desire to multitask.

There are many terms provided to the people studying in any school, college or university. However, among the most important are terms such as digital natives, the Google generation or the internet generation. Specifically, all these labels are utilised to express

the importance of the new technologies and internet in the lives of the young people and their impact on different fields of life. Moreover, the new generation is also very much focused on the new developments in the technologies which is predicting the basic change in the lives of the young people such as in the form of communication, socialisation, education and work. Most importantly, the effect of these technologies is highly significant in the educational aspects for the new generation (Livingstone and Helsper, 2007). In this regard, it is significantly accepted that the generation born during the last two decades have had more impact from the new technologies and internet on their lives while the generation born before the last two decades have not been familiar with these technologies since birth. However, they are also trying to manage the new technologies as they provide convenience in their lives. Furthermore, it is observed that the digital natives are really active and fast at receiving information at in a glance using the new technologies. The persons born before the digital native era such as around the 1980s are the ones who are termed to be the 'digital immigrants', as these people are not the ones who have seen the innovations of the technology since birth, but they are the ones who need to learn about the new technologies in order to get benefits out of them. And the existing research literature in the area of development of new technologies is based on the digital immigrants mainly. However, the digital natives are not yet explored by researchers but the area needs the core attention of the researchers. More importantly, the impact of the Web 2 is quite vital on the learning of the digital natives. But the researchers have not paid much attention to the phenomenon, so, due to the lack of existing literature in the area, the present research study make references to the Web 2.0 technologies for the learning aspects of the digital natives.

Paradigm Shift from Teacher-Centred to Student-Centred

Calazzo et al. (2010) highlight the fact that Web 2.0 technology enables users to move away from the role of a passive user; rather, they are now authors and creators of content. Furthermore, Tomberg et al (2013) cite Attwell (2007) and Zimmerman (1990) who refer to the fact that a personal learning environment (PLE) offers learners the ability to control their own learning through communication with peers (Salinas, Marin, and Escandell, 2011). Learners now have choices such as which tools to use or which activities to undertake. Munguatosha et al. (2011) cited Alexander (2008), who states that using social

network tools encourages students to interact and collaborate in order to highlight the opinions of students, which creates a learner-centred environment.

Interactivity Inside and Outside the Classroom

Sims (2003) highlighted the five major areas described in the beginning of this chapter, when considering the definition of interactivity, such as: 1: Educational psychology; 2: Theory and research; 3: Technologies with flexible online environment; 4: Communication and collaboration, and 5: Design or maintain a learning environment. Moreover, these five major areas play an important role in this thesis to understand the interactivity of Web 2.0 technologies.

Web 2.0 technology provides learners with opportunities to participate in order to increase engagement in the learning process. Engaged learners are more likely to participate, as Carnaghan et al. (2012) state that participation is linked to engagement. In addition, Web 2.0 technology enhances the 'architecture of participation'. O'Reily (2005) coined the term 'architecture of participation', which refers to a community of learners in Web 2.0 technology who participate together to create and develop Web 2.0 content. Thus, the idea of 'architecture of participation' was implemented in a study conducted by Wheeler et al. (2008); they argue that participation in the wiki helped build a community of practice through the publication of new content to the Web. Moreover, Web 2.0 technology enhances student learning. Vlachokyriakos et al. (2014) found that participation in electronic voting led to more interactivity and enhanced decision making in the learning process. However, there is limited research into the use of digital polls and how they influence student participation and voting experience (Vlachokyriakos et al., 2014). Song and Lee (2014) mention participation as one of the factors of Web 2.0 technologies. They cite Dunlap and Lowenthal (2011), who stated that Web 2.0 technologies encourage participation through the use of blogging. Malhiwsky (2010) explored the notion that building a community provided the learners with learner-centred learning and an intensive learning process. In addition, these features of community give the learner an effective learning environment.

2.3. Learning and Learning Theories

This section will discuss learning and learning theories. Below are brief overviews of social constructivism, construction, and connectivism theories and how they define the learning.

The idea of learning has been under thorough research and debated for years. Time has raised and promoted the idea in such a manner that it has brought forth its numerous dimensions, like compulsions created by the society and businesses wanting more capable and skilled graduates (Lediner and Javenpaa, 1995). Information technology has been duly accepted as a new avenue of learning and it carries some particular impressions. Therefore, this thesis will discuss the various dimensions of learning which have frequented the academic literature and, derived from this (McConnell, 1991), the presented perspective will be on online learning.

"Information Transfer Approach", which sees learning as "stored product", is one peculiar dimension, having problems like communication, retrieval, storage and transmission in its purview. Burgoyne and Reynolds (1997) state this dimension thus:

> This mode of thinking suggests that the outcome of learning is knowledge which is an objective entity, bestows ownership and can be publically recognized, and, at least in its simplified form, does have direct truthful value. The basic understanding of learning as a process is learning as memory, and the practical and theoretical issues that stem from or recognized by this perspective are to deal with how the learner grasps information, how it can be styled to be a part of cognizance, how the learner arranges & order their knowledge - like files piled up in some orderly fashion or a library so that it can be accumulated and recalled (remembered) when it is needed. .

Moreover, this perspective frames knowledge as something tangible or a possession, which could be transferred or disseminated to the learners. Institutions picking this approach are thriving, and they do so under a culture of 'Justificationism'. Firestone & Mcelroy (2003) support the viewpoint that knowledge possessed by 'elders' in any society is considered as true and cannot be judged, wherein 'elders' of society include family heads, managers and instructors. There is lesser thirst or urge for dialogue and

discussions in students and they internalise whatever is imparted to them, making it one-sided communication or flow of information. Students would be assessed on what they are able to reproduce about information and teachers would be considered as knowledgeable in their respective areas of teaching. This method of teaching leads the outcome of learning process in the context of goals and beliefs of educational institutions that practise this method or approach of teaching. According to Wagner & McCombs (1995), in this approach, much emphasis is on monitoring the learning process and controlling it in such a way that leads to certain outcomes, against which students are honoured and assessed. Students' insights and analyses have far less weight in this system. This approach is linked to an objectivist view of learning and education processes, implying that there is a certain set of methods or approaches for students that assist them to reproduce or rebuild from their respective learning experiences. According to Rumble (2001), this transmission approach is not only practised in the traditional face-to-face educational institutions, but is also a settled modus operandi of many online courses in spite of the fast-paced technological progress. Burgoyne and Reynolds (1997) presents an explanation for the aforementioned contradictory approach by saying that:

'Undeniably, most applications of information technology related to learning are and will be, because of its information storing and dissemination capability, basically based on this perspective' (Burgoyne, 1997).

Nonetheless, this certain instructor-centred approach has been criticised by many researchers (Barness et al., 2004). There are numerous issues bedevilling this asynchronous transmission model, for example the ingrained dearth of the room for improvements, reasoning skills and also knowledge formation and transmission, and also it causes ennui as students have to learn without any interesting stimulus (Markel, 1999). In contrast, Swan (2002) has gauged that employing collaborative learning methods to streamline negatively influenced students' learning. Although the transmission approach to learning is still a part of many educational institutions yet these institutions are rapidly declining, as research has pointed to the outcome of some of the other approaches to plug the lacunae of this transmission approach to learning, and one among those several approaches is social constructivism.

2.3.1 Social Constructivism

The genesis of the concept of social constructivism comes from the cognitive school of thought, which, firstly, sees learning as a process instead of a product. The orientation is towards the individual but it accepts the social facet of learning that is its interaction with others. It posits that an individual continuously nurtures and enriches his cognitive map or 'mentalistic' schemas through which learning occurs. Individualistic mental schemas keep growing and modifying as they are subject to newer piles of information from their surroundings all the time. These cognitive maps assist students to extract some knowledge or information or sense out of their experiences. Talja et al (2005) agree with the theory proposed by Vygotsky that social constructivism classifies itself as a socio-cognitive viewpoint. The formation of knowledge is regarded as a by-product of socio-cultural contexts and happening. An individual and environment experience changes when this happen (Talja et al, 2005). Hence, the relationship of an individual and socio-cultural context is the main perspective of their research. They further explain that social constructivism challenges the studies aimed at viewing the 'user in general' as they allude to Cornelius (1996), who says:

"Anyone … who is employing information is exercising something which is a part of social life. His or her actions in this regard must be taken as social actions, and the importance or understanding which any participant in that practice ascribes to one of the many objects in that practice (which could be a piece of information) is a socially manufactured or construed one" (Cornelius, 1996 cited by Talja et al, 2005).

Knowledge is viewed as subjective in social constructivism, which is in opposition to the 'information transfer' perspective on interaction of knowledge between external objects and the learner. Students are encouraged to construct or develop their own mental schemas to create knowledge. This tends to see it as objective and capable of public ownership, and transmission to others. From building to building blocks of Knowledge, all are built via social interactions where the culture is commonly shared by the group, and is emotionally assimilated by the individual. Tenenbaum et al. (2001) in a bid to explain this particular view of knowledge, says that:

Knowledge is gathered mentally through the actions and experiences which a learner does or faces during the learning process, in real time, and accompanying

social environments. It is somewhat like a construction activity, wherein Knowledge is being formulated in result of the interaction between the learner and external objects. Adaptation and to the experience add to this rising pile of knowledge. Thus, in result of this, learning process takes place with the assistance of different mental constructs.

(Tenenbaum et al., 2001).

This explains that for construction of knowledge and learners' mental schemas, which assist in processing and learning the incoming data, their interactions with the external world are imperative. These interactions of learners with the external world and processing would further result in development of creation of knowledge and an individual's mental schemas might be influenced by these interactions. These alterations in mental schemas are also mentioned as 'accommodation'. This phenomenon of accommodation is explained by Machanick (2007). He asserts that sometimes learning is not easy for individuals due to the flawed nature of cognitive schema, as the in-coming information from the environment is not aligned with this schema (Machanick, 2007). As mentioned by Kuhn (1996) and cited by Machanick (2007), it is paradigm shift or a change in the world view. It is considered as a comparatively simpler form of learning, called 'assimilation', when existing mental schema of an individual matches with incoming information. Machanick (2007) explains this in Figure 6 as below:
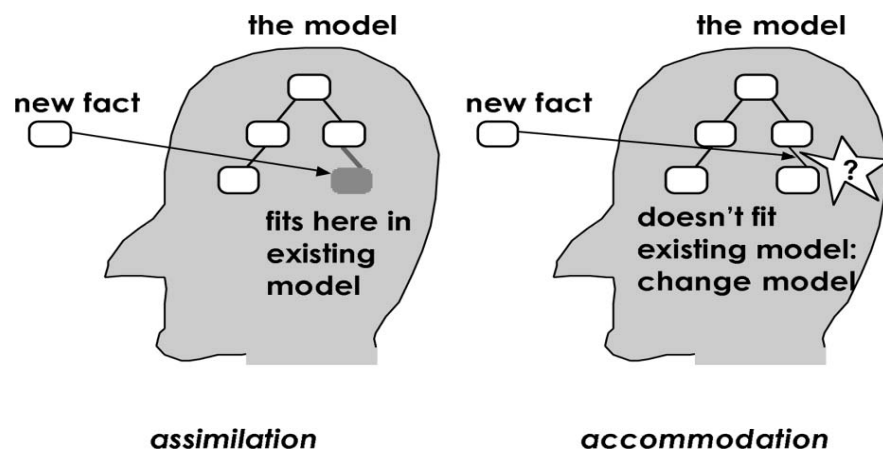
Figure 6 Assimilation (Source: (Machanick ,2007))

Social constructivism has concepts and views that are pedagogical in nature and have the potential to impact positively on all learning situations (Lunenberg, 1998). Social constructivist methodology helps to enhance learning of students as it emphasises the reflections and interpretations of students. According to Hodgson and Watland (2004), the 'mentalistic' process is encouraged by constructionism. Jonassen (1991) explains that this 'mentalistic' approach assists students to co-relate and process information with their prior experiences and knowledge to enhance their cognitive and problem-solving skills. If the instructional designs are developed to promote the learning environment, students become more capable of constructing their reasoning skills. Jonassen (1991) further suggests students are encouraged to develop their own mental schemas to create knowledge. Nevertheless, according to Jonassen (1991), in the ever-revolving external world, refinement and enhancement of such mental schemas are difficult in constructivism. Students do take considerable time to develop, construct or modify their methods of thinking and it could vary from individual to individual.

According to Candy (1991), constructivism has its base in the argument that humans socially negotiate and construct the realities and meanings of the external world to create common meanings of reality, though there may be variations in the learners' perceptions of reality. This creation of knowledge is possible when learners interact with the external environment, including electronic media, discoveries, daily and worldly events, teachers, peers, books and many others. Common meanings of reality could be possible when learners are able to negotiate and share their part of knowledge with others to develop a common ground and meaning to the realities of the external environment. Mental schemas refine and modify themselves to improve learning through such negotiation and transfer of meanings. Before moving forward, it is important to state that although social constructivism and cognitive constructivism have certain similarities, they do vary distinctly in various aspects.

Social constructivism is based on constructing the norms and values of society (Kennedy et al., 2008) and the technologies have a great impact on these norms and values. So the development of the technologies and the internet has advanced the social constructivism. In this regard, it is stated that the digital natives are playing a significant role in the social

construction of the society. Moreover, the society which is already formed by the digital immigrants or the people even before the digital immigrants is changing now. Specifically, this change is accepted and presented through the digital natives. These are the ones which are changing the existing trends and behaviours of society and moulding them into the new reforms. Now, the modes of studying or working in the organisations have been changed; in fact the whole lifestyle of societies has been changed due to the new developments in the technology and its adaption by the digital natives. Specifically, the educational system has also been modified and enhanced through the implementation of the better technologies. The students are preferring the technological education systems. Specifically, the work which was performed manually using handwritten techniques for two to three decades earlier have now moved towards computer-designed working. Similarly, a lot of the transformations have been taking place in the educational systems due to the availability of the technology such as the use of whiteboards linked in to projectors etc. In this regard, the latest reform is based on the Web 2 technology for learning purposes, which is quite new and has not been researched by the researchers yet. So the reforms in social constructivism by the digital natives due to the advancement of technologies are the most important factor for the current educational system, hence the need for exploring the impacts of the technological advancements on the digital natives since the learning aspects have become significant.

One of the constituent factors of constructivism is that humans make their understanding of different aspects of the outer world through their social experiences which take place in a shared environment yet could have different meaning for different people (Candy, 1991). This happens through a meaningful interaction with different avenues, like contact with peers, family members, world events or mass media. This helps in creation of a common ground or meaning to those increasing assimilation and transmission activities. Mental faculties do derive benefit from this and become ameliorated. However, it is important to understand that cognitive constructivism and social constructivism, despite similarities, are inherently varying from each other.

Piaget (1970), a cognitive constructivism proponent, enunciates that individuals are the constructors of knowledge and they do so via their actions. Contrary to this, Vygotsky (1962), a social constructivist, is of the view that grasping or understanding in itself is social. What has been believed is that this is equal to the notion that peers or lecture-

deliverers or anyone in this category give us a field to synthesise our perspective but through a commonly held broader world view. Individuals just build upon it a more irregular relative understanding. This might lack equilibrium in the overall grasp of things but continuous exchange and absorption of knowledge keep balancing and polishing the learning process, thus keeping it going (Machanick, 2007). Therefore, it could be said that it is a journey from a balanced, to worry, to, again, a balanced state. The journey goes on seeking new stimulus to emerge and commence the cycle anew. Here, equilibrium state would be equal to that condition which permits the use of existing knowledge in different ways. It is to be noted that the claim is not based on an objective research but merely a theoretical one. Yet it possesses a chance to be explored.

Moreover, some particular presumptions about social constructivism need to be considered. Among these suppositions is one which revolves around how an individual perceives the social and cultural aspect, in which members discuss and argue to work out the central idea of something. The norms and values among the participants are assumed a consensus of the values. There arise questions of how to determine the degree of credibility of knowledge presented or its validity. The process of socially negotiating the central meanings of the external environment also affects the ability to recall knowledge reliably. These presumptions would have to be examined, researched and tested before deciding issues about social constructivism and its advantages.

Brown et al. (1989) stated that learners were learning through using their previous experiences to understand and build their own meanings. Furthermore, learning occurs through collaboration and participation. Jonassen et al. (1995) argued that there are four main characteristics for the environment of the constructivist learning as follows: "context", "construction of knowledge", "collaboration" and "conversation". Chen and Bryer (2012) point out the importance of engagement in collaborative activities and the role of the tutor as a supervisor and facilitator of interactions between students.

In addition, McLoughlin and Lee (2010) linked social constructivism learning theories and Web 2.0 technology by arguing that one of Vygotsky's (1978) principles of dialogue and shared activity can be applied to learning by using Web 2.0 technologies. That is, learning is social dialogue in nature and the Web 2.0 tools can become the inquiry methods to help and support the learners to collaborate and engage. Furthermore,

Dalsgaard (2006) also considered the relationship between social constructivism and Web 2.0 technologies. He argued that they engage students and promote collaborative learning through problem solving.

Moreover, Chen and Bryer (2012) highlight the general principle of constructivism in that effective learning takes place through participation in collaborative activities. The collaborative nature of Web 2.0 technology aligns it with the learning principles of social constructivism. Ito et al., (2010) state that social media provides learners with a collaborative and participatory environment. These collaborative activities enable students to engage with peers who are more knowledgeable in order to improve their learning. Web 2.0 technology in a higher education learning context allows learners to interact socially through activities that lead to social negotiation. This interaction supports constructive learning (Herrington & Herrington, 2006). Brown and Adler (2008) state that the use of social media amongst digital natives encourages a large amount of informal learning to occur both inside and outside the classroom through interaction with peers. The principles of the social constructivism learning theory as explored by Schunk (2012) are as follows:

1. Learning occurs through the interaction of person and situation in the acquisition of skills and knowledge.

2. People are active learners and develop knowledge for themselves.

3. Learners construct understanding.

4. Teachers should structure situations so that the learners become actively involved with content though social interaction.

Additionally, Philavanh (2010) explored the principle of social constructivism theory based on Schunk (2004) as follows:

1. "Learning occurs when individuals share information and negotiate meaning through participatory and collaborative activities."

2. "Social environments are conducive to developing higher mental processes."

3. "Knowledge should be co-constructed between two or more individuals."

4. "Level of knowledge and skill should not be equal among learners."

According to Gredler (2009) the learning can be defined in social constructivism learning theory as "socially shared cognition that is a process of becoming a member of a sustained community of practice; social interaction that constructs and reconstructs contexts, knowledge and meaning" (p. 22).

However, social constructivism has the potential to influence the entire learning environment and it is among the few pedagogical approaches and this has been quickly embraced in different forms of education and in several areas (Lunenberg, 1995).

2.3.2 Social Constructionism

Constructionism is another significant perspective on learning which believes in the importance of individual cognition and talks about socially constructed knowledge in a more decisive manner. Social constructivism, however, chooses a different stance and asserts the importance of cognitive perspective to view knowledge or learning. According to Machanick (2007), constructionism, nevertheless, sticks its focus to the socialisation aspect and tries to understand the how-to dimension of interactions between society and individuals. Carson and Rowlands (2001), who are constructionists, state their viewpoint that constructivism, in both its forms, restrains the concept of knowledge by viewing it as an individual's mental representation without taking into consideration the communication aspect. Some other distinctive points are stated by Gregen (1995) as follows:

> Before standing in front of a class and lecturing with a worthwhile steady stream of knowledge, a lecturer goes through a certain exercise, he collects facts, different & interesting viewpoints or likewise content as well as uses his experience. However, the class does not know this nor that it is taught how to perform the same exercise itself.

Constructionism ponders over discourses, elaborations and emphasises interaction or discussion instead of cognitive process. Constructionists, on the other hand, call interaction a basic requirement to create a social world, to establish recognition and

understanding. It could be said that it is a rhetorical-perspective view of language. According to Tajla et al. (2005), it can also be stated that it is intimidated towards those views, which see language as something separated from context as well as taking words as entities with consistent and firm meaning.

In the context of the above-mentioned facts, it could be suggested that in constructionism, the dialogue or discourses are considered as limits or boundaries of social knowledge that provide a perspective on a phenomenon along categorising the world. According to Tajla et al (2005), another assumption about knowledge is that it is developed in systems of dispersions, signifying that dynamic tensions among multiple sources help construct knowledge. Moreover, it is suggested that constructionism embraces argumentative, perspective-dependent and context-based usage of language. This suggests that meaning linked with words carries different meanings in different contexts as well as its usage. Contrary to this, it is considered that individualistic schemas are comparatively constant and stable in social and cognitive constructionism. However, according to Hodgson (2000), academic literature shows that the constructionism approach towards learning is appreciated in many research works and this becomes possible due to elimination of educational and administrative limitations to open learning. Hodgson (2000) takes this idea further and explains that formal type of education is backed by government and public funding and is seen as the social and political responsibility of government. Therefore, it would practically leave no educational provision at all, though all constraints to learning are removed.

The applicability of constructionism is subject to various aspects, which are not in control of an organisation despite certain promising factors of construction. Some of the features that influence are perspectives towards education within the society, major cultures, educational background of students and attitude of individuals. This is witnessed more frequently in developing countries where taking this type of approach towards education takes quite a long time to be implemented. The breeding ground, especially within government-administrated universities, is not developed for embracing constructionism.

2.3.3 Connectivisim

This theory brings to the fore limitations of the existing theories of learning, including constructionism, constructivism and cognitivism. The key limitations in these theories are that these theories are somehow propose education as expert and content based. That is, these theories focus on transferring knowledge from experts (professors, teachers, educators) to students based on fixed programmes and contents. These theories of knowledge also revolve around the concept that learning takes place in closed structures, fixed hierarchies and bounded spaces such as classrooms. As the existing theories are based on content-based pedagogies, the role and importance of context are glossed over. Connectivism has proposed the idea of learning based on limitless dimensions, evolving and emergent learning spaces. Thus, connectivism downplays structures and hierarchies to suggest a pedagogy based on participation and focusing on new roles of student and teacher in learning.

These theories do not focus on the role of non-human aspects of learning. That is, these theories ignore the role of different objects, including technology. If learning is based on these theories, particularly in the current era, the role of information and communication technologies would not be considered and this will limit the benefits of advancement in information technology for learners. Moreover, there would not be conscious focus on the use of information technology, including Web 2.0 in education. Web 2.0 technologies have changed society and this digital age has led to the learning theory of connectivism (Siemens, 2005). Siemens (2005) argues that connectivism is tied closely to Web 2.0 technologies as they are essential technological tools that boost learning through their specification of information that can be maintained and used.

The learning theory of connectivism was developed based on certain limitations that were found in the traditional theories (Siemens, 2004), in which the limitations on the previous theories that learning occurs inside and not outside the person, fail to explain the learning within the community, network or organisation and they focus on the learning process not on what the learners have learned (Siemens, 2004). Siemens (2004) cited Dricoll's (2000) definition of learning that:

"Persisting change in human performance or performance potential... which must come about as a result of the learners' experience and interaction with the world."(p. 11)

Based on this definition, Siemens (2004) stated that behaviourism defines learning as "learning is about behaviour changes". In cognitivism, learning is defined as "process of input managed in short-term memory and coded for long-term recall". While constructivism defines learning as "learners create their knowledge as result to understand their experience"

He argues that there are technological changes in the digital era and the previous learning theories, namely behaviourism, cognitivism and constructivism cannot highlight the attributes of Web 2.0 technologies (Clara & Barbera, 2013). Consequently, a new theory is needed to cover the rapid change in knowledge and the external knowledge (Clara & Barbera, 2013). In 2004, Siemens proposed a new theory called "Connectivism learning theory". Connectivism theory defined learning as

"actionable knowledge that can reside outside of our selves, within organization or database, is focused on connecting specialized information sets and the connections that enable us to learn more and more important that our state of knowing." (Siemens, 2004)

Siemens (2004, 2005) lists eight principles for the theory of connectivism:

1. "Learning and knowledge rests in diversity of opinions."
2. "Learning is a process of connecting specialized nodes."
3. "Learning may reside in non-human appliances."
4. "Capacity to know more is more critical than what is currently known."
5. "Nurturing and maintaining connections is needed to facilitate continual learning."
6. "Ability to see connections between fields, ideas, and concepts is a core skill."
7. "Accurate in which up-to-date knowledge."
8. "Decision-making is itself a learning process."

In the connectivist learning, as Guder (2010) described, the learners tended to network through the use of technologies. Chen (2012) reports that Web 2.0 technologies tie in with one of the principles of connectivism due to the fact that learning is not seen as an individualistic or internal activity as learners can now access information through collaborating with others and sharing knowledge through Twitter and other platforms. Furthermore, Web 2.0 technology provides a network within which learning can take place through the effective use of nodes (Siemens, 2005; Downes, 2007). As Siemens (2005) states, the connection of "specialized nodes" is part of the learning process. Bell (2009) refers to the different forms that these nodes can take; individual, group, or community. Kop and Hill (2008) highlight the importance of connection through nodes between learners and their learning community. Downes (2007) states these connections facilitate learning. However, learners must be selective when choosing which nodes will be beneficial to their learning (Guder, 2010).

As a consequence of these connections through specialized nodes, the role of the instructor is evolving and changing within the learner network. In the connectivism learning theory, learning is becoming less teacher-centred as the responsibility for the choice of which nodes to connect to rests with the learner. Moreover, Anderson and Dron (2011) specify that in addition to traditional roles, the role of the teacher is to enable the learner to make connections and find new sources of information. In addition, the role of the teacher is changed when the teacher is present in the learner network as peer not as teacher (Friesen & Lowe, 2011). According to Greenhow (2011) the use of Web 2.0 technology facilitates a more student-centred approach in the learning environment,

However, connectivism has been criticised by authors such as Verhagen (2006), who believes it is pedagogy rather than a learning theory. Lange (2012) is also of the view that it is not a learning theory as it does not give us anything new, it is merely a mix of other learning theories. As well, Al-Sheri (2011) argues that it is not compatible with other theories. In addition, Clara and Barbera (2013) claim that connectivism cannot be applied to Web 2.0 learning as it fails to address important aspects of learning. First, "learning Paradox" and they highlighted some questions that not answered by connectivism as "when pattern is connected for the first time, why are the nodes connected in that specific way, and why is that configuration seen as a pattern?" Second, connectivism "underconceptualized interaction", where they highlight that interaction is a process not

stated as found for a long time in the scientific community. Finally, the concept "development" is not clear under connectivism. Moreover, Kerr (2006) stated that networks are significant in learning in which they support the educator in the digital age with new technologies such as Blogs, Wikis, Social media etc. but do not replace the tradition theories. According to Kerr (2006), claims that constructivism learning theory addressed both internal and external knowledge. Accordingly, Schunk (2012) explored three perspectives of social constructivism: First *Exogenous*, which relates to that knowledge construct from the world through experience. Second, *Endogenous* relates to working of the mind. Finally, *Dialectical* relates to the knowledge which comes from interactions between persons and environment.

2.4.3 Theoretical Assumptions

Social constructivist learning theory principles (1978) serve as the underpinning of this thesis to study the impacts of the interactivity of Web 2.0 technologies on students' learning experience.

According to social constructivism theory, learning occurs when individuals actively participate, interact, engage to share information meaning through collaborative activities in constructing new skills and knowledge, interpersonal interactions in corporative context, and problem-solving situations. Rodrigo and Nguyen (2013) argue that "according to social constructivist theory, higher levels of learning occur within this social context, where the interactions are promoted outside the face-to-face class time". Bank et al. (2007) describe formal learning as a "small fraction in the lifelong experience of student learning" and informal learning as the students move from their elementary school to high school to university; informal learning is important to student life since they can learn at any time and anywhere through the interaction and communication between students and other peer networks. Zhao and Kemp (2012) conceptualised the characteristics of informal learning as "people learn from doing (experience) and interaction with each other". Conole and Alevizou (2010) discussed the relationship between the learning theories and Web 2.0 technologies that provide new ways of learning as follows:

1. Inquiry-based and exploratory learning
2. New forms of communication and collaboration
3. New forms of creativity, co-creation and production
4. Richer contextualisation of learning.

Conole and Alevizou (2010) explored social networks to find how they fit with the "new forms of communication and collaboration". Merchant (2009) identifies five attributes of social participation in Web 2.0 as follows:

- it includes an online communication in an interactive environment

- it provides formal and informal learning environment in which they can interact at any time and at any place not limited to the traditional way of learning inside the classroom

- the interaction will be in an online environment where the learners network and share the information

- participation and engagement are the important factors to formulate the community of practice between the learners

- collaborative activities can be used to actively engage the learners.

Merchant (2009) concludes that Web 2.0 technologies have the potential to provide the learners with the tools to participate, and also that they are essential tools for learning in the learning process. The definition of Web 2.0 technologies that are highlighted by McLoughlin and Lee (2007) is "a second generation, or more personalised, communicative form of the World Wide Web that emphasises active participation, connectivity, collaboration and sharing of knowledge and ideas among users", describing the characteristics of these technologies. In addition, Zhao and Kemp (2012) defined the Web 2.0 technologies as "the second generation of Web technologies which allows users to connect and interact with one another".

Consequently, from the above, we can state that learning occurs when students participate in interactive activities in which they are actively engaged in constructing knowledge,

participating in active learning (students learning from doing) and forming interactions that are promoted outside the classroom as well as inside at any time and anywhere.

2.5. Conclusion

Chapter 2 has established the current state of the academic literature in relation to the pedagogical implementation of Web 2.0 technologies for student learners in higher education. The review has constructed the research theoretical foundation, upon which the author builds a Conceptual Framework in Chapter 3.

CHAPTER 3 CONCEPTUAL FRAMEWORK

3.1. Introduction

In this chapter, the research hypotheses that emerged from the reviewed literature regarding Web 2.0 technologies, interactivity and learning experience are presented in the conceptual framework that forms the backbone of the research study. Moreover, the definition of the independent, the dependent variables and the questions for each construct are included for the field studies 1A and 1B (Social Media outside classroom) and 2A and 2B (Web polls inside classroom). As well, Sims' (2003) framework regarding the areas such as communication and learning environment will be covered in this chapter.

3.2. Interactivity and Learning

Interactivity plays an important role in the student learning (Siau et al., 2006). Interactivity in classroom provides the learners with an interactive environment in which it facilitates the interaction among the learners, motivation to learning, engagement inside and outside classroom and instance assessment/feedback (Markett et al., 2006; Draper & Brown, 2004). As Draper and Brown (2004) described, formal learning is 'lacking interactivity' in which the students were passive learners, they are not interacting in the classroom because they might be too shy to participate in a large lecture and this leads to no progress in their learning. In addition, Markett et al. (2006) explained that instructors face difficulties in describing an interactive lecture. Therefore, educators may need to provide the learners with an environment that encourages them to be more active learners through the interaction between students-students and students-instructors.

3.3. Web 2.0 Technologies in Learning

Web 2.0 technologies promote the educators with tools that enhance the learning process through collaborative learning (e.g. Wiki and Blog), interaction among learners (Twitter, Facebook) and assessment (Electronic Voting or polling). Furthermore, Web 2.0 technologies give the learners the opportunities to generate content, participate and share

information in the learning process. Therefore, higher education may need to consider the impact of the use of Web 2.0 technologies tools in education and learning (Merchant, 2012). According to Wheeler (2009), social media will have a "significant" impact on future education (Selwyn, 2009). More importantly, educators in universities should seek to find new methods to engage the students in the learning process, as described by Ben-David Kolikant (2009) that "schools have a responsibility for preparing the new generation for life" (p. 131), with the 21st century skills. Digital native or the Net generation learners use the Web 2.0 technologies frequently in their personal life to interact with their friends and families. New generation engagement usually happens outside the classroom (Spires et al., 2008; Ito et al., 2008; Luckin et al., 2009; Jones et al., 2010). The education sector might need to provide an environment that embraces such tools to support the engagement inside and outside the classroom for students' learning (Kuh, 2009; Krathwohl, 2002).

Web 2.0 technologies have been used widely because of the great importance of social media for educational purposes in higher education (Wheeler, 2008; Campbell, 2010). Consequently, there are numerous literature reviews dealing with the uses of social media/Web 2.0 technologies in higher education (Barczyk & Duncan, 2013; Tomberg et al., 2013; Zhang, 2013;Wang, Woo et al., 2011; Deng & Yuen, 2013; Lou et al., 2013; Garcia et al., 2013). Some higher education institutions use Web 2.0 technologies tools to transfer from a face-to-face environment to an eLearning environment (Malita, 2008) and others use Web 2.0 technologies to embrace the potential to combine both formal and informal learning.

3.4. Web 2.0 Technologies and Learning Experience

Social media/social networking as described by Greenhow (2011) includes: 1. Social networks sites (Facebook, Twitter, Linkedin, Ning and Myspace) 2. Bookmarking, media sharing, collaboration development and content organisation (Delicious; YouTube and Flickr; wikis and blogs and RSS feeds). More recently, there were a lot of researches in the field of Social media/Web 2.0 technologies in learning such as: Twitter for learning (Hsu & Ching, 2012; Junco et al., 2010; Ebner et al., 2010), Blogs for learning (Zhang, 2013; Deng and Yuen, 2013; Tomberg et al., 2013; Garcia et al., 2013; Lou et al., 2013), Facebook for learning (Barczyk & Duncan, 2013; Irwin et al., 2012; Junco, 2012;

Suwannatthachote, 2012) and Polls for learning (Vlachokyriakos et al., 2014; Cochrane, 2014; Brown et al., 2014; Dunn et al., 2013; Colazzo et al., 2010) which have used social media inside, outside the classroom or both. Social Media (SM) can be defined as:

> [W]eb-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site (Boyd & Ellison, 2007).

The learning experiences of students can be enhanced if the students experience both formal and informal learning and SM technologies support the informal learning (Dabbagh & Kitsantas, 2012). With the increased use of SM technologies by students for interaction, collaboration and sharing information (Liburd & Christensen, 2013), educators in higher education are looking for innovative methods to engage students in the learning process (Wheeler, 2009; Hughes, 2009). Students-students and students-instructor interaction enable students to collaborate, communicate, engage and enhance their learning experience (Dabbagh & Reo, 2011a; Valjataga, Pata & Tammets, 2011).

The effectiveness of SM on students' learning experiences has been studied inside and outside the classroom. Social media is increasing in popularity and the number of active participants is growing. Hadyn (2008) refers to a Becta Questionnaire of learners in the UK. 2,600 learners were surveyed; 74 percent had social media accounts and 78 percent were using the Web 2.0 technologies to upload their work. Interestingly, the uses of Web 2.0 technologies are used for personal and social purposes outside the class schedule (Becta, 2008). The 2010 ECAR (EDUCAUSE Center for Applied Research) conducted a study to investigate the attitude of students and the uses of information technology; they found that usage of social media is gradually integrated into their learning experience (Smith & Caruso, 2010). The two most well-known tools are Facebook and Twitter, Twitter users were more than 106 million (Miller, 2010) and Facebook users were more than 400 million (Stross, 2010). In addition, the most frequent tools used by students in American college is Facebook, but other instructors are more prepared to use Twitter in their classes for learning (Grosseck & Holotescu, 2009; Ebner, Lienhardt, Rohs and

Meyer, 2010; Schroeder et al., 2010; Reinhardt, Wheeler & Ebner 2010). Twitter is one of the applications of Web 2.0 technologies and it allows users 140 characters to write a message (Ebner, Lienhardt, Rohs & Meyer 2010; Hsu & Chin, 2012). McFedries (2007) defined Twitter as: "A microblog can be seen as a weblog that is restricted to 140 characters per post but is enhanced with social networking facilities". In this research, Twitter was used to represent Web 2.0 technologies outside classroom and Web polls was used to represent the Web 2.0 technologies inside classroom.

3.5 The research framework

The research framework as shown in Figure 7 suggests that engagement, communication, motivation, instructor credibility and aspects regarding learning are important factors that lead individuals to achieve a desirable learning experience. As Hughes (2009) explained, instructors in higher education are influenced by Web 2.0 technologies to find methods to encourage their students to be more active learners. This thesis highlights the factors affecting the impact of the interactivity of Web 2.0 technologies on students' learning experience found in the previous literature and the constructs are represented through a hypothesis as demonstrated in detail in the following sections.

Study 1A

Study 1B

H1   Motivation

H2   Communication

**Interactivity
outside the
classroom**

**Social media
(Twitter usage)**

**Student learning
experience**

H3   Engagement

H4   Instructor credibility

eedback

**Interactivity of
Web 2.0
technologies**

Study 2A

H1   Entertainment

Study 2B

H2   Future

**Interactivity
inside the
classroom**

**(Web Polls
participation)**

**Student learning
experience**

H3   Valuable

H4   Extended

H5   Learning

Figure 7 Web 2.0 technologies and learning experience

Feedback

3.5.1. Definition of Constructs

To examine the impact of the interactivity of Web 2.0 technologies on students' learning experience in the classroom, definitions for each construct from previous literatures were examined to develop the instruments. Under this section, the thesis explains all the constructs used in this research as shown in Table 3 and Table 4. The two main variables in the questionnaire that were used are the independent variables (usage of Web 2.0) and dependent variables (students' learning experience). More information was highlighted in the sections below.

Table 3 Web 2.0 technologies outside classroom (Questionnaire)

Wording	Code	
Usage of Web 2.0 (Twitter) 1. How many people do you follow on Twitter? 10 or less 11-50 51-100 101-00 201-300 300-500 500-1000 More than 1000 2. How many people are following you on Twitter? 10 or less 11-50 51-100 101-200 201-300 300-500 501-1000 More than 1000 3. On average, how many Twitter posts or retweets do you make per week? Less than 1 1-5 6-10 11-20 21-30 More than 30	T1 T2 T3	
Motivation 15. Twitter is a good way to post things as soon as I think of them 16. Twitter is a good way to keep a record of what I learn 17. Twitter is a good way to get information	Mov1 Mov2 Mov3	Lowe(2011)
Communication 18. I enjoy using Twitter 19. I use Twitter for social activities 20. I use Twitter to make personal connections with people	Com1 Com2 Com3	Lowe(2011)
Instructor Credibility 21. Using Twitter enabled me to communicate with my tutor outside my scheduled class 22. Using Twitter reduces the boundaries between students and tutors 23. Using Twitter makes my instructor more approachable	Cred1 Cred2 Cred3	Lowe (2011) Johnson (2011)
Engagement 24. Using Twitter has enabled me to make better use of my time 25. Being able to read posts by other students was a positive aspect of using Twitter 26. I would like to see more use of Twitter for Learning in my modules 27. Use of Twitter means it is not necessary to attend lectures 28. Twitter can be an effective tool for Learning	E1 E2 E3 E4 E5	Lowe (2011) Lowe (2011) Lowe (2011) Self Self

Table 4 Web 2.0 technologies Inside classroom (Questionnaire)

Participation using Web 2.0 technology (Web Polls)		
1. Did you participate in voting on the polls in class?		
Learning		
		Lowe(2011) & Chris (2009
2. The use of Web Polls was entertaining	ENT	Lowe(2011) & Chris (2009)
3. The use of Web Polls contributed to my learning	LER	
4. The use of Web Polls should be continued in future classes	FUT	Lowe(2011) & Chris (2009)
5. The use of Web Polls made a valuable contribution to the class	VAL	Lowe(2011) & Chris (2009)
6. The use of Web Polls should be extended to other modules	EXT	
.		Self

3.5.1.1. Independent Variables

In this thesis, the independent variable which is the Web 2.0 technologies was measured through 1) usage of Web 2.0 (item 1 to 3) for study (1A and 1B) Web 2.0 technologies outside classroom as shown in Table 3 and 2) students' participation in the class (item 1) for study (2A and 2B) as shown in Table 4.

3.5.1.2 Dependent Variables

In this section, we discuss each of these individual constructs of the students' learning experience and their theoretical link to the use of Web 2.0 technologies. These constructs were defined from different literature reviews. The dependent variables for (Interactivity outside classroom, 1A and 1B) were measured by using 14 items or questions related to Communication, Motivation and Engagement developed by Lowe (2011) and questions related to Instructor Credibility developed by Johnson (2011) as shown in Table 3, while the dependent variables for the (Interactivity inside classroom, 2A and 2B) were measured by using five items regarding learning, developed by Johnson (2011) and Chris (2009), as shown in Table 4 above. Based on the definitions from Table 5 and Table 6 below, specific

questions were reused from Lowe (2011), Johnson (2011) and Chris (2009) and grouped under each construct. In the other sections, there will be more elaboration on each construct and the questions that measure it in the questionnaire.

Learning Experiences (Web 2.0 Technologies outside the Classroom)

Table 5 Constructs of the questionnaires of interactivity of Web 2.0 technologies outside classroom

Construct	Definition	References
Communication	Willing To Communicate: Communication with different people for social relationship (WTC)/ Sending or receiving information/ Exchanging of information by speaking, writing or using other medium Learner- learner communication	Cho et al. (2007) McCroskey (1997) Liu and Shrum (2002) Wiberg (2007) Moore (1993)
Engagement	Involvement/ Feedback/ Cooperation among students/ Time/effort In-class/out-of-class engagement	Astin (1984) Chickering & Gamson (1987) Kuh (2009)
Motivation	Extrinsic motivation (Reward/ incentives)/ (privacy, convenience)	Davis, Bagozzi & Warshaw (1992) Huang et al. (2014)
Instructor credibility	Competence, character, sociability, composure, extraversion and caring/ Learners- instructor communication	Johnson (2011) McCroskey et al. (1974) and McCroskey et al. (1992) Moore (1993)

Classification

In this thesis, there were two questions which can be used to measure more than one variable, such as: Q18. I enjoy using Twitter (from Lowe (2011)) and Q21. Using Twitter enabled me to communicate with tutor outside the scheduled class (from Lowe (2011)). Q18. I enjoy using Twitter, can be used to measure motivation, not communication, but in this thesis, the extrinsic motivation is used to measure the students' motivation towards the usage of Web 2.0 technologies in their learning. In other words, motivation variables in this thesis are used to measure whether the use of Web 2.0 technologies is convenient or reliable for their learning not whether they perceived the use of Web 2.0 technologies is enjoyable to them. From the literature review, the extrinsic motivation is mostly used to measure the students' motivation (convenience or reliable) in their learning rather than intrinsic motivation (enjoyment). Huang et al. (2014) defined the extrinsic motivation as "the perceived importance of using technologies in relation to external awards relates to incentives" that the user may receive (Zhang, 2013; Janzik and Herstatt, 2008), as well that as extrinsic motivation is more important than intrinsic motivation (Oulasvirta et al., 2009). Based on this argument, this thesis decided to use the extrinsic motivation to measure the motivation variable not intrinsic motivation. So, this Q18 is used to measure communication, as shown in Table 3 through WTC (Willing to communicate), that the higher the level of communication the more they communicated for social relationships or learning in a social environment. Moreover, the variable communication is used to determine learner- learner communication, using Web 2.0 technologies for the interaction with friends and peers.

In addition, this thesis has another question which might fit well to measure more than one variable: Q21. Using Twitter enabled me to communicate with tutor outside the scheduled class. This question can be used to measure both Instructor Credibility and Communication. In this thesis, this question has been used to measure Instructor Credibility as shown in Table 3 not Communication. based on the classification and definition of instructor Credibility, that the student communicates with their tutor to measure the credibility. Moreover, the wording of this question fits well with the instructor credibility variable not with communication variables. As explained above, communication is used to measure peer interaction, learner-learner communication, while instructor credibility is used to measure

learners-instructor communication. So, Q 21 is used to measure Instructor credibility as shown in Table 3

More elaboration on this classification will be found in Chapter 5 under study 1A as scenarios. The future work of this thesis will highlight this issue to be addressed either by rephrasing the questions or using different definitions to those in this thesis. The following paragraphs will highlight the hypotheses of this thesis.

Motivation

In this thesis, the focus is on extrinsic motivation in the context of using technology in the learning environment. Huang et al. (2014) defined the extrinsic motivation as "the perceived importance of using technologies in relation to external awards relates to incentives" that the user may receive. In addition, Zhang (2013) studied the motivation in which the use of Web 2.0 technologies enhances and enthuses the student learning. Zhang et al. (2009) explored that students use Web 2.0 technologies based on extrinsic motivation. Moreover, Janzik and Herstatt (2008) reported that extrinsic motivation is more important than intrinsic motivation (Oulasvirta et al., 2009). In a study of 146 college students by Zhang (2013), respondents felt that the setting up of a classroom blog increased their motivation to learn. Another study by Harrison (2011) was conducted to study whether classroom learning was reinforced by students' participation in a blog communication outside class hours. The results demonstrated that students perceived the use of blogs outside classroom hours as motivational. In this thesis, motivation was measured by items (15, 16 and 17). The hypothesis for this construct is as follows:

H1: The use of Web 2.0 improves students' motivation

Communication

Willing To Communicate is defined by Cho et al. (2007) cited McCroskey (1997) that "the degree to which an individual is inclined to initiate communication with different people in various social settings". In addition, Cho et al. (2007) stated that "A high WTC individual feels more comfortable with initiating, continuing, and strengthening social relationships with new communication partners". Communication refers to sending or receiving

information (Liu & Shrum, 2002) or exchanging of information by speaking, writing or using other medium (Wiberg, 2007). Tess (2013) refers to the way that technology, such as the use of social media, is transforming communication between students in universities. Students interact through the sharing of photos, through games or by generating user content. According to Moore (1989), learner-learner interaction encourages the exchange of information through interpersonal communication. In addition, McCarthy (2010) suggests that Facebook encourages learners to develop peer relationships. In a questionnaire survey of 300 students, Kabilan et al. (2010) found that 72% of participants found that the use of social media impelled them to interact and communicate. A study by Brady et al. (2010) looked at the use of Ning by online graduates and found 70% of respondents agreed that social network services enhanced communication between peers as opposed to face-to-face communication. Furthermore, Ebnar, Lienhardt, Rohs and Meyer (2010) revealed that students' use of microblogging as a means of communication supported formal and informal social interaction.

In this thesis, communication was measured by items (18, 19 and 20). The hypothesis for this construct is as follows:

H2: The use of Web 2.0 improves students' communication

Instructor Credibility

Credibility refers to the competence, character, sociability, composure, extraversion and caring nature of an instructor (McCroskey et al, 1974, 1992). Sharing personal information, such as pictures and conversations held outside the classroom on social networking sites (like Twitter), increases instructor credibility. Furthermore, social networking sites can help with the development of trust, and help enhance students' perception of their teacher (Johnson, 2011; Johnson & Wiedenbeck, 2009). The usage of social media by the educators (Irwin et al., 2012) focuses on the impact of social media on instructor credibility. Johnson et al. (2011) argued that it is essential to study instructor credibility since previous studies found that credibility has a significant influence on student learning (Frymier & Thompson, 1992; Martin et al., 1997; Schrodt et al., 2009). Li (2009) studied the use of virtual office

hours (Facebook's instant messaging) to communicate with their instructor outside the classroom using Web 2.0 technology. The findings suggest that students that were using the virtual hours had higher feeling towards the use of Facebook instant message compared with the student using the traditional way of meeting hours. Furthermore, Moore (1989) noted the importance of communication between the instructor and the learner and its positive influence on the learning experience.

In this thesis, Instructor Credibility was measured by items (21, 22 and 23). The hypothesis for this construct is as follows:

H3: The use of Web 2.0 improves Instructor Credibility

Engagement

Engagement refers to the investment a learner places in their studies, such as the time or effort invested inside or outside the classroom to enhance the learning experience (Kuh, 2009). Cochrane (2014) conducted a collaborative project on the use of mobile Web 2.0 technology in higher education. The results show that Web 2.0 tools increase student engagement. A study conducted by Sadaf et al. (2012) on the intent of teachers who will use Web 2.0 technology in their classrooms in the future reported that 51% would consider using these tools as an instructional methods in which it enhances the engagement of the students and increase their learning. In addition, Junco (2012) found that the use of Facebook resulted in a negative relation to student engagement. A study done by Suwannatthachote (2012), found no relationship between Facebook usage and engagement of the group; in contrast, there is a positive relationship between the usage of Facebook and engagement of the learners as reported by Heiberger and Harper (2008). Furthermore, McCarthy (2010) highlighted that Facebook activity logs increase engagement with an assessment task. Harrison (2011) concluded that blogging helped increase student engagement and encouraged the development of informal learning communities. In this thesis, engagement was measured by items (24, 25, 26, 27 and 28). The hypothesis for this construct is as follows:

H4: The use of Web 2.0 improves students' engagement

Learning Experiences (Web 2.0 Technologies inside the Classroom)

Table 6 Constructs of the questionnaires of interactivity of Web 2.0 technologies inside classroom

Construct	Definition	References
Perceived Learning	Learner's feeling or beliefs	Sun and Hsu (2013)

Perceived learning refers to the "learner's feeling or beliefs that learning has occurred" as defined by Sun and Hsu (2013), p.173. Marrison (2006) cited Alexander's findings in which the use of technology enhances learning and student can get feedback on their learning (p.3). In addition, Lou et al. (2013) adopted a quasi-experimental approach using students' blog-assisted life education. The study found that students' blog-assisted life education enhances learning. Moreover, the usage of Twitter between respondents as reported by Ebner and Schiefner (2008) is valuable. Hsu and Ching (2012) used mobile microblogging (Twitter) activities in an online course in a mid-size state university. The study concluded that the students have a positive perception of using mobile microblogging activities for supporting their learning and connecting them with their peers. Also, Schroeder and Greenbowe (2009) formed a Facebook group in order to facilitate students-students and students-instructor communication. A comparison found that the use of Facebook was better for discussion than the use of WebCT's. In addition, Irwin et al. (2012) reported that the Facebook usage in four different courses in the university might be an essential tool for learning.

Entertaining

In this thesis, entertainment was measured by items (2). The hypothesis for this construct is as follows:

H1: The use of Web 2.0 enhances entertainment

Contributed to learning

In this thesis, this construct was measured by items (3). The hypothesis for this construct is as follows:

H2: The use of Web 2.0 contributes to my learning

Continued to Future Classes

In this thesis, this construct was measured by items (4). The hypothesis for this construct is as follows:

H3: The use of Web 2.0 should be continued in future classes.

Valuable Contribution

In this thesis, this construct was measured by items (5). The hypothesis for this construct is as follows:

H4: The use of Web 2.0 makes a valuable contribution to the class.

Extended to Other Modules

In this thesis, this construct was measured by items (6). The hypothesis for this construct is as follows:

H5: The use of Web 2.0 should be extended to other modules.

3.6 Conclusion

Chapter 3 established the Conceptual Framework of this research from the academic literature in relation to the interactivity of Web 2.0 technologies and students' learning experience in higher education. The two main variables, which are the independent and

dependent variables, have been defined based on previous literature reviews. The conceptual framework from this chapter leads this research to the methodology, methods and the data analysis that were implemented in order to answer the research question in Chapter 4.

CHAPTER 4 RESEARCH METHODOLOGY

4.1. Introduction

The general aim of the thesis is to determine whether the interactivity of Web 2.0 technologies enhances the students' learning experience. The literature about Web 2.0 learning, as discussed in Chapter Two, revealed many factors that impact on student learning, but also revealed a gap in our knowledge in regard to student experiences. In general, the methodology was designed to allow the students and teachers to convey their background information and reveal their experience in the context of using the Web 2.0 technologies in the learning process in which they were involved. This chapter explains the methodology adopted to guide the work and to address the research question "Does the interactivity of Web 2.0 technology enhance the learning experiences of students?" The discussion will explain and justify the findings. The selection of methods consists of qualitative and quantitative techniques to acquire data and perform analysis for the study. The ethical consideration, research design, methodology, data-collection instruments, analysis methods and methodological rigour are outlined in detail in the following sections.

4.2. Ethical Considerations

Ethical approval for the studies was obtained from the Brunel Business School Ethics Committee. Interview participants were given an information sheet outlining the purpose of the interviews. This indicated the general area of interest without disclosing the research hypotheses in order to reduce the effects of interviewee bias. The information sheet informed them that participation was entirely voluntary and they could stop and withdraw from the interview at any time. This ensured that no information was given under duress and participants did not suffer unnecessary distress. The information sheet informed them of the duration of the interview so they did not experience unexpected pressure of time. It also informed them that the data would be kept confidential and the identity of the participants would be kept anonymous so that, so far as is reasonably possible, the source of the data could not be traced to a specific individual. Participants gave verbal informed consent to be

interviewed. All these considerations both ensured the protection of the rights of the individuals, and also allowed the participants to be honest in sharing their personal opinion and experiences to ensure the integrity of the data.

Similar considerations applied to the questionnaires. Participants were given a brief outline of the purpose of the research and an indication of the expected time it would take to complete the questionnaire. They were explicitly asked not to disclose their names in completing the questionnaire in order to ensure anonymity. They were asked to be as honest as possible but were told they could decide not to continue with answering questions at any time if they wished. This was designed to ensure the integrity of the data as well as protecting their rights.

4.3. Field Study Research Design

This thesis employed a replicated-field-study design similar to Mayer's (2009) methodology; the difference is that this study used a mixed-methods approach where both methods, quantitative and qualitative data, were collected and analysed. The researcher elected to use the field-study design because it allowed for in-depth exploration of student experiences in a real setting. Field study is described in the literature as a purposeful, systematic and selective way of watching an interaction or phenomenon as it happens (Bouchard, 1976). The data for this thesis was gathered in four in-depth field studies and further information on students' learning experience was gathered using online questionnaires, questionnaire and semi-structured interviews. Four mixed-method field studies were done: two to investigate interactivity outside the classroom (Chapter 5 Social Media) and the other two to investigate interactivity inside the classroom (Chapter 6 Web Polls). This research started with Field Study 1A (Interactivity outside the classroom: Social media), followed by data collection through the online questionnaire and staff interview. The feedback from both students and staff from Field Study 1A were fed into Field Study 1B (Interactivity outside the classroom: Social media), which had the same procedure. This procedure continued for the remaining field studies, 2A and 2B (Interactivity inside the classroom: Web Polls).

4.4. Mixed-Methods Methodology (Triangulation)

This research used a triangulation mixed-methods methodology, which allows the research to have the advantages of quantitative and qualitative methods while at the same time compensating for the known disadvantages of each of these methods (Creswell, 2007). Cohen et al. (2007) defined triangulation as "the use of two or more methods of data collection in the study of some aspect of human behaviour". The primary purpose of employing this method is to acquire a fuller description of the context of the experience that allowed the researcher to understand and describe the effect of Web 2.0 tools on the students' learning experience, to establish rigour and to strengthen the results. Merging the results of several methods not only allowed this thesis to compensate for the weakness of one method with the strength of another, as shown in Figure 8, but also helped to better understand students' behaviour by studying it from more than one point of view (Cohen, Manion & Morrison, 2007). In addition to that, Creswell and Plano-Clark (2006) stated that using this method is ideal when one wants to "compare results or to validate or confirm quantitative results with qualitative findings". This has been put into practice here by using data-rich mixed-methods studies that have contributed to the theoretical foundation in methodological design for gathering data from students about their experience in using Web 2.0 technologies in their learning process.

In this research, methodological triangulation was used to answer the research question and has implemented both categories of Denzin's (1970b) typology which were 'within methods' triangulation (replication) and 'between methods' (reliability). Triangulation "within methods" is where the study can be replicated in order to test the reliability and confirm the theory. Triangulation "between methods" is the use of different methods in collecting the data in the same study. In this respect, Cohen et al. (2007) stated that the notion of triangulation bridges issues of reliability and validity. This has been put into practice here by using data-rich multi-method studies that have contributed to the theoretical foundation in methodological design for gathering the experience aspects from students in using Web 2.0 technologies in their learning process.
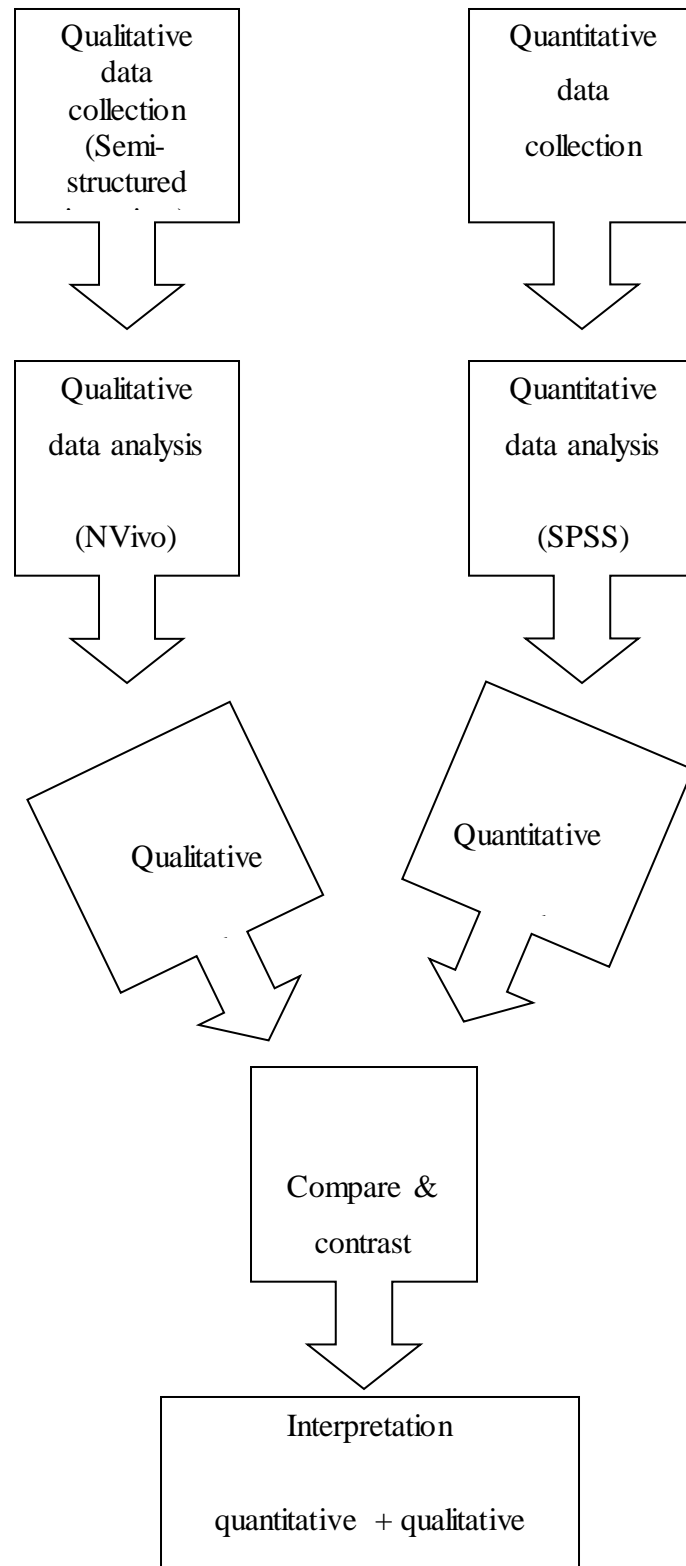
Figure 8 Research-methodology procedure

4.5. Methods of Collecting Data

This section describes the range of tools used for the collection of data. Each tool has its own merit in capturing specific data relating to the students' Web 2.0 learning experience. The selection of tools listed here corresponds to the research question, which aims to determine whether the interactivity of Web 2.0 technologies enhances the students' learning experiences. The different methods used to collect data in this research are presented in Table 7. Further elaboration of each adopted tool is discussed in the upcoming sections.

Table 7 Summary of tools for data collection in this research

	Tool	
Study	Questionnaire	Semi-structured interview
Study 1A **(Web 2.0 technologies outside classroom)**	Online questionnaire one	Staff interview (4)
Study 1B **(Web 2.0 technologies outside classroom)**	Online questionnaire two	Student interview (5)
Study 2A **(Web 2.0 technologies inside classroom)**	Hard copy questionnaire	Not done Exam time
Study 2B **(Web 2.0 technologies inside classroom)**	Hard copy questionnaire	Student interview (5)

4.5.1. Questionnaire Survey

The online questionnaires and hard copy questionnaires were designed to capture information relating to the way Web 2.0 technologies were perceived and used, as well as to study the effect of the interactivity of Web 2.0 technologies on the student learning experience. The data extracted using these tools provides further information about students' experiences in a Web 2.0 learning environment, such as students' attitudes, behaviour and learning engagements over the duration of one semester.

Online Questionnaires

Two field studies considering interactivity outside the classroom were conducted utilising different questionnaires: one field study utilised an online questionnaire and the other field study utilised a reflective online questionnaire as highlighted in sections 4.4.1.1 and 4.4.1.2 below. Both questionnaires were conducted at the end of the semester to measure students' overall experience in regard to using the Web 2.0 technologies in their learning process. The elements of the questionnaires were influenced by studies measuring student engagement, student motivation and communication (Lowe, 2011) and instructor credibility (Johnson, 2011). For example:

Twitter is a good way to keep a record of what I learn.
1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

4.5.1.1. Online Questionnaire One

The questionnaire for the first study consisted of 26 Likert-scale and non-Likert-scale questions using 5-point agreement levels from 1 (strongly disagree) to 5 (strongly agree), designed to collect responses from students (Appendix A). An online questionnaire was administered consisting of 14 non-Likert-scale demographic questions to identify age, gender and device usage. There were then 12 Likert-scale questions using 5-point agreement

levels from 1 (strongly disagree) to 5 (strongly agree). The questions were categorised to measure Twitter usage, motivation, communication, instructor credibility and engagement.

4.5.1.2. Online Questionnaire Two

The questionnaire was mainly derived from previous online questionnaires with little modification and from the early understandings gathered from previous data collection. There were 25 Likert-scale and non-Likert-scale questions using 5-point agreement levels from 1 (strongly disagree) to 5 (strongly agree), designed to collect responses from students (Appendix B). The questions were categorised to measure Twitter usage, motivation, communication, instructor credibility, engagement and performance. Overall, the main strategy for the reflective questionnaire was to keep the questions simple while attempting to achieve maximum impact. Another goal was to validate the data from a previous questionnaire in this study.

Questionnaire

Two field studies considering the interactivity inside the classroom utilised the same questionnaire as highlighted in section 4.4.1.3. The elements of the questionnaire were influenced by a study measuring interactivity (Evans, 2008), For example:

The use of Web Polls contributed to my learning:

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

4.5.1.3. Questionnaire

There were 16 Likert-scale and non-Likert-scale questions designed to collect responses from students (Appendix C). A questionnaire was administered, consisting of 11 non-Likert-

scale demographic questions to identify age, gender and internet usage. There were then 5 Likert-scale questions using 5-point agreement levels from 1 (strongly disagree) to 5 (strongly agree). Details of all 16 questions are given in Chapter 6.

4.5.1.4. Bias in Questionnaire

Bias is the process by which the researcher or participant influences the results in order to portray a certain outcome. In order to minimise the effects of response bias, participants were not told the research hypotheses and were only given a vague indication of the subject of study. In the questionnaire, themes were addressed using multiple questions in order to try to establish consistency and reduce the effects of bias arising from individual questions. It is difficult to eliminate bias in all questions. However, the questions were phrased as clearly and concisely as possible without the use of jargon or use of theoretical concepts. Wherever possible, questions were grounded in the real-life experiences of participants rather than being abstract.

There are certain advantages and disadvantages for using questionnaires, as Oates (2006) described as follows:

4.5.1.5. Advantages of Questionnaire

1. Does not cost time and money for the researcher.
2. Questions with Likert-scales or closed questions help the researcher to analyse and the participant to answer the questions.
3. There are different ways to send the questionnaire: telephone, emails and by post.

4.5.1.6. Disadvantages of Questionnaire

1. The limited options for the respondents, such as closed questions, might be biased and restrict their answers.
2. The researcher does not have the opportunity to discuss the questions with the participant to find the true answers.
3. The researcher cannot give more explanation to the participant.

4. "Self-administered" questionnaires will be difficult for those participants with difficulties in learning.

4.5.2. Semi -Structured Interviews

Three field studies utilising several open-ended questions were summarised and used to gather participants' perceptions of the effects of the interactivity of Web 2.0 technologies in the learning process. All the data obtained from the semi-structured interview transcripts were thematically coded and analysed using a code scheme framed around students' learning experience. Further description regarding analysis of the data is discussed in Chapters 5 and 6.

4.5.2.1 Bias in an Interview

Interviewer bias is mitigated by trying to avoid influencing interviewees through comments, tone or non-verbal behaviour on the part of the interviewer. Questions were addressed in as neutral a way as possible, and the interviewer was conscious to avoid any body language which might communicate their preferences to the interviewee. Care was also taken not to interrupt the interviewee which might otherwise have the effect of directing them to a preferred answer.

There are also advantages and disadvantages for using interviews, as Oates (2006) described as follows:

4.5.2.2. Advantages of Interviews

1. This technique helps the researcher to have more details in the concept that is investigated.
2. This depends on the researcher skills and does not need more tools to be used.
3. Comfortable techniques in gathering information since the interviewer can control the interview to have more details from the interviewees.

4. Interview in some cases is better than questionnaire since it gives the participants the chance to explain their opinion more in depth rather than to limit them in writing.

4.5.2.3. Disadvantages of Interviews

1. It needs time and effort from the researcher to transcribe the interview and choose the suitable analysis.
2. The voice tone of the researcher might influence the participant to answer differently and they might give the answer the interviewer needs. This also will affect the reliability if there is no consistency in the answers by interviewees.
3. The participant might feel uncomfortable when they are recorded by tape recorder or video recorder; this will lead to a different impression from the interviewees.
4. The interviewers need skills and knowledge on the topics to be investigated since it might need more elaboration from the researcher to the interviewees.
5. It is limited to a small sample, therefore this technique cannot be used for generalisation about the population.

4.6. Sampling

4.6.1. Convenience Sampling

This thesis focused on adult learners over the age of 18 enrolled as undergraduate and postgraduate students at Brunel University. They were full-time students whose ages ranged from 18 to 42 (more elaboration on the participants in each study is described in Chapters 5 and 6). According to Cohen, Manion and Morrison (2007), "convenience sampling involves choosing the most easily available individuals to serve as respondents and continuing that process until the required sample size has been obtained from those who happen to be available and accessible at the time" (p.113). In addition, they said that "captive audiences such as students or student teachers often serve as respondents based on convenience sampling" (p.114). A variety of sample sizes were required across the methods and the decision was made to engage in convenience sampling for the data-collection activities.

According to Creswell, Plano-Clark and Garrett (2008), "different sample sizes are common in Mixed-methods design because quantitative and qualitative data are usually collected for different purposes" (p. 74).

4.6.2. Bias of Convenience Sample

Convenience sampling involves choosing those institutions that are flexible and easy to access. According to Cohen et al. (2007), a convenience sample might not represent any group separately from itself; it is not used to generalise the sample to the larger population. This weakness might produce a bias, but this can be overcome by using triangulation, in which using different methods for collecting the data within one study will enhance the reliability and validity.

4.7. Approach for Data Analysis

This thesis adopted a mixed methods approach. Generally speaking, two sets of data were collected for each study: one quantitative and one qualitative. The data sets were analysed separately. This design excels at bringing insights derived from two methods to the analysis of a given phenomenon. The studies start with a questionnaire survey (subject to quantitative analysis) and then collect qualitative data in order to provide richness and give insight into the numerical data (Oates, 2006). To ensure internal validity, mixed methods data were collected so as to cross-validate the information obtained from the research. Data were collected from the questionnaire, the online questionnaire, the student semi-structured interviews and the staff semi-structured interviews.

4.7.1. Quantitative Data Analysis

The quantitative data sources involved in this research were derived from two online questionnaires distributed to students. These questionnaires consisted mainly of Likert-scale

questions which were numerically coded. The data were analysed using SPSS 18, both descriptively and inferentially. Full details of the questions are presented in the next two chapters. Generally speaking, however, the questions consisted of statements with a 5-point agreement scale coded from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) to 5 (strongly agree). Negative questions (e.g. "Use of Twitter means it is NOT necessary to attend as many classes") were presented in the same way to participants, but were reverse coded 5 (strongly disagree), 4 (disagree), 3 (neutral), 2 (agree) to 1 (strongly agree). This ensured that for all Likert-scale questions, higher scores would represent more positive attitudes.

Descriptive statistics were computed by first calculating the frequency for each point on the scale for each question. The questions were then grouped into their corresponding variables and the means and standard deviations calculated for the resulting interval data (Boone & Boone, 2012). These statistics allow an overview of the extent to which responses are negative or positive for each variable of interest. These measures of central tendency and variance are useful in summarising the data. The main drawback to the use of descriptive analysis is that it describes only the sample of participants involved in each of the studies rather than the population as a whole. Care needs to be taken in generalising beyond the samples. Inferential analysis was conducted to assist with this process.

Inferential statistics were used to assess the extent to which the observations involving the sample are generalisable to the population more generally by calculating the probability of a random sample exhibiting the same characteristics. Two kinds of inferential analyses were performed: one-sample Student's t-test and Pearson correlation coefficients. One-sample Student's t-test was used to determine whether there was deviation from neutrality (Bland, 2000; Kanji, 1994). The hypotheses predict that use of Web 2.0 technologies improves specific learning experiences. A positive deviation from neutrality is thus the first indicator that the data might support the hypotheses. For example, if the mean score for the questions relating to improving communication was significantly greater than neutrality, this lends initial support to the hypothesis that communication has been improved.

Where the *t*-test revealed a significant difference, the effect size was also calculated using Cohen's *d* as Burns (2000) described (where $d= +/- 0.2$ is small, $d= +/- 0.5$ is medium, $d=+/- 0.8$ is large) (p.185). All tests were performed using a significance threshold of $\alpha = .05$.

The use of the one-sample Student's *t*-test is a fairly crude measure of deviation. The null hypothesis assumes the population mean $\mu=3$ (neutrality). The use of the test also assumes that the population from which the sample has been drawn is normal and that the sample observations are random. Whilst there are grounds to question each of these assumptions in the studies, the one-sample Student's t-test is fairly robust in the face of minor violations and forms the basis for many similar questionnaire analyses (e.g. Kaplan,2010; Lowe, 2011; Lou et al., 2013; Tomberg et al., 2014).

According, to Kaplan et al. (2010), 191 students were participated in their study from Marketing Management course and 3 instructors. During the beginning of the year the students informed to create a blog as groups, five students in each group. The students had to post a 5 blogs through the course. After the students completed the course, a survey emailed to 81 students contained 42 statements rated on 5 point Likert-scale, 1 ' I completely Disagree' and 5 ' I completely agree'. The study implemented a one sample *t*-test with the midpoint 3 ' neither agree nor disagree' as the test value to compare with. The results found that 37 statements were higher than 3, 2 statements were below 3, 2 negative statements were below 3 and 1 statement no significance difference. They conclude that the Marketing course blog enhanced the students' skills. Another study done by Lowe et al. (2011), implemented the same strategy in their study, in which they used one sample *t*–test with 3 is the 'neutral' or ' no difference' point. 46 questions were administrated to the 123 students in marketing course with Likert scale 1' strongly Disagree' and 5 ' Strongly Agree'. The results were 80% statistically different from 3 and 20% were not statistically different 3. They conclude that that Twitter is a good tool to enhance the learning outcome of students.

Pearson's correlation coefficients were used to determine whether there was a correlation between the independent variable (technology usage) and each of the dependent variables. Coefficients approaching 1 (or -1) suggest there is a strong association between the amount of technology usage and improvement of the learning experience.

Analysis using Pearson's correlation also makes four assumptions. Firstly, the data must be interval or ratio. The process of grouping and combining Likert-scale questions ensures that they are interval level rather than ordinal. The other assumptions are: there is a linear relationship between each pair of variables; there are no significant outliers; and the variables are approximately normally distributed. Any significant outliers were removed before calculating the coefficients

The level of significance (probability value) for each of the correlation coefficients allows us to measure the interval confidence for the data in the sample being representative of the population.

4.7.2   Qualitative Data Analysis

Qualitative data was collected by means of semi-structured interviews with both students and staff. A deductive approach was adopted, using categories that arose from the literature review. This differs from the more traditional approach in which induction is used to code the qualitative data, generating hypotheses or theories after the data has been collected. However, the literature is strong enough to be able to form hypotheses prior to data collection. This allowed analysis of the data to be conducted with specific categories or codes already in mind. This also makes it easier to triangulate the quantitative and qualitative approaches, since both are conducted in a deductive way. The qualitative findings are then more easily utilised to elucidate and elaborate the quantitative findings. Silver and Lewins (2014) suggest that "there are many reasons for taking such an approach, for example, where the intention is to test an existing theory or hypothesis on newly generated data, or to investigate its transferability to different social context; or due to perceived time constrains or for other pragmatic reasons" (p. 166).

For example, in this study 1A (Interactivity outside classroom: social media) the themes were derived from the theoretical framework shown in Figure 7 as follows: (Communication, Motivation, Instructor credibility and Engagement) and (Barriers) comes from the interview question; more elaboration on these themes will be found in Chapter 5. A similar argument applies for study 2A (Interactivity inside classroom: Web polls), where the themes come from the research hypotheses, see Figure 16 (Participation and Enhancement) while

(Barriers) comes from the interview question. More discussion of the themes is provided in Chapter 6. This deductive approach was also repeated for the other two field studies (1B and 2B). This procedure of pre-developed themes was based on the description of Miles and Huberman (1994) cited by Silver and Lewins for the deductive approach as "a variety of factors (e.g. the conceptual framework, research questions, hypotheses, problem area) inform the generation of a provisional list of codes prior to commencing fieldwork" (p. 166). As Miles and Huberman (1994) argue, there is no single or well-accepted approach to analysing qualitative data. The approach is modelled on the observations by Hussey and Hussey (1997), who suggest: "If you have commenced your study with a theoretical framework, this will provide a structure and may give prior specification of categories into which data can be fitted"(p.248).

The qualitative analysis made use of NVivo. After collecting the data from the interviews, the data were transcribed and saved in simple names as "staff name" or "student1" and so on. The first step in NVivo is to create the codes or themes which can be found under the "Nodes" e.g. under Nodes, "Communication" was created and so on for all the codes for the four studies. Then the transcript file for the staff1 was imported in NVivo by choosing "Source". Then the researcher looked for data from the responses regarding communication, highlighted it and dragged it under this code; from this stage, new sub codes might arise under the main code, in which new sub codes e.g. "Communication tool" or "Interaction" etc. were generated while reading through the transcript, and some of the sub codes have been refined while repeating this step. This procedure was repeated for all the transcript files, 4 staff and 10 students from three field studies (1A, 1B and 2B). Then NVivo generated a combined file (e.g. has been named as "Communication") for all the responses from staff regarding this code or theme. Also, this software generates a tree file for all the codes and sub codes from the transcript file. This procedure was carried out again and again for the other codes for both staff and students. Then the findings were reported in the thesis in Chapter 5 and Chapter 6 under the "Qualitative findings" and interpreted in the discussion in Chapter 7.

Summary of the steps that were carried out in this research for the qualitative analysis using NVivo 10:

1. Collect the data through the semi-structured interview

2. Transcribe the interview

3. Upload or import the transcript data into NVivo 10

4. Create themes/codes that are generated from the theoretical framework and from the interview questions

5. Drag the responses to the codes from the transcript files for both staff and students

6. Describe findings, report the findings and interpret the meaning as shown in Chapter 7.

Each dataset is analysed and presented in Chapters 5 and 6. Then the qualitative and quantitative results are compared. The comparisons of the findings as a result of merging the two datasets are elaborated upon in a discussion detailed in Chapter 7.

4.8. Methodological Rigour

This thesis considered the rigour of the research design that has been used. To evaluate the quality of this research reliability, validity and generalisability of the studies are described in the following sections.

4.8.1. Reliability

In this research, Cronbach's alpha has been used to find out the internal reliability by using SPSS v20. Cronbach's alpha is a good indicator of the internal consistency of instruments thus it can be used for questionnaires that have Likert scales (Burns, 2000; Black, 1999). According to Black (1999), internal consistency is important in any instrument. Items or questions measuring the same concept should produce similar results irrespective of their number (Kumar, 2014). In addition, replication is used in this research to test the reliability (Burns, 2000; Hussey & Hussey, 1997). According to Hussey & Hussey (1997) replication is "repeating a study as a check on reliability" (p.57). Replicated field studies using the same methods of data collection and analysis were used. Each of the studies on the effects of interactivity inside and outside the classroom was repeated under similar conditions. So, for example, Study 1A investigated the effects of interactivity outside the classroom by surveying a group of 252 undergraduate students using Twitter. Study 1B then repeated this

investigation, this time using 184 different undergraduates with a slightly modified questionnaire and with the addition of interviews with students to collect triangulating qualitative data. Thus Study 1B replicates Study 1A. A similar procedure was used to investigate the effects of interactivity inside the classroom, Study 2B replicates Study 2B. The purpose of using the replication is to find out whether the results will be the same as the first study (Yin, 2009). LeCompte and Preissle (1993, p.334) argue that such replication might include repeating:

- "the status position of the researcher"
- "the choice of informant/respondents"
- "the social situations and conditions"
- "the analytic constructs "
- "the methods of data collection and analysis."

Instead of statistical tools and tests, the qualitative research focuses on incorporating methodological strategies for the purpose of reliability. Thus, to ensure the reliability of data, to avoid personal biases in sampling and data collection, methods were critically reflected upon. Moreover, it was ensured that record keeping was carefully maintained and interpretation of different themes was consistent. Comparisons were established across interviews and quantitative data in order to identify differences and similarities. Furthermore, a reflexive approach (Creswell, 2003) was followed to ensure self-awareness. Data was looked at many times and interpretations were discussed with a few of the respondents in order to make sure of the consistency in the meanings of the data.

4.8.2. Validity

Validity refers to how well key questions are relevant to the aims and objectives of the study (Creswell, 2003). Essentially, the purpose of validity is about how trustworthy the study is and it is related to the chosen measures to for the purpose of achieving the aims and objectives of the study. According to Creswell (2003), to overcome the validity issues, the study is considered valid if the questions and constructs that measure different variables are based on the previous literature. To ensure the validity of qualitative research, the questions asked of the respondents were based on the literature. Moreover, follow-up interviews were

conducted. In addition, other than the formal interviews, informal chats and discussions were held with the interviewees. Any intermediary links between the interviewer and interviewees were avoided in order to offer primary interpretations (Creswell, 2003).

For quantitative data, Zikmund's (2003) suggestions were followed. According to Zikmund (2003), validity has different types and these include construct validity, discriminant validity, predictive validity, concurrent validity, criterion validity and face validity. According to Zikmund (2003), face validity and construct validity are important and care must be taken in relation to these during research. Face validity in this study was ascertained by critically analysing the literature and pulling out and establishing themes relevant to the research aims and hypotheses. On the other hand, construct validity was ensured by developing appropriate items that are suitable to measure the constructs under study and are clearly relevant to the aim of the study.

Moreover, in this study, validity was supported through the usage of mixed methods (questionnaire and semi-structured interviews) for collecting the data of the fields studies used, which allowed the researcher to achieve triangulation. Validity as explained by Oates (2006) "is the extent that the researcher investigated what was intended to be investigated or collected the right data from the right sources". In the questionnaires, data from 245 students were collected for Study 1A and data from 184 students were collected for study 1B. In the semi-structured interviews, data from four staff for study 1A and five students for study 1B were collected in order to promote a different investigation and provide more information to describe the concept under each study. Therefore, the results will be more precise. This procedure is carried out for the other two field studies (2A and 2B). Cohen et al. (2007) defined 'triangulation as the use of two or more methods of data collection in the study of some aspect of human behaviour' (p.141).

4.8.3. Generalisability

In this research, in order to ensure generalisability, empirical or statistically significant generalisation has been adopted when the research constructed sample in which the research is trying to test whether the sample chosen represents the population (Hussey & Hussey, 1997). Statistics is one method to generalise from sample to reflect its population. In this

research, generalisability was tested through the convenience sample to answer the two online questionnaires that are used in the interactivity outside classroom (1A and 1B). In addition, two questionnaires were used for the interactivity inside the classroom (2A and 2B). In generalisability, the research concerns the concept and the theories that are used in a specific context that might be used and implemented in different contexts (Hussey & Hussey, 1997). Gomm (2008) claimed that "what is true for sample is true for population from which the sample is drawn".

On the other hand, qualitative results offer analytical generalisations (Hussey and Hussey, 1997). For example, this study has offered lessons for the students and teachers of the universities on how to use Web 2.0 with caution in higher education. Similarly, this study revealed and suggested that the interactivity of the Web 2.0 technology improves the credibility of the instructor, increases the engagement and communication of students, and increases the motivation of students and results in a positive attitude to the use of Web 2.0 for learning. The results of this study may be used to create effective online and face-to-face courses using Web 2.0 technologies inside the classroom and outside the classroom, as well as to influence all educators and pedagogical policy makers in the use of Web 2.0 technologies; and to improve the effectiveness of Web 2.0 technologies in the classroom. The results of this study may provide justification for the use of Web 2.0 technologies in the classroom. These findings thus offer lessons for the educational institutions for improved use of Web 2.0.

4.9. Conclusion

Chapter 4 explored the research design, methodology, methods and data analysis that have been used in this thesis. The ethical consideration in conducting this research and the bias in sampling and methods were highlighted. Finally, the reliability, validity and generalisability of this research were described.

Chapter 5 will elaborate on the analysis and results of the interactivity of Web 2.0 technologies outside the classroom (Study 1A and Study 1B).

CHAPTER 5 INTERACTIVITY OUTSIDE THE CLASSROOM

5.1. Introduction

This Chapter contains a description and explanation of the research findings for both studies 1A (Social media: Interactivity outside the classroom) and 1B (Social media: Interactivity outside the classroom), obtained from the data collected from the Questionnaire and Semi-structured interviews. More elaboration in each study will be covered in the coming sections.

5.2. Study 1A (Social media: Interactivity outside the classroom)

5.2.1. Method

5.2.1.1. Participants

In total, 252 first-year undergraduate students participated in the questionnaire survey representing different views on the impact of Twitter on learning, and four staff members in the Business School at Brunel University in London, United Kingdom, were interviewed. The age of participants ranged from 18 to 24, with 91% between 18 and 21. 51% were female and 49% were male.

5.2.1.2. Design and Procedure

To address the research question, the following mixed-methods study was implemented to find the impact of the interactivity of social media on the student learning experience. In this thesis, the research was conducted through quantitative methods and the main research instrument was an online questionnaire. To test the validity of the questionnaire, three scenarios (scenario1, scenario2 and scenario3) were reported under this study in order to consider the best classification of the measurement used. With this data collection, a qualitative interview was used to explore the staff's perceptions about the impact of social media on learning. The students set up Twitter accounts during a laboratory session in the

first two weeks of the semester. Both tutors and students were encouraged to make posts using the module hashtag during the 12 weeks of the semester. Tutors were given regular suggestions for postings but were free to make whatever usage they desired. In the last two weeks, the students were asked to complete the questionnaire during a laboratory session, as shown in Figure 9. Data analysis was carried out using SPSS version 20.

The research started with

4 hypotheses

Create Twitter account

Practical

Brief Introduction

(6 classes) (1 hours)

Tweets with class teacher

26 questions

(10-15 mins)

Online evaluation questionnaire

Staff

Total number of students = 301

Participants = 252 students

Analysis (SPSS)

Analysis (NVivo)

Interview = 4 staff

Correlational analysis and t-test

Descriptive Statistics

Themes
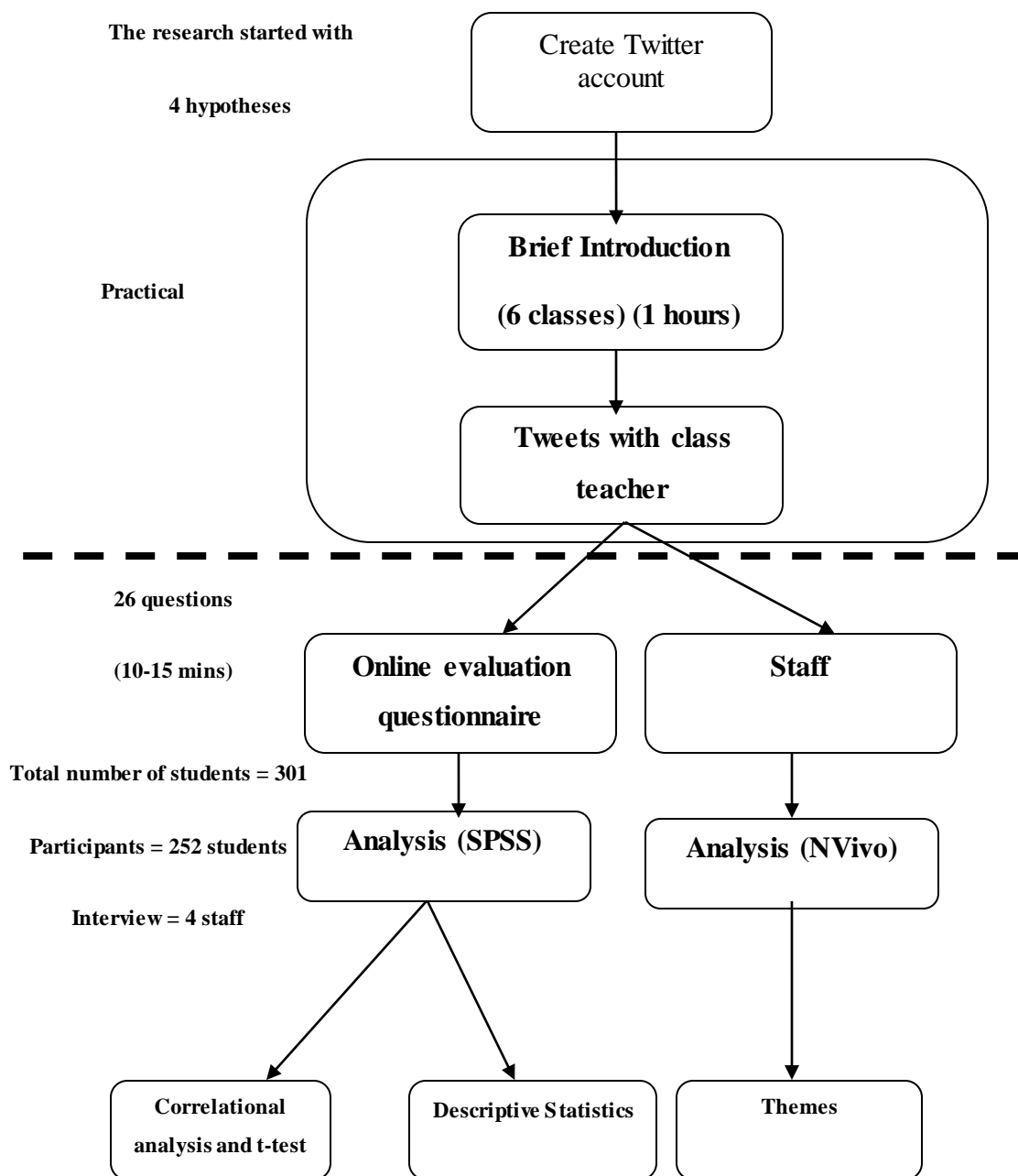
Figure 9 Twitter for Learning procedure (Source: (Buqawa, 2012))

5.2.1.3. Materials

Prior to the collection of data, students set up Twitter accounts on the Web and both tutors and students adopted hashtags using module codes (e.g. #MG1016) to identify their posts. The majority of students (47%) used their laptops to access Twitter; 27% used their smartphone using a Twitter application; and 19% used a desktop computer. The remainder (7%) used either a mobile Web browser or SMS. 44% of the students owned a Blackberry smartphone, and 23% an Apple iPhone. An online questionnaire was administered, consisting of several demographic questions to identify age, gender and device usage. There were then 14 Likert-scale questions using 5-point agreement levels from 1 (strongly disagree) to 5 (strongly agree), and three non-Likert scales representing the Twitter usage. The questions were categorised to measure Twitter usage, motivation, communication, instructor credibility and engagement. The wording of the key questions is shown in the Table 8 below.

Table 8 Non-Likert and Likert-scale questions

Wording	Code
How many people do you follow on Twitter?	T1
How many people are following you on Twitter?	T2
On average, how many Twitter posts or retweets do you make per week?	T3
Twitter is a good way to post things as soon as I think of them	Mov1
Twitter is a good way to keep a record of what I learn	Mov2
Twitter is a good way to get information	Mov3
I enjoy using Twitter	Com1
I use Twitter for social activities	Com2
I use Twitter to make personal connections with people	Com3
Using Twitter enabled me to communicate with my tutor outside my scheduled class	Cred1
Using Twitter reduces the boundaries between students and tutors	Cred2
Using Twitter makes my instructor more approachable	Cred3
Using Twitter has enabled me to make better use of my time	E1
Being able to read posts by other students was a positive aspect of using Twitter	E2
I would like to see more use of Twitter for Learning in my modules	E3
Use of Twitter means it is not necessary to attend lectures	E4
Twitter can be an effective tool for Learning	E5

5.2.2. Results of Scenario1

Four overall dependent variables were computed by taking the means indicated in Table 8. Cronbach's alpha was utilised to evaluate the internal consistency of each of these four dimensions. All of the variables were reliable with Cronbach's alpha > than .7, as shown in Table 9.

Table 9 Internal consistency of questionnaire using Cronbach's alpha

Cronbach's alpha	Calculated from mean	Overall variable
.744	M1, M2, M3	Motivation
.728	Com1, Com2, Com3	Communication
.792	Cred1, Cred2, Cred3	Credibility
.777	E1, E2, E3, E4, E5	Engagement

5.2.2.1. Twitter usage

Forty per cent of the participants already had Twitter accounts prior to the start of the study. Overall usage of Twitter was high given that they were essentially early adopters. 39% of students followed more than 10 people and 34% had more than 10 followers. 27% made more than one post per week.

5.2.2.2. Statistical analysis

Descriptive analysis was used in this research for all the measurements used 5 – Likert scale questionnaire items with the following format: 1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree and 5. Strongly Agree, as shown in Table 10. The overall of each variable (Motivation, Communication, Instructor credibility and Engagement) was used in this thesis

in which the overall was computed by the sum of scores of each question under this variable divided by the number of questions.

To assess the impact of Twitter for learning, two statistical tests were performed. In order to evaluate whether the Likert scores differ from a random population, a one-sample t-test was performed against the fixed value M=3. The effect size estimates Cohen's d as Burns (2000) described (where $d= +/- 0.2$ is small, $d= +/- 0.5$ is medium, $d=+/- 0.8$ is large) (p.185), were calculated independently for each variable as well as overall. An alpha level of .05 was used. A Pearson bivariate correlational analysis was used, taking overall Twitter usage as the predictor against each of the four dependent variables. Overall Twitter usage was calculated by taking the mean of T1, T2 and T3, shown in Table 8.

The Student's t-test results and Pearson co-efficient are reported for each of the four hypotheses in Tables 11 and 12 below.

Table 10 Mean (M) and standard deviation (SD) for test measures

Descriptive Statistics					
Questionnaire Item		N	Mean	Std. Deviation	%
Motivation					
Twitter is a good way to post things as soon as I think of them.	MOV1	247	**3.22**	1.079	40.48
Twitter is good way to keep a record of what I learn.	MOV2	246	2.57	.931	13.42
Twitter is a good way to get information.	MOV3	247	**3.30**	1.024	45.74
Communication					
I enjoy using Twitter.	Com1	245	2.84	1.074	23.26
I use Twitter for social activities.	Com2	246	2.68	1.128	24.79
I use Twitter to make personal connection with people.	Com3	246	2.79	1.111	26.02
Instructor credibility					
Using Twitter enabled me to communicate with my tutor outside the scheduled class.	Cred1	247	**3.14**	.922	35.62
Using Twitter reduces the boundaries between students and tutors.	Cred2	247	**3.30**	.946	41.96
Using Twitter makes the tutor more approachable.	Cred3	246	**3.26**	.947	47.96
Engagement					
Using Twitter has enabled me to make better use of class time.	E1	246	2.59	.870	11.78
Being able to read posts by other students was a positive aspect of using Twitter.	E2	246	**3.33**	.922	46.74
I would like to see more use of Twitter for learning in my modules.	E3	246	2.83	1.092	28.45
Use of Twitter means it is not necessary to attend as many classes .	E4	244	2.07	.987	9.426
Twitter can be an effective tool for learning.	E5	246	2.93	1.008	29.67

Table 11 Mean scores (M) and standard deviation (SD) for Twitter group on different overall test measures

Twitter group			Df	Student's *t*-test	P-value	Cohen's d	Test measure
M	SD	M					
1.7240	1.21505	3	244	-16.403	<.001	-1.050	Twitter usage overall
3.0271	0.82434	3	244	0.516	.607	0.03	Motivation overall
2.9129	0.61006	3	244	- 2.234	**.026**	-0.14	Communication overall
3.2344	0.78977	3	244	4.655	**<.05**	0.29	Instructor credibility overall
2.7527	0.71128	3	244	-5.398	**<.05**	-0.34	Engagement overall

** significant at p < .05

Table 13 Correlational anlaysis for study 1A

		Twitter overall usage	Motivation Overall	Communication Overall	Instructor Credibility Overall	Overall engagement
Twitter overall usage	Pearson Correlation	1				
	Sig. (1-tailed)					
	N	244				
Motivation Overall	Pearson Correlation	.259**	1			
	Sig. (1-tailed)	.000				
	N	243	246			
Communication Overall	Pearson Correlation	.409**	.552**	1		
	Sig. (1-tailed)	.000	.000			
	N	243	244	245		
Instructor Credibility Overall	Pearson Correlation	.064	.508**	.226**	1	
	Sig. (1-tailed)	.161	.000	.000		
	N	243	246	244	246	
Overall engagement	Pearson Correlation	.210**	.678**	.413**	.637**	1
	Sig. (1-tailed)	.001	.000	.000	.000	
	N	239	240	239	240	241

**. Correlation is significant at the .05 level (1-tailed).

As shown in Table 11, the *t*-test results revealed that the group using Twitter was not neutral about the instructor credibility (*d*=0.29) and was not neutral about motivation (*d*= 0.03), overall communication (*d*=- 0.14) and engagement (*d*=- 0.34). The results of the correlation analysis show there is a statistically significant relationship between the Twitter usage and students' overall motivation, students' communication and students' engagement at the 99% confidence interval. Meanwhile, there is no statistically significant relationship between the Twitter usage and instructor credibility. More elaboration is made on the results of each hypothesis in the following paragraphs.

H1: Twitter usage improves students' motivation

The descriptive statistics are shown in Table 10. The mean was high for overall motivation (M=3.0271). 40.48% either agreed or strongly agreed that Twitter is a good way to post messages as soon as they think of them (79.35% agreed, strongly agreed and neutral). 45.74% either agreed or strongly agreed that using Twitter is a good way to get information (80.96% agreed, strongly agreed and neutral).

The overall motivation of students was measured by taking the mean of the scores for questions Mov1, Mov2 and Mov3. The Student's *t*-test was not neutral about motivation, *t*(245)= 0.516, p=.607. However, correlational analysis showed that there was a significant relationship between the amount of Twitter usage and students' overall motivation r (243)= .259, P<.05, as shown in Table 12.

H2: Twitter usage improves students' communication

In the descriptive statistics, as shown in Table 10, the mean for the Overall communication (M = 2.9129), this means that students did not believe (strongly disagree or disagree) that using Twitter improved their communication.

The overall improvement in communication was measured by taking the mean of the scores for questions Com1, Com2 and Com3. The Student's *t*-test indicated that the groups were more positive than neutral about the students' communication, *t*(244) = - 2.234, p< .05 where the effect size was d=0.14, which is small as shown in Table 11. In addition, the Correlational analysis showed that there was a significant relationship

between how students view Twitter usage and students' overall communication, r (243) = .409, P<.05, as shown in Table 12.

H3: Twitter usage improves Instructor credibility

In the descriptive statistics, as shown in Table 10, the mean for the overall instructor credibility was (M= 3.2344). 35.62% either agreed or strongly agreed that using Twitter enabled them to communicate with the tutor outside the scheduled class (79.34% agree, strongly agree or neutral). 41.96% either agreed or strongly agreed that using Twitter reduced the boundaries between tutor (83.80% agreed, strongly agreed or neutral) and 47.96% either agreed or strongly agreed that using Twitter make the tutor more approachable and are credible to them (80.89% agreed, strongly agreed or neutral). This is consistent with the *t* test result.

The overall Instructor credibility was measured by taking the mean of the scores for questions Cred1, Cred2 and Cred3. The result of the Student's *t*-test that the groups were more positive than neutral about students' instructor credibility, *t* (245) = 4.655, p<.01. The effect size was d=0.29, which is small as shown in Table 11. However, the result of the correlation analysis shows there is no statistically significant relationship between how students view Twitter usage and students' instructor credibility overall, r (243) = .064, P=.161, as shown in Table 12.

H4: Twitter usage improves students' engagement

In the descriptive statistics, as shown in Table 10, the mean for the overall engagement was (M= 2.7527), that students disagree that using Twitter improve their engagement. This is consistent with the *t* test result.

The overall improvement in engagement was measured by taking the mean of the scores for questions E1, E2, E3, E4 and E5. The Student's t-test indicate that the groups were more positive than neutral about the students' overall engagement, t (240) = -5.398, p<.01. The effect size was d=- 0.34, which is small as shown in Table 11. In addition, the Correlational analysis showed that there was a significant relationship between how students view Twitter usage and students' overall engagement, r (243) = .210, P<.05, as shown in Table 12.
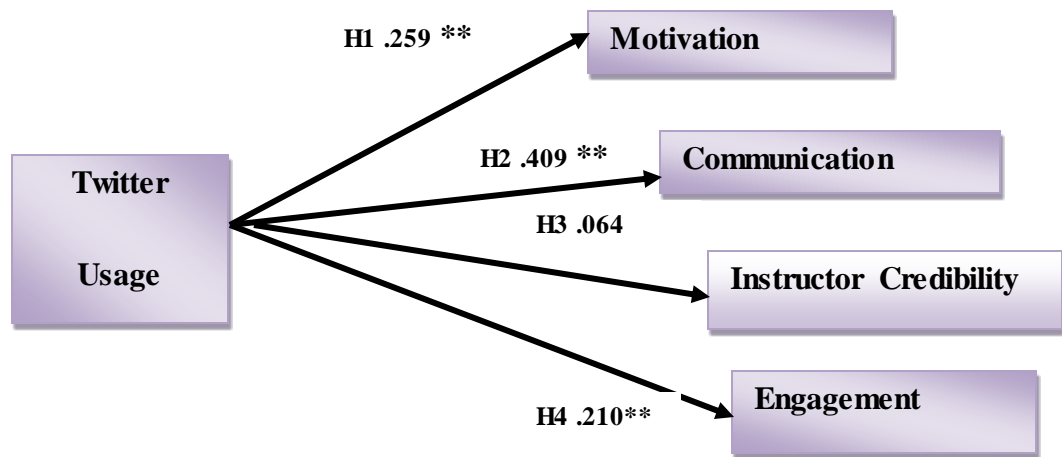
Figure 10 Results of hypothesised relationships based on conceptual framework (Source: Buqawa, 2012))

5.2.3 Reflection on the Reliability of scenario 2 and scenario 3

This thesis has studied all the scenarios of the classification regarding the two questions namely (Q18. I enjoy using Twitter and Q21 using Twitter enables me to communicate with my tutor outside the scheduled class). Since these questions can be used to measure more than one variable in this thesis, the Reliability is analysed for all the three scenarios. More elaboration on this will be in the following paragraphs.

The main assumption was that question 18 (I enjoy using Twitter) used to measure the communication as in the scenario 1 as it was used by the original author Lowe (2011) to measure the student's attitude. The reliability and the consistency of the questions were high in the scenario 1 R=.728. Based on scenario 2, Q18 also can be used to measure motivation variable; this scenario has been considered. This question has been added to measure the motivation variable (Mov1, Mov2, Mov3, Com1 (Q18)) while communication has measured by two questions (Com2 and Com3). The research analysed the Reliability for the two variables Communication and Motivation as shown in Table (13). The results of the reliability of the communication variable drops to R= .571 which is not acceptable and the reliability of the Motivation variable was acceptable R=.802. Since the reliability of the communication variable drops to poor, the decision is whether to delete all the communications questions in which they are a very important construct in this thesis or to return to scenario 1. Consequently, Q18 has been returned to communication variable (Com1, Com2 and Com3) as in scenario 1 since there was consistency between the three communication questions; this is proving that the first assumption was correct.

Regarding Q21 Using Twitter enables me to communicate with my tutor outside the scheduled class, in the main assumption this question was used to measure the Instructor credibility as in scenario 1 but this question can be used to measure communication as well. In Scenario 3, this question was considered to measure communication variables (Com1, Com2, Com3 and Cred1) while the instructor credibility variable was measured by (Cred2 and Cred3). The reliability was analysed for both variables, instructor credibility and communication. The reliability for communication variable also dropped to R= .663 which is questionable and for the Instructor credibility was acceptable R= .796 as shown in Table 13. Again in scenario 3 the communication questions were either to delete them all or to return to scenario 1 the decision was made to implement scenario 1. Based on the reliability test, the Cronbach alpha was high in scenario 1 compared to scenario 2 and scenario 3 for all the four variables (Motivation, Communication, Instructor Credibility and Engagement). So this thesis adopts the first assumption in order to replicate study 1A in study 1B in this research

Table 14 Classification Reflection of all scenarios

Scenario 1		Scenario 2		Senerio3	
Variables	**Reliability**	**Variables**	**Reliability**	**Variables**	**Reliability**
Mov1 Mov2 Mov3	.744	Mov1 Mov2 Mov3 Com1	.802	Mov1 Mov2 Mov3	.744
Com1 Com2 Com3	.728	Com2 Com3	<u>.571</u>	Com1 Com2 Com3 Cred1	<u>.633</u>
Cred1 Cred2 Cred3	.792	Cred1 Cred2 Cred3	.792	Cred2 Cred3	.796
E1, E2 E3 E4 E5	.777	E1 E2 E3 E4 E5	.777	E1 E2 E3 E4 E5	.777

5.2.4 Reflection on the one sample *t* test and correlation analysis of scenario 2 and scenario 3

This thesis considered as well the main two tests that are used, in which they are the correlation analysis and one sample *t* test that were used to find out, whether the interactivity of Web 2.0 technologies outside the classroom indicate that the groups were more positive than neutral about students' learning experience. The two tests were reported for both scenario 2 and scenario 3 as shown in Table 14. From the results, this thesis found no substantial differences between the two scenarios in terms of one sample *t* test results and correlational analysis results. For example, under the one sample *t* test analysis Communication, Instructor credibility and Engagement in both scenarios 2 and 3 indicate that the groups were more positive than neutral about them while the responses were not neutral about Motivation in both scenarios 2 and 3. In addition, correlational analysis presented a significant relationship between how students view Twitter usage and students' overall Communication, Motivation and engagement in both scenarios 2 and 3. There was no significant relationship between how students view Twitter usage and students' overall Instructor credibility in both scenarios 2 and 3. These results were consistent with the results of scenario 1 as highlighted in Table 14.

Table 15 Reflection on one sample *t* test and correlation analysis

Scenario 1			Scenario 2			Scenario 3		
Variables	**T test**	**Correlation test**	**Variables**	**T test**	**Correlation test**	**Variables**	**T test**	**Correlation test**
Mov1			Mov1			Mov1		
Mov2	.607	.259**	Mov2	.829	.361**	Mov2	.607	.259**
Mov3	**Not Sig**		Mov3	**Not Sig**		Mov3	**Not Sig**	
			Com1					
Com1			Com2			Com1		
Com2	**<.05**	**.409****	Com3	**<.05**	**.395****	Com2	<.05	.439**
Com3	**Sig**			**Sig**		Com3	**Sig**	
						Cred1		
Cred1			Cred1			Cred2		
Cred2	**<.05**	**.064**	Cred2	**<.05**	**.064**	Cred3	<.05	.079
Cred3	**Sig**		Cred3	**Sig**			**Sig**	
E1, E2, E3, E4,E5	**<.05 Sig**	**.210****	E1 E2 E3 E4 E5	**<.05 Sig**	**.210****	E1 E2 E3 E4 E5	<.05 **Sig**	.210**

5.2.5 Conclusion on the reflection of the classification

From the results and the reflection on the classification as described in sections 5.1.3 and 5.1.4, the reliability of all variables, namely Motivation, Instructor credibility and Engagement, was acceptable in all scenarios 1, 2 and 3. However, there were substantial differences in the Cronbach's alpha for Communication variable, in which it was not acceptable in both scenarios 2 (R= .571) and scenario 3 (R= .663), while it was acceptable in scenario 1 (R=.728). However, in the one sample *t* test and correlational analysis there were no differences in all scenarios 1, 2 and 3. Consequently, this thesis concluded that the first assumption, which is scenario 1, is the best scenario to be adopted regarding the interactivity of Web 2.0 technologies outside the classroom, in order to be used to replicate 1A in 1B in section 5.3 page 119.

5.2.6. Qualitative Findings

To investigate the effect of Web 2.0 technologies on the student learning experience, four staff were interviewed after the 12 weeks. Five themes were developed from the theoretical framework and from the questions. The analysis of the interview transcripts revealed codes on how students used these Web 2.0 technologies in their learning and how it affected their learning experience. The codes were labelled with an NVivo (word or phrase actually used by the participants). This was done in order to preserve the students' words in describing their experience using social media (Twitter) technologies. These themes as explained in Chapter 4 were described as follows:

1. Communication
2. Motivation
3. Engagement
4. Instructor credibility
5. Barriers.

Table 13 delineates the subthemes which emerged within each theme.

Table 16 Themes and subthemes from staff

Communication	Motivation	Engagement	Instructor Credibility	Barriers
- Communication tool - Enjoyment or fun - Personal connection - Social activities	- Get information - Post things - Training	- Engagement tool - Learning tool	- More approachable - Reduces the boundaries	Obstacles

Theme 1: Communication

Communication Tool

Staff reported on using social media (Twitter) with their students as a communication tool. Staff 1 said Twitter contributed to their enhanced experience of communication between staff and students. Staff 1 described the communication tool in the following terms: "It has already widely spread as a communication tool." Staff 3 explored his experience using Twitter by saying "I think it's going to be a huge turning point in terms of communication tools", and he continued "I believe absolutely yes. Depends on the content, and the content is that it is leading to social media activities so I feel it has a huge future, especially in terms of communication tools." Staff 4 highlights "Yes I think it has a future as a communication tool as it is being used differently now." On the other hand, Staff 2 described his negative communication experience: "Twitter is not used as a communication channel as much as it is used as a channel to promote or push information to students." He continued "I believe in the traditional way of Learning. Twitter is new technology; ultimately, this is a social tool."

Enjoyment or Fun?

Staff found their use of these technologies to be entertaining. Staff 1 described his experience as follows: "Twitter has proved to be an interesting". Staff 2 expressed that Twitter shows students "basic ideas, fun, and there is something they can benefit from; the actual information is relevant to what they are studying."

Personal Connection

The staff members explained their abilities to communicate with one another. Staff 3 said "I guess that's good for one-to-one communication but other peers can also view the Twitter users and followers." Others described their negative experiences; Staff 2 pointed out "And then academics are most reserved when using this kind of technology as a social tool to engage with students." He continued "So they have to understand and have to experience communicating with peers through the communication channel of email. With Twitter again, it's not the right tool, let's say." Staff 2 explored his terms: "so in terms of communication, personal communications, I would probably be against using Twitter."

According to Staff 2: "I believe in engaging with students on a one-to-one basis in class rather than online."

Social Activities

Staff found the use of Twitter enhanced social activities. The words from Staff 1 and Staff 3 summarise this theme: "Twitter already is the support, but I think it is still the contents of following celebrities, media, journalists, sports and art", while Staff 3 said "Young students are using Twitter. They don't regard themselves as attending to education purposes but for their own social purposes; they follow interesting people."

Summary

The interview data suggested that the staff of the university consider the Web 2.0 technologies as a reliable method of communication. In this regard, the staff highlighted its benefit as a fast and efficient communication tool that can deliver the message to unlimited students with just one click; for example, as a tweet on Twitter can be used to inform the students regarding any change in the examination date etc. when they are even not present on campus. Secondly, since these technologies save time, there is a positive outcome in terms of providing more leisure time. Besides the interaction with the students, the staff can also benefit from Web 2.0 technologies by interacting with other staff members for solving any query. And finally, the social activities are at the core of these technologies because the experienced people in the relevant field can be followed in order to learn valuable information and tactics.

Theme 2: Motivation

Get Information

Many staff accounts related to motivation through the use of Twitter in learning. Staff 1 suggests that "Using Twitter as a source for Learning, you could or you can benefit from this tool by pushing information towards you." Another staff member explored the idea that "people do use Twitter in terms of Learning and to promote discussion." Staff 3 identified that "for our module we provide links to useful materials which they might

want to view in their own time. They might find more information which might not be relevant to just their question and there may be other people asking other questions which might be useful." Staff 4 added "We can give students information, articles and videos relevant to a particular topic."

Postings

Staff felt that motivation is enhanced by posting things. Staff 1 said that "we can post the actual link on the virtual learning system or environment." Staff 2 stated that it is possible to "merge the virtual learning environment along with Twitter by posting messages". Staff 3 described motivation by pointing out that Twitter can be useful "for our students to voice any concerns or suggest any feedback in terms of an actual module of Learning. And you need to keep yourself more active." Staff 4 recounted "I know a lecturer who told his students 'if you want a question answered by me you should put it on Twitter'".

Training

The words of Staff 2 sum up this theme: "They might not feel that Twitter can be a useful tool for them. We or someone has to show them these examples of how it can be utilised or to guide them."

Summary

The respondents have focused on the phenomenon that the Web 2.0 technologies such as Twitter motivate them in order to learn more and more. Specifically, they argue that the tweets from different individuals and organisations motivate them to collect the valuable information that can help in their careers. Moreover, some of the accounts at Twitter also provide information themselves which encourages the students to learn more details. Furthermore, there is the option of posting as well that helps the staff to let the others know about their required information which can possibly be shared with others, thus increasing knowledge. Similarly, different training programmes are advertised on Twitter etc., which motivates the students to attend the one which is beneficial for their field.

Theme 3: Engagement

Engagement Tool

Staff found Twitter to be an engagement tool. Staff 2 explained his experience and the effect on students by stating "It is a channel whereby we help you through it to get more information and better understanding of problems engaging with your students, or with a lecturer or online academy. I have some computer experience with online engagement with students throughout the learning system uLink."

Learning Tool

Twitter was used as a learning tool. Staff 3 explained that "in terms of using it for Learning, I would definitely encourage lecturers to make use of the benefits of Twitter." There is always another side of the argument. Staff 2 complained "I don't feel personally it can help students much to engage in the Learning and learning experience."

Summary

The staff responded that the Web 2.0 technologies are very effective for engaging all the students for any kind of activity. Moreover, any specific information can be gathered from all students in a very short time and they also get the notifications and engage in the activity. In particular, in any kind of survey regarding the improvement in the courses or in the university rules, the opinions of the students can be achieved by engaging them on Twitter etc. Moreover, the Web 2.0 technologies have also introduced such tools which are only used by the professionals to engage with each other such as uLink. Secondly, it is an important learning tool because it encourages and engages the students in the discussions and arguments.

Theme 4: Instructor Credibility

More Approachable

Twitter enhances students' interaction with their instructor. Staff 1 indicated that "You feel you're always there, reading something related to them; you can Tweet it to them." Staff 1 continued "response to you on the move being on mobiles phones".

Reduces the Boundaries

This theme was summarised when Staff 1 pointed out "there is a boundary between academics and the students."

Summary

The Web 2.0 technologies are making the credibility of the staff more effective, mainly because the students can access the instructor very easily and at any time. So the information sharing on the Web 2.0 technologies between the faculty and the students has become really easy and effective. Hence, the learning process of the students regarding every phenomenon has been enhanced. Furthermore, the interaction on the Web 2.0 technologies is very friendly and is a relaxing environment so it reduces the barriers between the teachers and students.

Theme 5: Barriers

Some staff pointed out that there were some obstacles preventing them from using Twitter in their teaching. One of the barriers, as Staff 1 said, is "the time you spend to think about what to write on Twitter". He also stated "it is not used in the university as a formal tool." Staff 2 identified "not being experienced with technology" as another obstacle for academic staff against using new technology. Meanwhile, Staff 3 observed that "if you don't post anything interesting no one is going to be bothered to follow you."

Further light will be shed on the staff views in the context of the student interviews in section 5.3.3.

Summary

There are many benefits of the Web 2 technologies for the students and staff; however, some barriers also apply to these conveniences. Specifically, the respondents explain that

it takes time to think that what they should post on Twitter to be most informative. Hence the time constraint is there. Moreover, the tool is not officially recognised so the faculty members do not take seriously the queries of the students some of the time. Moreover, it is tied with the availability of the internet so the unavailability of the internet can also cause a barrier for the students and the instructors.

5.3. Study 1B (Social media: Interactivity outside the Classroom)

5.3.1. Method

5.3.1.1. Participants

Students were recruited as described in Study 1A. In total, 184 participants, all of whom were first-year undergraduate students, participated in the survey, representing different views on the impact of Twitter on their learning, and five students were interviewed from the Managing Information Systems course at Brunel University in London, United Kingdom. The age of participants ranged from 18 to 24, with 91% between 18 and 21. 46% were female and 53% were male.

5.3.1.2. Design and Procedure

To establish the reliability of the results of Study 1A, Study 1B was conducted to determine if the results of Study 1A would be replicated in the same contexts, this time using a different participant group, modified online questionnaire and an added student interview. An interview was used to explore the views of the students regarding their experience of using social media in learning. The procedure was the same as that used in Study 1A. The procedure steps were that the students set up Twitter accounts during a laboratory session in the first two weeks of the semester. Both tutors and students were encouraged to make posts using the module hash tag during the twelve weeks of the semester. Tutors were given regular suggestions for postings but were free to make whatever usage they desired. In the last two weeks, the students were asked to complete the questionnaire during a laboratory session, as shown in Figure 11. Data analysis was carried out using SPSS version 20.
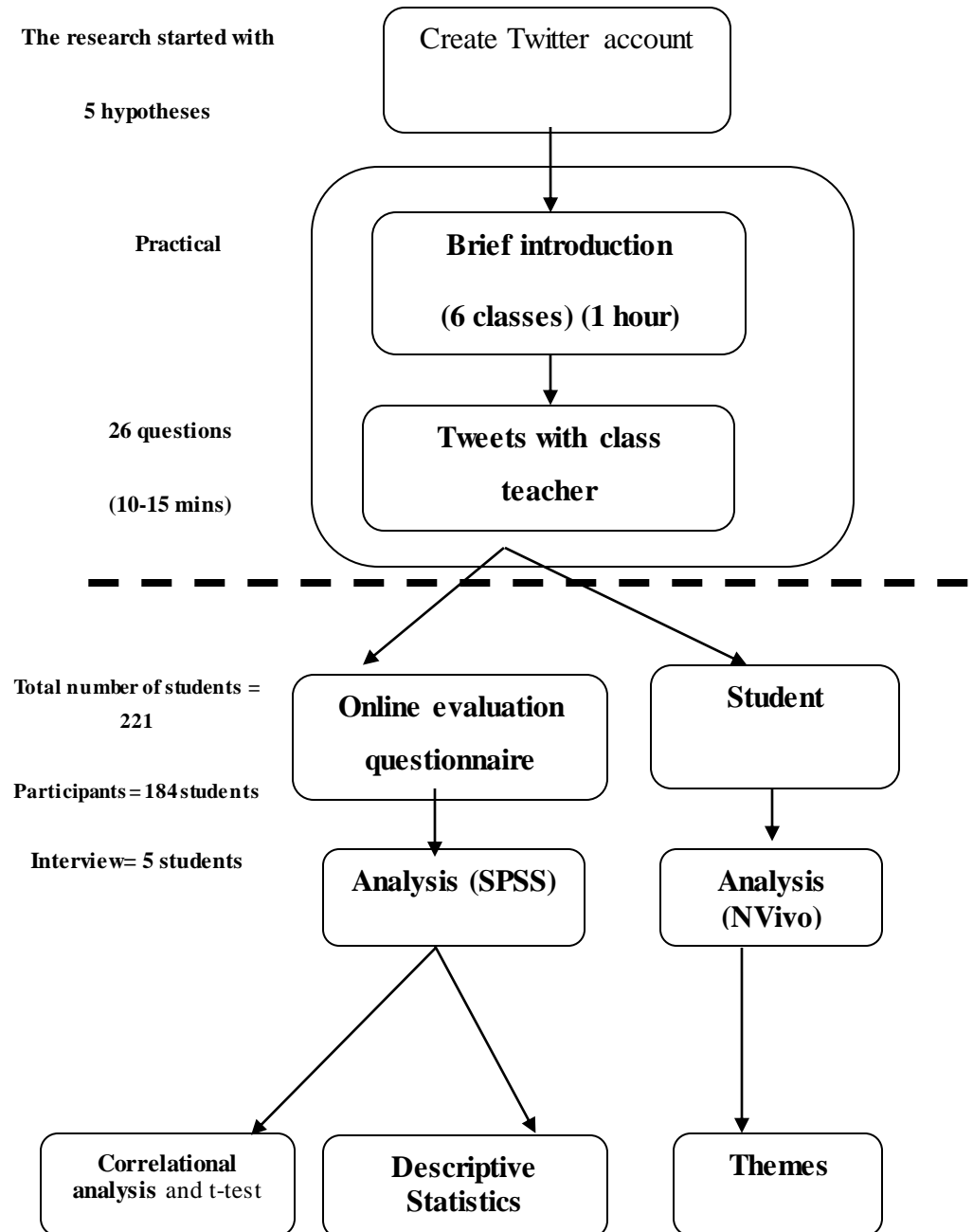
Figure 11 Study 1B Twitter for Learning Procedure (Source: (Buqawa, 2012))

-

5.3.1.3. Material

Students set up Twitter accounts on the Web and both tutors and students adopted hashtags using module codes (e.g. #MG1016) to identify their posts. The majority of

students (52%) used their smartphones using a Twitter application; 23% used their laptops to access Twitter; and 19% used a desktop computer. The remainder (11%) used a mobile Web browser. 47% of the students owned an Apple iPhone, and 22% owned a Blackberry smartphone or Android. An online questionnaire was administered. This was identical to the previous one; some questions regarding device usage and Twitter usage were modified or removed after the feedback from Study 1A. This online questionnaire consisted of several demographic questions to identify age, gender and Twitter usage. There were then 14 Likert-scale questions using 5-point agreement levels from 1 (strongly disagree) to 5 (strongly agree). The questions were categorised to measure Twitter usage, motivation, communication, instructor credibility, and engagement. The wording of the key questions for the non-Likert scale and Likert scale is shown in Table 16 below.

Table 17 Non-Likert-scale and Likert-scale questions

Wording	Code
How many people do you follow on Twitter?	T1
How many people are following you on Twitter?	T2
On average, how many Twitter posts or retweets do you make per week?	T3
Twitter is a good way to post things as soon as I think of them	Mov1
Twitter is a good way to keep a record of what I learn	Mov2
Twitter is a good way to get information	Mov3
I enjoy using Twitter	Com1
I use Twitter for social activities	Com2
I use Twitter to make personal connections with people	Com3
Using Twitter enabled me to communicate with my tutor outside my scheduled class	Cred1
Using Twitter reduces the boundaries between students and tutors	Cred2
Using Twitter makes my instructor more approachable	Cred3
Using Twitter has enabled me to make better use of my time	E1
Being able to read posts by other students was a positive aspect of using Twitter	E2
I would like to see more use of Twitter for Learning in my modules	E3
Use of Twitter means it is not necessary to attend lectures	E4
Twitter can be an effective tool for Learning	E5

5.3.2. Results

Four overall dependent variables were computed by taking the means indicated in Table 16. Cronbach's alpha was utilised to evaluate the internal consistency of each of these four dimensions. All of the variables were found to be reliable, in that the Cronbach's alpha was greater than .7, as shown in Table 17.

Table 18 Internal consistency of questionnaire using Cronbach's alpha

Cronbach's alpha	Calculated from mean	Overall variable
Motivation	Mov1, Mov2, Mov3	**.749**
Communication	Com1, Com2, Com3	**.808**
Credibility	Cred1, Cred2, Cred3	**.798**
Engagement	E1, E2, E3, E4, E5	**.777**

5.3.2.1. Twitter Usage

Overall usage of Twitter in Study 1B was higher than the Twitter usage in Study 1A, given that the participants were essentially early adopters. 62% of students followed more than 10 people and 61% had more than 10 followers. 49% made more than one post per week.

5.3.2.2. Statistical Analysis

Descriptive analysis was used in this research for all the measurements used 5 –Likert scale questionnaire items with the following format: 1. Strongly Disagree 2. Disagree 3.

Neutral 4. Agree and 5. Strongly agree as shown in Table 18. The overall of each variable (Motivation, Communication, Instructor credibility and Engagement) was used in this thesis in which the overall was computed by the sum of scores of each question under this variable divided by the number of questions.

To assess the impact of Twitter for learning, two statistical tests were performed. A one-sample t-test was performed against the fixed value M=3. Overall Twitter usage was calculated by taking the mean of T1, T2 and T3, shown in Table 16. In order to evaluate whether the Likert scores differ from a random population, the effect size estimates Cohen's d as Burns (2000) described (where $d=$ $_{+/-}$ 0.2 is small, $d=$ +/- 0.5 is medium, $d=$+/- 0.8 is large)(p.185), were calculated independently for each variable as well as overall. An alpha level of .05 was used. A Pearson bivariate correlational analysis was used taking overall Twitter usage as the predictor against each of the four dependent variables.

Student's t-test results and the Pearson co-efficient are reported for each of the four hypotheses in Tables 19 and 20 below.

Table 19 Mean (M) and standard deviation (SD) for test measures

Descriptive Statistics					
Questionnaire Item		N	Mean	Std. Deviation	
Motivation					
Twitter is a good way to post things as soon as I think of them.	Mov1	184	**3.53**	.997	60.33
Twitter is good way to keep a record of what I learn.	Mov2	184	2.70	1.011	19.56
Twitter is a good way to get information.	Mov3	184	**3.54**	1.029	56.52
Communication					
I enjoy using Twitter.	Com1	184	**3.24**	1.237	42.93
I use Twitter for social activities.	Com2	184	2.98	1.239	36.41
I use Twitter to make personal connection with people.	Com3	184	2.81	1.193	26.62
Instructor credibility					
Using Twitter enabled me to communicate with my tutor outside the scheduled class.	Cred1	184	**3.59**	1.073	63.04
Using Twitter reduces the boundaries between students and tutors.	Cred2	184	**3.46**	.991	54.35
Using Twitter makes the tutor more approachable.	Cred3	184	**3.44**	1.033	55.43
Engagement					
Using Twitter has enabled me to make better use of class time.	E1	184	2.55	1.039	13.59
Being able to read posts by other students was a positive aspect of using Twitter.	E2	184	**3.34**	1.023	52.17
I would like to see more use of Twitter for learning in my modules.	E3	184	**3.15**	1.236	42.93
Use of Twitter means it is not necessary to attend as many classes.	E4	184	1.98	.997	7.065
Twitter can be an effective tool for learning	E5	184	**3.03**	1.094	36.96

Table 20 Mean scores (M) and standard deviation (SD) for Twitter group on difference of overall test measures

Test measure	Twitter group					P-value	Cohen's d
	M	**SD**	**M**	*df*	*t*- test		
Twitter usage overall	2.4475	1.47956	3			<.001	-0.373
Motivation overall	3.2554	.82351	3	183	4.207	**<.05**	0.310
Communication overall	3.0127	1.10547	3	183	.156	**.877**	0.011
Instructor credibility overall	3.4964	.87187	3	183	7.723	**<.05**	0.569
Engagement overall	2.8098	.78602	3	183	-3.283	**<.05**	-0.241

** Significant at p < .05

Table 21 Correlational Analysis for Study 1B

Correlations		Twitter usage Overall	Motivation overall	Communication overall	Instructor credibility overall	Engagement overall
Twitter usage overall	Pearson Correlation	1				
	Sig. (1-tailed)					
	N	184				
Communication overall	Pearson Correlation	.651**	1			
	Sig. (1-tailed)	.000				
	N	184	184			
Engagement overall	Pearson Correlation	.311**	.526**	1		
	Sig. (1-tailed)	.000	.000			
	N	184	184	184		
Instructor credibility overall	Pearson Correlation	.209**	.292**	.655**	1	
	Sig. (1-tailed)	.002	.000	.000		
	N	184	184	184	184	
Motivation overall	Pearson Correlation	.353**	.542**	.758**	.666**	1
	Sig. (1-tailed)	.000	.000	.000	.000	
	N	184	184	184	184	184
**. Correlation is significant at the 0.05 level (1-tailed).						

H1: Twitter usage increases students' motivation

The descriptive statistics, as in Table 18, show that the mean for the motivation overall was (M=3.2554) in which 60.33% either agreed or strongly agreed with using Twitter for getting information (86.96% agree, strongly agree or neutral). 56.52% either agreed or strongly agreed with using Twitter for posting things as soon as they think of them (86.41% agree, strongly agree or neutral).

The overall motivation of students was measured by taking the mean of the scores for questions Mov1, Mov2 and Mov3.The Student's *t*-test also indicated that the groups were more positive than neutral about the students' overall motivation, $t(183) = 4.207$, p<.05, although it was not significant in Study 1A. The effect size was d=0.310, which is a small effect as shown in 19. As in Study 1A, correlational analysis showed that there was a significant relationship between how students view Twitter usage and students' overall motivation, $r(184) = 0.353$, p<.05 as shown in Table 20.

H2: Twitter usage improves students' communication

In the descriptive statistics, as in Table 18, the mean for the overall communication was (M= 3.0127). 42.93% either agreed or strongly agreed that Twitter was enjoyable (76.08% agree, strongly agree or neutral).

The overall improvement in communication was measured by taking the mean of the scores for questions Com1, Com2 and Com3. The Student's *t*-test indicated that the responses were not neutral about the students' overall communication, $t(183) =.156$, p=.877, as shown in Table 19, although it was significant in Study 1A. However, the Correlational analysis showed that there was a significant relationship between how students view Twitter usage and students' overall communication, $r(184) = 0.651$, p<.05 as shown in Table 20 and it is consistent with the results of Study 1A.

H3: Twitter usage improves instructor credibility

In the descriptive statistics, as in Table 18, the mean for the instructor credibility overall was high (M= 3.4964), 63.04% either agreed or strongly agreed that using Twitter enabled students to communicate with their tutors outside the classroom (83.69 % agreed, strongly agreed and neutral). 54.35% agreed or strongly agreed that using Twitter reduces the boundaries between tutor and students (86.42 agree, strongly agree or neutral) and 55.43% agreed or strongly agreed that using Twitter makes the tutor approachable (83.69% agree, strongly agree or neutral).

The overall instructor credibility of students was measured by taking the mean of the scores for questions Cred1, Cred2 and Cred3. As in Study 1A, the Student's *t*-test indicated that the groups were more positive than neutral about the students' overall instructor credibility, t(183)= 7.723, p<.01. The effect size was d=.569, which is a medium effect as shown in Table 19. In addition, the Correlational analysis showed that there was a significant relationship between how students view Twitter usage and students' overall instructor credibility, r (184) = .209, p<.05, as shown in Table 20, while in Study 1A there was no significant relationship between them.

H4: Twitter usage improves students' engagement

In the descriptive statistics, as in Table 18, the mean for engagement overall was (M= 2.8098), 52.17% agreed or strongly agreed that Being able to read posts by other students was a positive aspect of using Twitter (85.32% agree, strongly agree or neutral) .42.93% agreed that they want to see more use of Twitter in their module (70.10% agree, strongly agree or neutral) and 36.961% agreed or strongly agreed that Twitter is an effective tool for their learning (70.66% agree, strongly agree or neutral).

The overall engagement was measured by taking the mean of the scores for questions E1, E2, E3, E4 and E5. The Student's *t*-test indicated that the groups were more positive than neutral about the students' overall engagement, which is consistent with the result in Study 1A, *t* (183) = -3.283, p<.05. The effect size was d=0.241, which is a small effect as shown

in Table 19. As in Study 1A, the correlational analysis showed that there was a significant relationship between how students view Twitter usage and students' overall engagement, r (184) = .311, p< .05, as shown in Table 20.
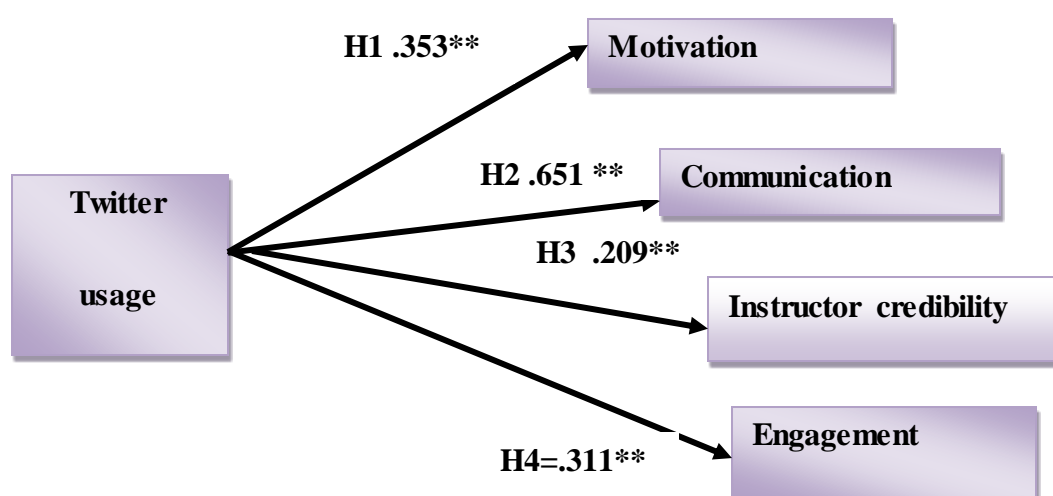
Figure 12 Results of hypothesised relationships based on conceptual framework: (Source: Buqawa, 2012))

5.3.3. Qualitative Findings

To investigate the effect of Web 2.0 technologies on the student learning experience, five students were interviewed after the 12 weeks. Five themes were developed from the theoretical framework and from the questions. The analysis of the interview transcripts were revealed codes on how students used these Web 2.0 technologies in their learning and how it affected their learning experience. The codes were labelled with an NVivo (word or phrase actually used by the participants). This was done in order to preserve the students' words in

describing their experience using social media (Twitter) technologies. These themes were described as follows:

1. Communication
2. Motivation
3. Engagement
4. Instructor credibility
5. Barriers.

Table 19 delineates the subthemes which emerged within each theme:

Table 22 Themes and subthemes from students

Communication	Motivation	Engagement	Instructor credibility	Barriers
• Communication tool • Personal connection	• Post things • Training • Enjoyment	• Educational tool	• Outside the scheduled class	• Obstacles

Theme 1 : Communication

Communication Tool

Students reported using Web 2.0 technologies as communication tools. Student 2 described the communication tool in the following terms: "I do it because it is less restrictive than Facebook; not many people block a Twitter account." Student 4 said "I use it quite a lot" and continued by stating "if there is no other way to communicate with your lecturer or tutor - that is why I have it because my tutor has it." Meanwhile, Student 5 explained the theme negatively: "I have a Twitter account for communication but personally it is like Facebook; now I am not using it that much."

Personal Connection

The students explained their abilities to communicate with one another. Student 1 pointed out the following: "Yes, I think so because you can talk to people all around the world, not just your country; you can communicate with others easily." Student 2 highlighted "I think you could follow people: your tutor or your teacher." The negative case is described by Student 4: "I am not sure about mixing personal life, teachers following them and knowing about personal things."

Summary

In order to gather the information regarding the use of Web 2.0 technologies for the learning of students, interviews were conducted. Specifically, these technologies are considered as the most important means of communication. So it is the effective tool for the communication between the students and teachers. Moreover, the respondents indicated that if they do not have any other source to communicate with their instructors then they can simply contact them using the social media. In this context, another major benefit explained by the students was that the Web 2 technologies have the most important benefit in the form of showing the icon of 'available', so the required person has to answer the query. Furthermore, it is also considered as the widely used personal communication tool because it allows the user to communicate around the world and not only in the limited area or country.

Theme 2: Motivation

Post Things

Students explained the motivation for posting things. Student 1 stated that "Yes, when our tutor has a Twitter account, we could ask him questions and we could get the answers." Student 1 indicated "additionally, I post questions in Twitter and my tutor answers via a Twitter feed post." Student 5 added "If the teacher tweets for the student, this might let them have it; of course people will go to Twitter"

Training

The words of Student 5 summarised this theme: "By putting links to Twitter in Blackboard, or having a workshop on how to use Twitter."

Enjoyment

Student 1 found the use of these technologies as enjoyment activities that entertained her. Student 2 described her experience as follows: "Like, I personally enjoy using Twitter but some people don't."

Summary

The Web 2.0 technologies are also considered as the motivational tool once again by the respondents. Mainly, they focused on the fact that posting the information on Twitter is a a very enjoyable activity, as it allows the user to post any query or any argument and then the thread of the arguments can result in more effective information as well. Besides this, the interest for training and attending the workshops which seems very relative to their filed of work can be attended and the learning can be increased. Lastly, the usage of social media for learning purposes is considered really entertaining.

Theme 3: Engagement

Educational Tool

Students found Twitter useful as an educational tool. Student 1 said that "Yes, it has actually helped me educational-wise: at A level I used Twitter a lot to look for revision tools." Student 5 revealed "Personally I use Twitter as an educational tool." One student complained "I don't see it as providing the opportunity for education".

Summary

In particular, engaging the students through the use of Web 2 technologies is very effective. Moreover, the students consider it as the educational tool because learning is effective on Twitter. Specifically, the interaction with the teachers and other students can also prove social media to be an effective educational tool.

Theme 4: Instructor Credibility

Outside the Scheduled Class

Students determined that Twitter enhances instructor credibility. Student 3 indicated that "You can connect with your tutor outside the classroom in a different environment and feel less vulnerable." Student 5 suggested that "on Twitter you tend to get an instant reply."

Summary

The instructor's credibility is also improved by the usage of Twitter. Moreover, the students accepted that they can contact with the teachers outside the classroom as well. So, the interaction with their instructors increases and the learning is enhanced.

Theme 5: Barriers

Barriers were considered as the main obstacle for students to use Twitter for their learning. Distraction is one of the issues that was found by students, as Student 1 explained by saying "For Learning it is very distracting." Student 4 identified "if you are not into social networking, it might be a problem to tweet; if you don't know how to use it, it might not be so interesting – that could be a barrier." Meanwhile, Student 5 explained "sometimes I have a question that I put on Twitter but at that time the lecturer is not online; although we have

smartphones the lecturer is not always using the smart devices, and it might also affect the lecturer with his private time at weekends."

From the qualitative findings of Study 1B, the research found that five categories were identical to those of the staff in the communication and motivation themes and seven categories differed from the staff, such as engagement, instructor credibility and obstacles.

Summary

The Web 2 technologies have certain obstacles along with their conveniences. Specifically, the students face the issue of focusing on the main learning phenomenon on Twitter etc. Mainly, Twitter has many other social activities as well so the students find it difficult to focus on the learning content only. Moreover, the account creation is also necessary for interacting on Twitter so some of the students find it difficult to use.

5.3. Conclusion

Chapter 5 explored the results and analysis of the interactivity of Web 2.0 technologies outside classroom for both 1A and 1B. Quantitative analysis such as descriptive analysis, t test and correlation analysis were reported for the two field studies 1A and 1B. The results of hypotheses were tested and presented in Figure 10 for 1A and Figure 12 for 1B. In addition, the qualitative analyses for the two field studies also were reported in this chapter.

Chapter 6 will elaborate on the analysis and results of the interactivity of Web 2.0 technologies inside classroom (Study 2A and Study 2B).

CHAPTER 6 INTERACTIVITY INSIDE THE CLASSROOM

6.1. Introduction

This chapter contains a description and explanation of the research findings for both studies 2A (Web Polls: Interactivity inside the classroom) and 2B (Web Polls: Interactivity inside the classroom), obtained from the data collected from the questionnaire survey and semi-structured interviews. More elaboration in each study will be covered in the coming sections.

6.2 Study 2A (Web Polls: Interactivity Inside the Classroom)

6.2.1. Method

6.2.1.1. Participants

The participants were 69 first-year undergraduate and postgraduate students on the marketing course at Brunel University in London, United Kingdom. The age of participants ranged from 18 to 42, with 94% between 18 and 27. 65.2% were female and 34.8% were male.

6.2.1.2. Design and Procedure

The researcher uploaded the multiple-choice questions that had been provided by the marketing-course teacher into the polleverywhere.com site. This site has a feature that converts multiple-choice questions into PowerPoint slides. At the beginning of the sessions in which a Twitter account or the Web was used to answer the Web Polls, the teacher presented multiple-choice questions on PowerPoint slides. After each question, the teacher required the students to choose the code of the correct answer. Then the students were given 60-90 seconds to discuss the question. The answer was given either through their Twitter

account or the Web. The Web Polls registered the students' answers and all the answers of students were displayed on the screen in the class. Then, after the time is over, all the answers were shown as a graphical chart (e.g. Bar chart) to the students in an interactive way with the percentage of each response. Finally, the correct answer was shown, see Figure 13.

The research started

with

5 hypotheses

Source Web Polls

(Polleverywhere.com)

Practical

Brief introduction

to Web Polls

Students answer 5 revision questions (using Twitter account or Web) through mobile phones or laptops

16 questions

(10-15 mins)

Participants = 69 students

Questionnaire

Analysis (SPSS)

Descriptive analysis
Correlational analysis and t-test
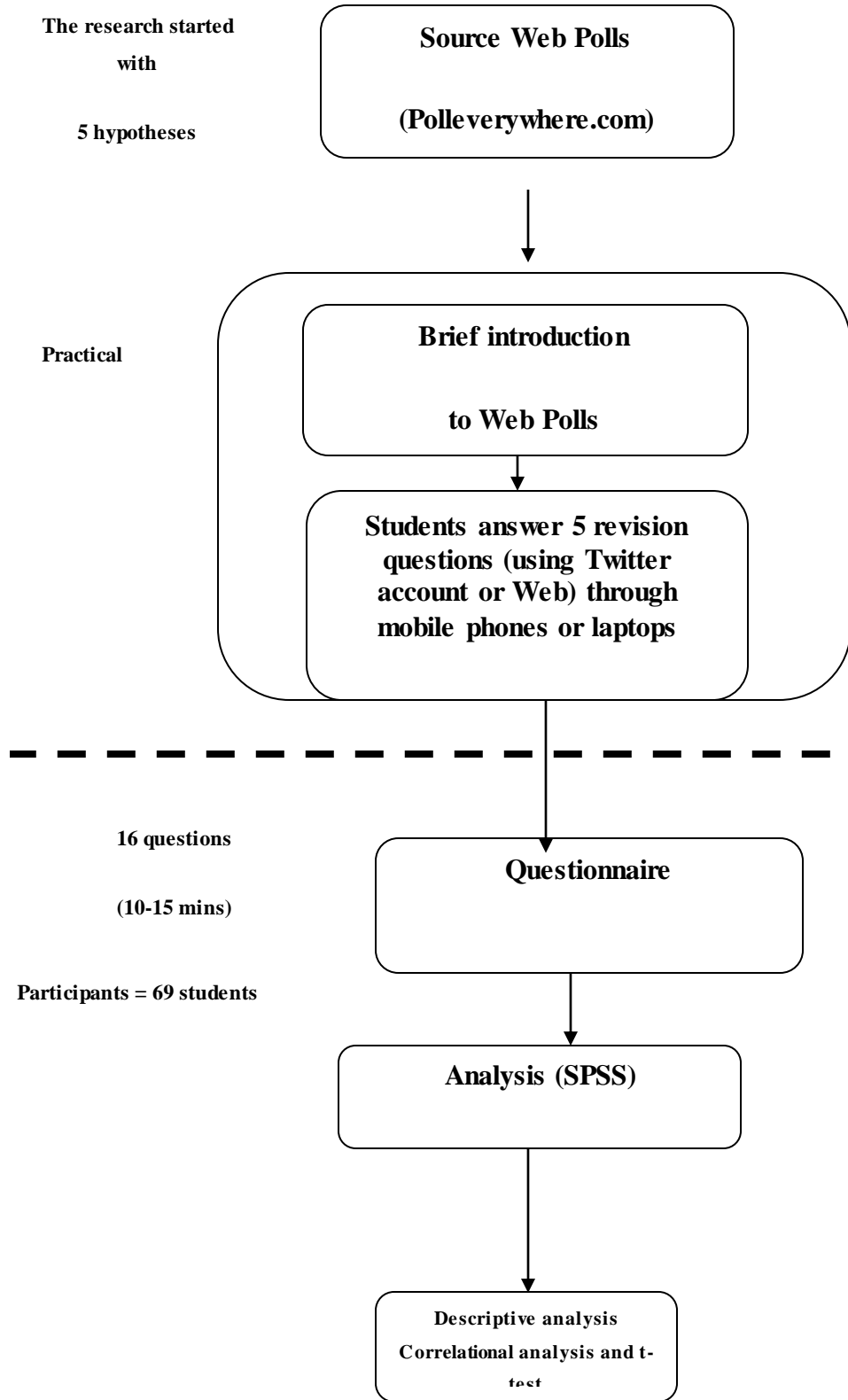
Figure 13 Web Polls for Learning procedure (Source: (Buqawa, 2012))

6.2.1.3. Materials

The materials used during the quiz sessions consisted of six PowerPoint slides. Each slide contained a multiple-choice question that tried to check the students' understanding of the material of the marketing course, as shown in Figure 14.
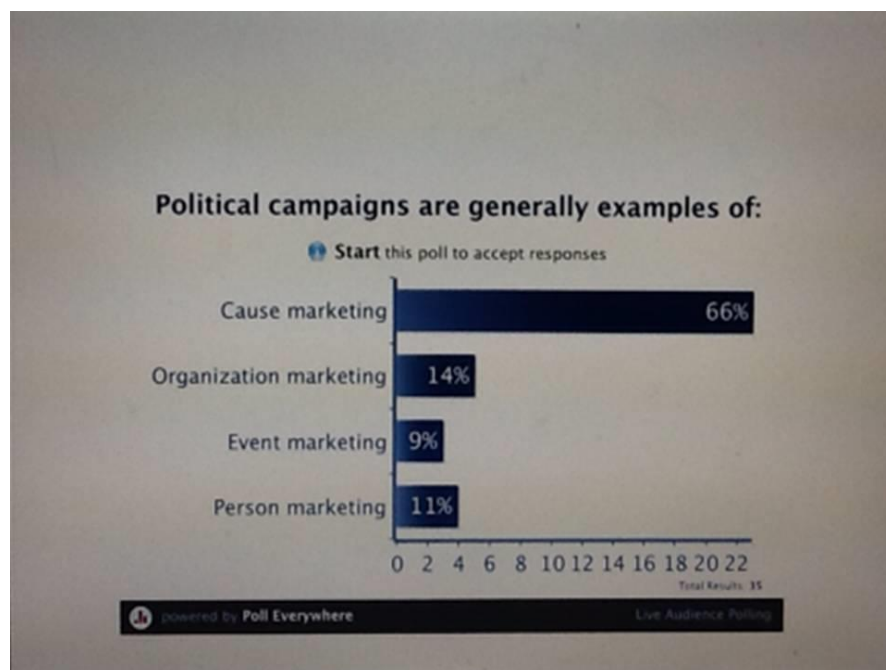
Figure 14 An example of multiple-choice questions using Web Polls

The majority of students (95%) had a mobile phone. 42% of the students owned an Apple iPhone, and 24% a Blackberry smartphone. 82% of students had a mobile phone connected to the Internet and 94% of the students answered yes to the question "if there was a phone signal in their lecture room". 81.16% of the students voted and 18.84% did not vote, as shown in Figure 15. A questionnaire was administered consisting of several demographic

questions to identify age, gender and mobile-phone-and-Internet usage. There were then five Likert-scale questions using 5-point agreement levels from 1 (strongly disagree) to 5 (strongly agree). The questions were categorised to measure the extent to which the use of Web Polls was entertaining, aided learning, should continue in future classes, was valuable and should be extended to other modules. The wording of the key questions is shown in Table 22 below.
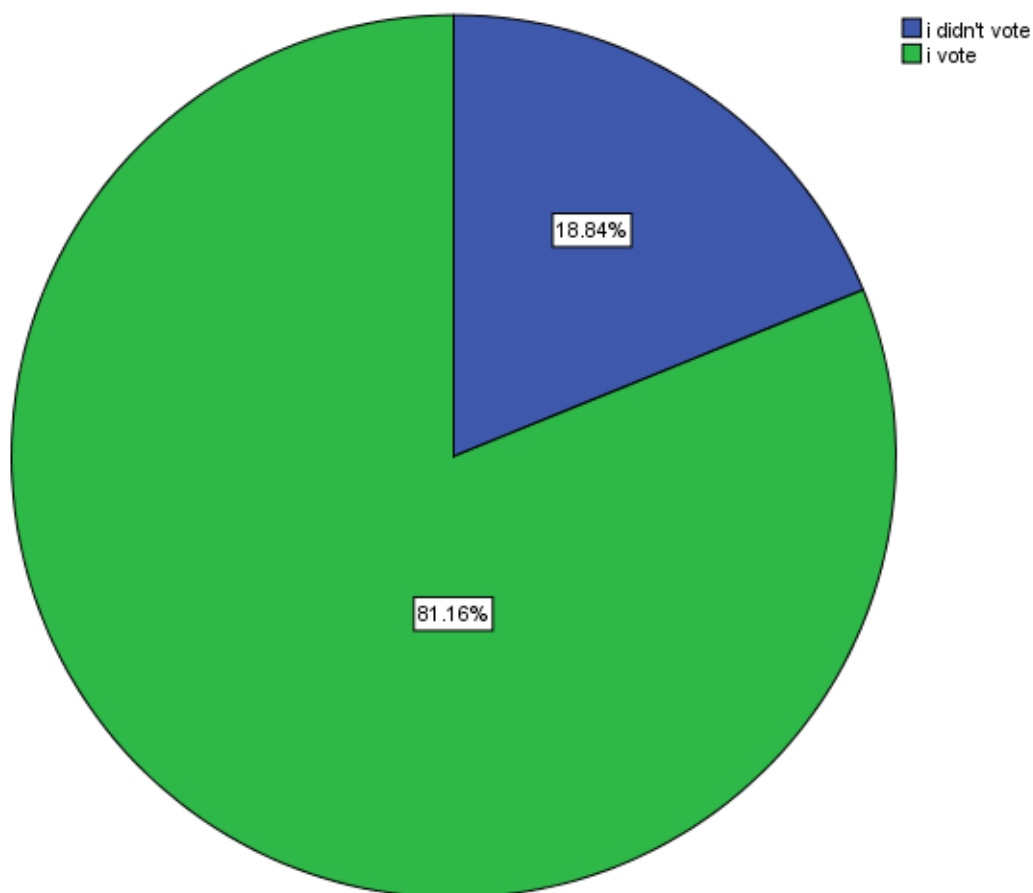
Figure 15 Students' participation in Web Polls

Table 23 Likert-scale questions

Wording	Code
The use of Web Polls was entertaining.	ENT
The use of Web Polls contributed to my learning.	LER
The use of Web Polls should be continued in future classes.	FUT
The use of Web Polls made a valuable contribution to the class.	VAL
The use of Web Polls should be extended to other modules.	EXT

6.2.2. Results

Four overall dependent variables were computed by taking the means indicated in Table 22. Cronbach's alpha was utilised to evaluate the internal consistency of each of these five dimensions. All of the variables were reliable, in that the Cronbach alpha was greater than .7, as shown in Table 23.

Table 24 Internal consistency of questionnaire using Cronbach's alpha

Overall variable	Calculated from mean	Cronbach's alpha
Learning experience	ENT, LER, FUT, VAL, EXT	.930

6.2.2.1 Impact of Web Polls

Descriptive analysis was used in this research for all the measurements used 5 –Likert scale questionnaire items with the following format: 1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree and 5. Strongly Agree as shown in Table 24.

To assess the impact of using Web Polls for learning, two statistical tests were performed, as in Study 2A. A *t*-test, a Pearson bivariate correlational analysis and Cohen's *d* as described by Burns (2000), where *(d=* +/- 0.2 is small, *d=* +/- 0.5 is medium, *d=*+/- 0.8 is large)(p.185) were used, taking overall Web Polls participation as the predictor against the overall learning experience of the five dependent variables (ENT, LER, FUT, VAL, EXT) and against each of the five dependent variables separately. A *t*-test and Pearson co-efficient are reported for each of the five hypotheses in Tables 25 and 26 below.

Table 25 Mean (M) and standard deviation (SD) for test measures

Descriptive Statistics

	N	Mean	Std. Deviation	%
The use of Web Polls was entertaining	69	**3.59**	1.129	59.42
The use of Web Polls contributed to my learning	69	**3.43**	1.091	52.17
The use of Web Polls should be continued in future classes	69	**3.43**	1.118	53.62
The use of Web Polls made a valuable contribution to the class	69	**3.43**	1.007	50.72
The use of Web Polls should be extended to other modules	69	**3.43**	1.118	50.72

Table 26 Mean scores (M) and standard deviation (SD) for Web Polls group on the difference between overall test measures

Test measure	Twitter group					P-value	Cohen's d
	M	SD	M	*df*	*t*- test		
Web Polls participation overall	.81	.394	3	68		<0.001	-5.55
Learning experience overall	3.4667	.966	3	68	4.009	**<.001**	.483
Entertaining	3.59	1.129	3	68	4.373	**<.01**	.522
Learning	**3.43**	**1.091**	3	68	3.310	**<.01**	.394
Future classes	**3.43**	**1.118**	3	68	3.231	**<.01**	.384
Valuable contribution	3.43	1.007	3	68	3.586	<.01	.427
Extended to other modules	3.43	1.118	3	68	3.231	<.01	.384

Table 27 Correlational analysis for study 2A

		Participation for voting	The use of Web Polls was entertaining	The use of Web Polls contributed to my learning	The use of Web Polls should be continued in future classes	The use of Web Polls made a valuable contribution to the class	The use of Web Polls should be extended to other modules
Participation for voting	Pearson Correlation	1					
	Sig. (1-tailed)						
	N	69					
The use of Web Polls was entertaining	Pearson Correlation	.156	1				
	Sig. (1-tailed)	.100					
	N	69	69				
The use of Web Polls contributed to my learning	Pearson Correlation	.125	.671**	1			
	Sig. (1-tailed)	.153	.000				
	N	69	69	69			
The use of Web Polls should be continued in future classes	Pearson Correlation	.222*	.690**	.723**	1		
	Sig. (1-tailed)	.033	.000	.000			
	N	69	69	69	69		
The use of Web Polls made a valuable contribution to the class	Pearson Correlation	.284**	.636**	.789**	.783**	1	
	Sig. (1-tailed)	.009	.000	.000	.000		
	N	69	69	69	69	69	
The use of Web Polls should be extended to other modules	Pearson Correlation	.222*	.608**	.735**	.871**	.796**	1
	Sig. (1-tailed)	.033	.000	.000	.000	.000	
	N	69	69	69	69	69	69

**. Correlation is significant at the 0.05 level (1-tailed).

Using Web Polls Enhances Overall Learning Experience

The student's *t*-test also indicated that the learning experience mean was higher than the average sample mean, t(68)= 4.009 , p<.01. The effect size was d=.483, which is a medium effect, demonstrating that using Web Polls is effective in educational practice, as shown in Table 25. In addition, the Correlational analysis showed that there was a significant relationship between participation in Web Polls and the overall learning experience as shown in Figure 16.
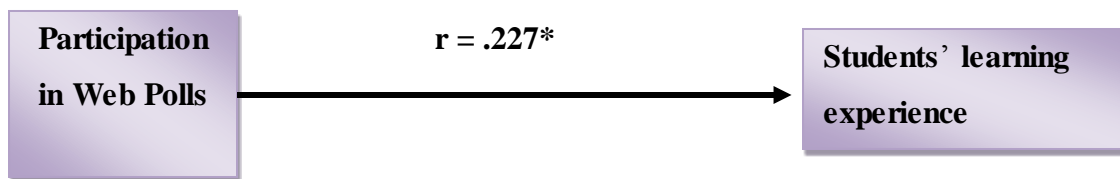
Figure 16 Results of hypothesised relationships between participation and overall learning experience: (Source: (Buqawa, 2012))

H1: Using Web Polls is entertaining

The descriptive statistics show, as in Table 24, that the mean is high for Entertaining (M = 3.59). 59.42 % agreed and strongly agreed that the use of polls was entertaining to them (85.51% agree, strongly agree and neutral).

The *t*-test indicated that the groups were more positive than neutral about students' entertainment, *t* (69) = 4.373, p<.05. The effect size was d=.522, which is a medium effect; this indicates that using Web Polls is an effective instructional method for educational practice and has practical significance as well as statistical significance, as shown in Table 25. However, the Correlational analysis showed that there was no evidence that participation in Web Polls enhanced entertainment r (69) = .156, p= .100, as shown in Table 26.

H2: Using Web Polls Enhances Learning

In the descriptive statistics, as in Table 24, the mean is high for 'contribute to Learning' (M= 3.43). 52.17% agreed and strongly agreed that the use of polls contributed to their learning (81.16 %agree, strongly agree and neutral).

The *t*-test indicated that the groups were more positive than neutral about learning t (68) = 3.310, p<.05. The effect size was d=.394, which is a small effect, as shown in Table 25. However, the Correlational analysis showed that there was no evidence that participation in Web Polls enhanced learning, r (69) = .125, p= .153, as shown in Table 26.

H3: Participation in Web Polls Enhances Future Classes

In the descriptive statistics, as in Table 24, the mean is high for 'continued in future classes' (M = 3.43). 53.62% agreed and strongly agreed that the use of polls should be continued in future classes (81.16% agree, strongly agree and neutral).

The *t*-test indicated that the groups were more positive than neutral about using Web poll in the future classes, t (69) = 3.231, p<.05. The effect size was d=.384, which is a small effect, as shown in Table 25. According to the results of the correlation analysis, there is a significant relationship between how students view the participation in Web Polls and it should be continued in future classes, r (69) = .222, p< .05, as shown in Table 26.

H4: Participation in Web Polls enhances class value

In the descriptive statistics, as in Table 24, the mean is high for 'continued in future classes' (M = 3.43). 50.72% agreed and strongly agreed that the use of polls made a valuable contribution to the class (84.05 % agree, strongly agree and neutral).

The *t*-test indicated that the groups were more positive than neutral about the value of the class, t (68)= 3.586, p<.05. The effect size was d=.427, which is a small effect, as shown in Table 25. Correlational analysis showed that there was a significant relationship between how students view the participation in Web Polls and it made a valuable contribution to the class r (69) = .284, p< .05, as shown in Table 26.

H5: Participation in Web Polls enhances the desire for their extension to other modules

In the descriptive statistics, as in Table 24, the mean is high for 'extended to other modules' (M = 3.43). 50.72 % agreed and strongly agreed that the use of polls should be extended to other modules (82.6 % agree, strongly agree and neutral)...

The *t*-test indicated that the groups were more positive than neutral about the use of web polls should be extended to other modules: t (69) = 3.231, p<.01. The effect size was d=.384, which is a small effect, as shown in Table 25. In addition, the Correlational analysis showed that there was a significant relationship between how students view the participation in Web Polls and whether it should be extended to other modules, r (69) = .222, p< .05, as shown in Table 26.
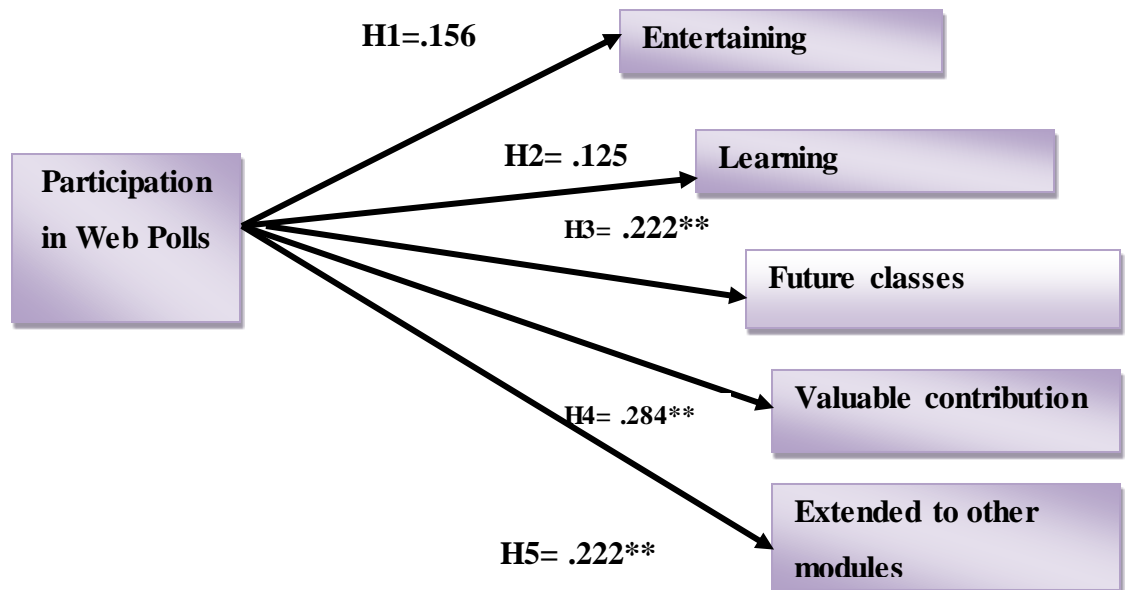
Figure 17 Results of hypothesised relationships between participation and learning experience: (Source: (Buqawa, 2012))

6.3. Study 2B (Web Polls: Interactivity inside the Classroom)

5.3.1. Method

6.3.1.1. Participants

The participants were 57 first-year undergraduate and postgraduate students on marketing courses at Brunel University in London, United Kingdom. The age of participants ranged from 18 to 42, with 94% between 18 and 27. 65.2% were female and 34.8% were male.

6.3.1.2. Design and Procedure

To establish the generality of the results of Study 2A, Study 2B was conducted to determine if the results of Study 2A would be replicated in the same contexts; Study 2B featured differences in the participant group, a modified online questionnaire and added student interviews. Otherwise the procedure was identical to that used in Study 2A. The participants were 57 first-year undergraduate and postgraduate students on marketing courses at Brunel University in London, United Kingdom, as shown in Figure 18. The age of the participants ranged from 18 to 42, with 93% between 18 and 27. 61% were female and 39% were male.

Source Web Polling

(Polleverywhere.com)

The research started with

5 hypotheses

Practical

Brief introduction

to Web Polling

Students answer five

revision questions (using

Twitter account or Web)

16 questions

(10-15 mins)

Participants = 57 students

Interview = 5 students

Questionnaire

Interview

Analysis (SPSS)

NVivo

Descriptive statistics, *t* **test and Correlational Analysis**

Themes

Figure 18 Study 2B :Web Polls for learning procedure (Source: (Buqawa, 2012))

6.3.1.3. Material

The material was identical to that in Study 2A: the materials used during the quiz sessions consisted of five PowerPoint slides. Each slide contained a multiple-choice question designed to check the students' understanding of the material of the marketing course, as shown in Figure 19.
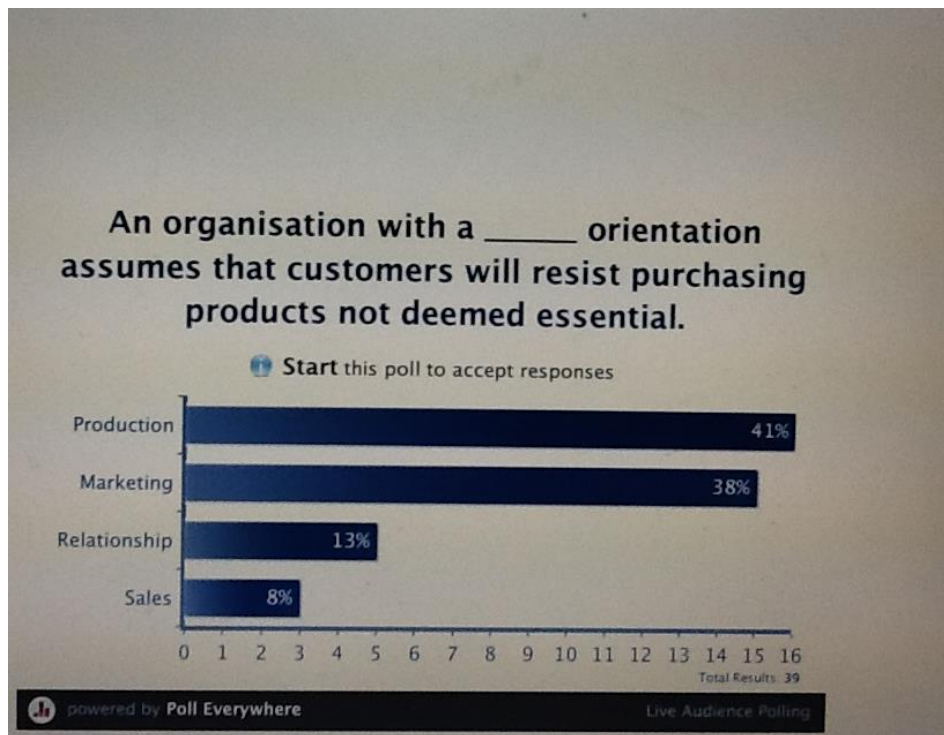
Figure 19 An example of a multiple-choice question using Web Polls

The majority of students (96%) had a mobile phone. 64% of the students owned an Apple iPhone, and 12% a Blackberry smartphone. 93% of students had a mobile phone connected to the Internet and 94% of the students answered yes to the question "if there is a phone signal in their lecture room". 76.27% of the students voted and 20.34% did not vote, as shown in Figure 20. A questionnaire was administered consisting of several

demographic questions to identify age, gender and mobile-phone-and-Internet usage. There were then five Likert-scale questions using 5-point agreement levels from 1 (strongly disagree) to 5 (strongly agree). The questions were categorised to measure the extent to which the use of Web Polls was entertaining, aided learning, should continue in future classes, was valuable and should be extended to other modules. The wording of the key questions is shown in Table 27. Finally, five students were interviewed in order to get more information on the Web Polls participation.
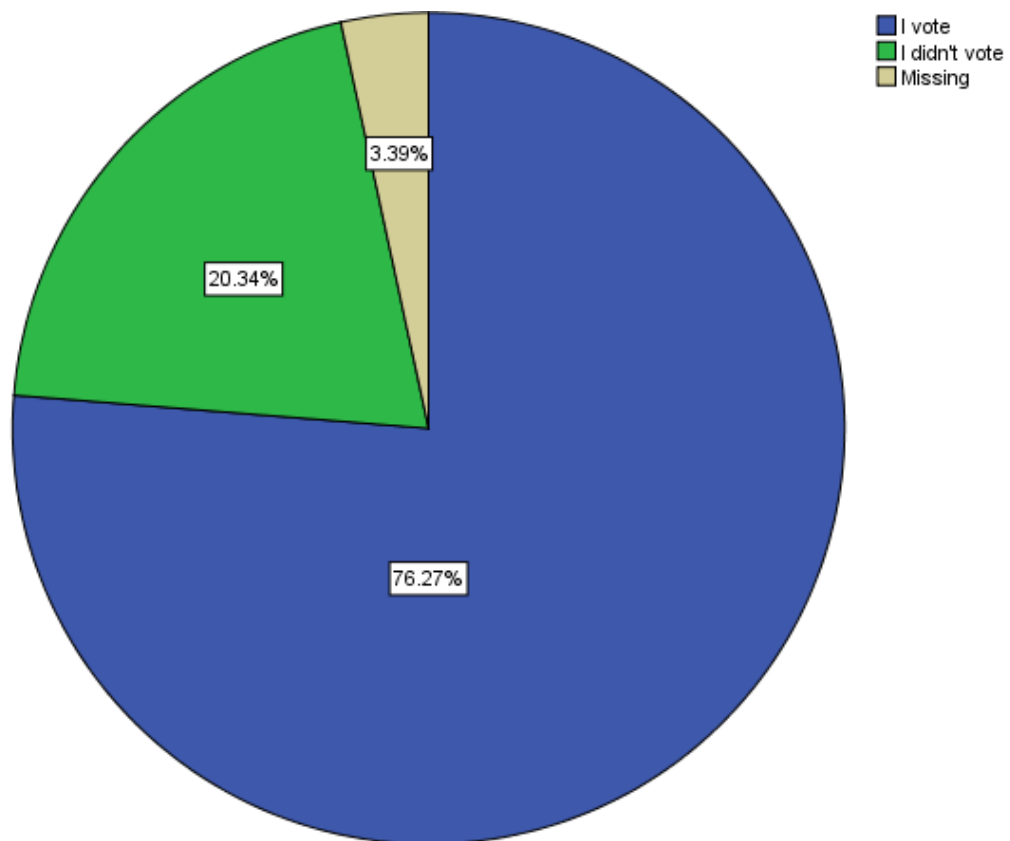
Figure 20 Students' participation in Web Polls

Table 28 Likert-scale questions

Wording	Code
The use of Web Polls was entertaining.	ENT
The use of Web Polls contributed to my learning.	LER
The use of Web Polls should be continued in future classes.	FUT
The use of Web Polls made a valuable contribution to the class.	VAL
The use of Web Polls should be extended to other modules.	EXT

6.3.2. Results

Four overall dependent variables were computed by taking the means indicated in Table 27. Cronbach's alpha was utilised to evaluate the internal consistency of each of these five dimensions. All of the variables were reliable, in that the Cronbach's alpha was greater than .7, as shown in Table 28.

Table 29 Internal consistency of questionnaire using Cronbach's alpha

Overall variable	Calculated from mean	Cronbach's alpha
Learning experience	ENT, LER, FUT, VAL, EXT	.858

6.3.2.1. Statistical Analysis

Descriptive analysis was used in this research for all the measurements used 5 – Likert scale questionnaire items with the following format: 1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree and 5. Strongly agree, as shown in Table 29.

To assess the impact of using Web Polls for learning, two statistical tests were performed, as in Study 2A. A Student's *t*-test, Pearson bivariate correlational analysis, and Cohen's *d* as described by Burns (2000), where *d*= +/- 0.2 is small, *d*= +/- 0.5 is medium, *d*=+/- 0.8 is large (p.185) were used, taking overall Web Polls participation as the predictor against the overall learning experience of the five dependent variables and against each of the five dependent variables separately. The *t*-test and Pearson co-efficient student are reported for each of the five hypotheses in Table 30 and 31 below.

Table 30 Mean (M) and standard deviation (SD) for test measures

Descriptive Statistics

	N	Mean	Std. Deviation	%
The use of Web Polls was entertaining	58	3.97	.794	74.14
The use of Web Polls contributed to my learning	58	3.62	.813	60.34
The use of Web Polls should be continued in future classes	57	3.81	.811	71.93
The use of Web Polls made a valuable contribution to the class	58	3.55	.882	46.17
The use of Web Polls should be extended to other modules	58	3.88	.727	74.14

Table 31 Mean scores (M) and standard deviation (SD) for Web Polls group on the difference between overall test measures

**Correlation is significant at p < .05

Test measure	Twitter group					P-value	Cohen's d
	M	SD	M	*df*	*t*- test		
Web Polls participation overall	1.21	.411	3	56		<.001	-4.35
Learning experience overall	3.761	.644	3	56	8.924	**<.001**	1.18
Entertaining	3.97	.794	3	56	9.261	**<.01**	1.22
Learning	**3.62**	**.813**	3	56	5.816	**<.01**	.762
Future classes	**3.81**	**.811**	3	56	7.508	**<.01**	.998
Valuable contribution	3.55	.882	3	56	4.764	<.01	.623
Extended to other modules	3.88	.727	3	56	9.207	<.01	1.21

Table 32 Correlational analysis for 2B

Correlations

		Recoding voting into participation	The use of Web Polls was entertaining	The use of Web Polls contributed to my learning	The use of Web Polls should be continued in future classes	The use of Web Polls made a valuable contribution to the class	The use of Web Polls should be extended to other modules
Recoding voteing into participation	Pearson Correlation	1					
	Sig. (1-tailed)						
	N	57					
The use of Web Polls was entertaining	Pearson Correlation	.031	1				
	Sig. (1-tailed)	.408					
	N	57	58				
The use of Web Polls contributed to my learning	Pearson Correlation	**.244***	.469**	1			
	Sig. (1-tailed)	.034	.000				
	N	57	58	58			
The use of Web Polls should be continued in future classes	Pearson Correlation	.088	.468**	.397**	1		
	Sig. (1-tailed)	.259	.000	.001			
	N	56	57	57	57		
The use of Web Polls made a valuable contribution to the class	Pearson Correlation	**.270***	.529**	.566**	.520**	1	
	Sig. (1-tailed)	.021	.000	.000	.000		
	N	57	58	58	57	58	
The use of Web Polls should be extended to other modules	Pearson Correlation	.150	.509**	.515**	.688**	.762**	1
	Sig. (1-tailed)	.134	.000	.000	.000	.000	
	N	57	58	58	57	58	58

*. Correlation is significant at the 0.05 level (1-tailed).

Using Web Polls Enhances Overall Learning Experience

As in Study 2A, the student's *t*-test indicated that the groups were more positive than neutral about students learning experience, *t* (56) = 8.924 , p<.01. The effect size was d=1.18, which is a high effect, as shown in Table 30. Correlational analysis showed that there was no significant relationship between participation using Web Polls and the overall learning experience; this result is not consistent with the result of Study 2A as shown in Figure 20.
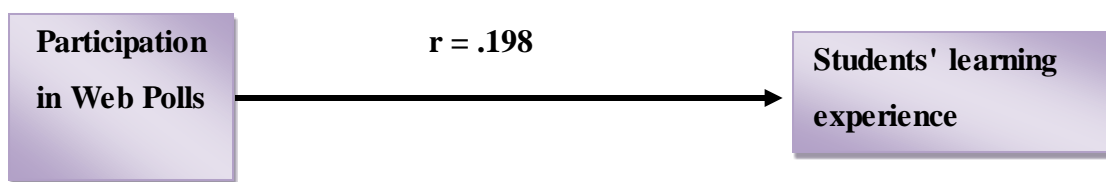
Figure 21 Results of hypothesised relationships between participation and overall learning experience: (Source: (Buqawa, 2012))

H1: The use of Web Polls is Entertaining

In the descriptive statistics, as in Table 29, the mean is high for Entertaining (M = 3.97). 74.14 % agreed and strongly agreed that the use of polls was entertaining to them (96.55% agree, strongly agree and neutral).

The *t*-test was consistent with Study 2A, showing that there is an enhancement in students' entertainment, *t* (56) = 9.261, p<.05. The effect size was d=1.22, which is large, as shown in Table 30. As in Study 2A, correlational analysis showed that there was no significant relationship between the students' view of participation in Web Polls and entertainment r (57) = .031, p= .408, as shown in Table 31.

H2: The use of Web Polls contributes to learning

In the descriptive statistics, as in Table 29, the mean is high for 'contribute to learning' (M = 3.62). 60.34% agreed and strongly agreed that the use of polls contributed to their learning (93.1% agree, strongly agree and neutral).

The *t*-test was consistent with Study 2A, indicating that the groups were more positive than neutral about students' learning, *t* (69) =5.816, p<.05. The effect size was d=1.22, which is large, as shown in Table 30. In addition, the Correlational analysis showed that there was a significant relationship between the students' view of the participation in Web Polls and learning r (57) = .244, p< .05 as shown in Table 31, while in Study 2A there was no significant relationship between them.

H3: The use of Web Polls should be continued in future classes

In the descriptive statistics, as in Table 29, the mean is high for 'continued in future classes' (M = 3.81). 71.93% agreed and strongly agreed that the use of Web Polls should continued in future classes (94.74 % agree, strongly agree and neutral).

As in Study 2A, the *t*-test indicated that the groups were more positive than neutral about the use of Web Polls should be continued in future classes, *t* (69) =7.508, p<0.05. The effect size was d=.998, which is large, as shown in Table 30. According to the results of the correlational analysis, there was no significant relationship between the students' view of the participation in Web Polls and whether it should be continued in future, r (56) = .088, p=.259, as shown in Table 31, which is inconsistent with the result of 2A.

H4: The use of Web Polls makes a valuable contribution to the class

In the descriptive statistics, as in Table 29, the mean is high for 'continued in future classes' (M = 3.55). 46.17 % agreed and strongly agreed that the use of polls made a valuable contribution to the class (80.65 % agree, strongly agree and neutral).

The *t*-test indicated that the groups were more positive than neutral about the web polls do make a valuable contribution to the class, *t* (69) = 4.764, p<.05. The effect size was d=.623, which was large, as shown in Table 30. As in Study 2A, the correlational analysis showed that there was a significant relationship between the students' view of the

participation in Web Polls and whether it made a valuable contribution to class, r (57) = .270, p< .05 as shown in Table 31.

H5: The use of Web Polls should be extended to other modules

In the descriptive statistics, as in Table 29, the mean is high for 'extended to other modules' (M = 3.88). 74.14 % agreed and strongly agreed that the use of polls should be extended to other modules (96.55 % agree, strongly agree and neutral).

The *t*-test indicated that the groups were more positive than neutral about web polls should be extended to other modules, *t* (69) = 9.207, p<.05. The effect size was d=1.21, which is large, as shown in Table 30. However, the Correlational analysis showed that there was no significant relationship between how students view the participation in Web Polls and whether it should be extended to other modules, r (57) = .150, p=.134, as shown in Table 31, while in Study 2A there was a significant relationship between them.
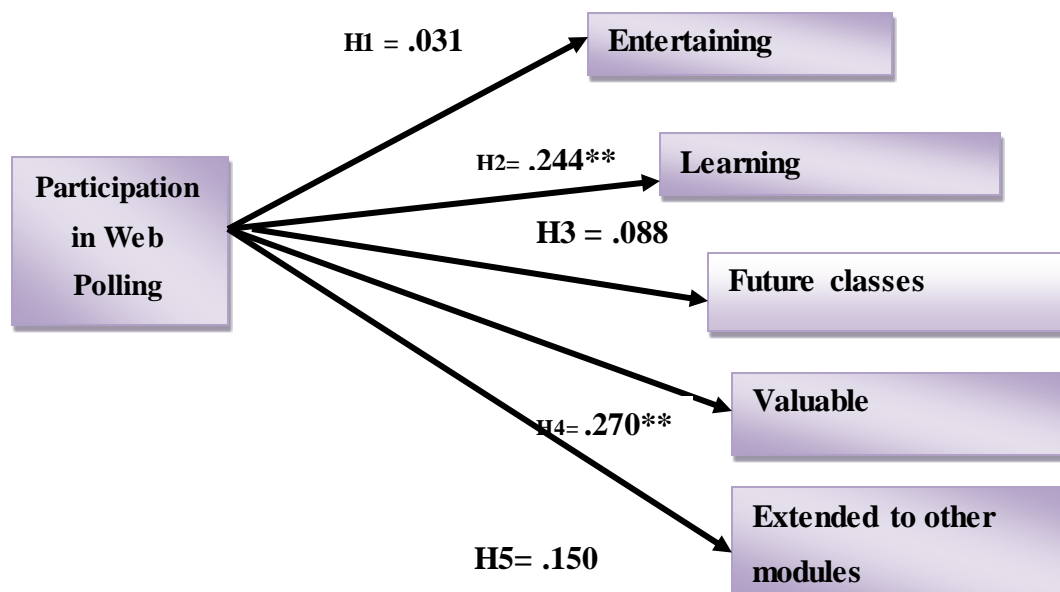
Figure 22 Results of hypothesised relationships between participation in Web Polls and learning experience: (source: (Buqawa, 2012)

6.2.3. Qualitative Findings

To investigate the effect of Web 2.0 technologies on the student learning experience, five students were interviewed after the 12 weeks. Three themes were developed from the theoretical framework and from the questions. An interpretive analysis of the interview transcripts revealed codes of how students used these Web 2.0 technologies in their learning and how it affected their learning experience. The codes were labelled with an NVivo (word or phrase actually used by the participants). This was done in order to preserve the students' words in describing their experience using Web polls technologies. These themes as explained in Chapter 4 were described as follows:

1. Participation
2. Enhancement
3. Barriers to using Web Polls.

Table 32 delineates the subthemes which emerged within each theme:

Table 33 Themes and subthemes from students

Participation	Enhancement	Barriers
• Useful • Enjoyable/Fun • Frequently used in class • As a review	• Contribution • Learning • Learning tool	• Costs money • Delay • First time • Mobile type • Speed of Internet

Theme 1: Participation in Web Polls

Students reported participation in Web Polls to be *useful* and *fun*, that Web Polls *should be frequently used* and that they are useful as a *review tool*.

Useful

The first subtheme *useful* was described by Student 2: "Yes, I think they are useful; they encourage the students in class to participate." Student 4 said "I think by using Web Polls, the teacher can find out which students are paying attention in class", and continued "the student will realise that it is not a scary tool." Student 1 concluded "I think it is a novelty piece."

Enjoyable/fun

Enjoyable was the second subtheme of participation in Web Polls; Student 1 described it in the following terms: "As a research tool, it would be enjoyable"; meanwhile, Student 4 said "if they know there is a reward at the end, it will be fun."

Frequently Used in Class

This subtheme was summed up by Student 3: "Implement this method in class frequently in order to encourage the students to use it and be familiar with it."

Review Tool

Student 1 summarised this subtheme: "If at the beginning of the lecture there is a review of the previous week, that is the best way to get students to contribute."

Analysis or Summary for Theme 1

The information which was collected from the respondents through the usage of interview tools presents three fundamental themes such as participants in Web polls, enhancement and barriers. Specifically, these themes identify that the students want to use the Web polls on a wider scale for the purpose of enhancing their knowledge; however, they face certain barriers as well in the course of using the Web polls. In this regard, the interviews

explain that they find these Web polls quite useful for their learning. Although the Web technologies have made it very easy to share the information, knowledge or data with one another, they can also make certain sharing as well that can adversely affect the real learning essence for the students, such as a specific task solved by one student being copied by others as well. However, the specific use of Web polls within the classrooms can be beneficial for both parties concerned, ie teachers and students. As was confirmed, the students who were interviewed indicated that they find it very enjoyable to learn through the Web polls. This can now be presented in two basic forms such as the positive and negative modes. Relating to the previous argument, the inverse form of the fun of working with Web polls can be based on the act of getting completed work from their classmates. However, it can be presented in a positive manner because through the usage of Web polls, the students can interact with one another and also with the teacher in order to have a deep discussion. Moreover, they also have a chance to collect the research data by accessing diverse participants. In the same strand, the sharing of useful study notes or books can be another positive source of enjoyable learning for the students using Web polls. Moreover, the students want to use Web polls frequently in order to gain their benefits along with the learning of new technology. In addition, the Web polls are also considered as a reviewing tool by the participants. In particular, they argue that the Web polls must provide the review for the previous lecture that can help the students in refreshing their memory about the knowledge they have gained in the last class. However, the reviewing application can allow the students to just forget the lesson in between the two classes and they can simply get the highlights from the Web polls when they enter the class. So it will encourage the students to treat their studies as 'a piece of cake', which will ultimately affect the learning of the students.

Theme 2: Enhancing the learning experience

The students explained how using Web Polls enhanced their learning experience, using these subthemes: *contribution*, *learning* and *learning tool*.

Contribution

Student 4 highlighted that Web Polls had provided them with a "better understanding of how to study and how to contribute to lectures", and continued "I think towards the end of term, Web Polls could contribute quite well by reviewing what I know to date."

Learning

Student 1 pointed out the following: "I think using Web Polls you can do in-depth learning so you could see your progress and what you did in your previous lecture." Student 4 highlighted that using Web Polls "in my learning, personally I would see that if I answered five questions wrong, there was something wrong in my way of study." Finally, Student 3 said "it adds knowledge."

Learning Tool

Students found Web Polls to be a learning tool. Student 3 identified that "I believe that it is useful as a learning tool; it helps students to revise what they have learnt during the course." Also, Student 3 said "It enables students to memorise what they have done and to understand it." Student 4 revealed "It will help me to understand how to improve myself professionally in the lecture."

Analysis or Summary for Theme 2

The second theme for the interviews explains about the enhancement in learning through the usage of Web polls. Hence, analysed shows the students take the Web polls as a positive learning tool for their studies. In this context, the Web polls are considered a major tool for the contribution of the students towards their studies. Specifically, contributions can also be made to the lecture in the class and the teacher will also be able to get the participation of the students at every question. Therefore, the Web polls can contribute in the active participation of the students in the lectures and contents of the

study. Moreover, the Web polls can allow the students to review their course before the examination which would contain all the information and the discussion of the class. Hence, the Web polls can also contribute in the preparation for the exams in an effective manner. Secondly, for learning enhancement, the Web polls can contribute by providing the students with a chance to assess their own performance in the studies. So they can review what they have participated in in the lectures, what has been studied in the lecture and what is known to them and finally what performance they has given in the quizzes of the teacher. So the Web polls can contribute as the learning tool as well as the self-assessment tool for the students.

Theme 3: Barriers

Money, delay, first time, mobile type and speed of Internet were considered as the obstacles preventing students from using Web Polls for their learning. Money was found as the first barrier, as Student 1 asked "Is this going to cost me money? If it is not free and it involves any top-up mechanisms that will be an issue." Student 1 also stated that the second barrier was delay – "The actual mechanism has a lot of delay in between" – and concluded with the last barrier, which is the first time using Web Polls: "Maybe because this is the first time and this might be the biggest barrier other than the money." Meanwhile, Student 3 explored others barriers, suggesting two other potential obstacles: "Maybe the type of mobile phone the students are using and maybe the speed of the Internet in the lecture room."

Summary or Analysis of Theme 3

Despite the benefits and facilities provided by the Web polls, they also have certain kinds of barriers or obstacles; for example, the interviews identify that if the Web polls cost money for the students, it will be a huge obstacle for many students. As the cost of the education will rise due to Web polls and the internet, the potential students may not take up admission in the program as they cannot afford it. So, it will raise standards of learning but it might block the educational journey of some others as well. Besides that, the barrier regarding the familiarity with the usage of Web polls is also there, as the students have to face difficulties in using the Web polls for the first time and they have rated this problem

even higher than the cost problem. It can also be considered that if these Web polls are to be used on mobile phones, this can cause problems, as the students might not own a cell phone that fulfils the required specifications. Hence, they might have to change their phones which will cost them a lot. Lastly, the speed of internet provided by the institute in the classroom can affect the learning process because the lower speed will create hurdles for the students in gaining the required information at the desired time. So there are some barriers as well for the Web polls along with the conveniences which they offer for the students' learning.

6.3. Conclusion

Chapter 6 explored the results and analysis of the interactivity of Web 2.0 technologies outside the classroom for both 2A and 2B. Quantitative analysis such as descriptive analysis, t test and correlation analysis were reported for the two field studies 2A and 2B. The results of hypotheses were tested and presented in Figure 17 for 2A and Figure 22 for 2B. Moreover, the qualitative analyses for the two field studies also were reported in this chapter.

Chapter 7 will discussed the results of the interactivity of Web 2.0 technologies inside and outside the classroom on the learning experience of students. In addition, the Conclusion of this thesis will be highlighted.

CHAPTER 7 DISCUSSION AND CONCLUSION

7.1. Introduction

This chapter analytically discusses the results and brings together the findings concerning students' usage of interactive Web 2.0 technologies in their learning. This chapter is designed to address the research question, which is "Does the interactivity of Web 2.0 technologies enhance students' learning experience?" in order to find out whether the interactivity of Web 2.0 technologies inside and outside the classroom enhanced students' learning experience. The conclusion and the limitations of this research are provided. This chapter will be organised around the hypotheses of the research.

7.2. Discussion of Results

The primary purpose of this research was to determine whether the interactivity of Web 2.0 technologies enhances students' learning experience. This thesis has focused on adult learners over the age of 18 using the interactivity of Web 2.0 technologies in their learning. This research found that the use of interactive Web 2.0 technologies enhances students' learning experience. This result highlights the importance of promoting interactive technologies among students in class through the use of Web 2.0 technologies in order to increase students' learning. Thus, the higher usage level of the interactivity of Web 2.0 technologies enhances the students' level of learning experience. In sum, the results demonstrate that the interactivity with peers and with the teacher that results from using Web 2.0 technologies is critical for promoting a more credible instructor and increasing engagement, communication, motivation and learning by considering that using interactive technologies in the classroom is valuable and contributes to their learning and that its use needs to be extended. Web 2.0 technologies are shown to be a powerful technological tool to enhance the student's learning experience.

This empirical finding reveals that the interactivity of Web 2.0 technologies outside the classroom enhances students' learning experience, because it enhances students' communication, students' motivation, students' engagement and students' perceptions of instructor credibility, as shown in Figure 23.

The discussion of interactivity inside the classroom and interactivity outside the classroom will be presented in sections 7.2.1 and 7.2.2 respectively.
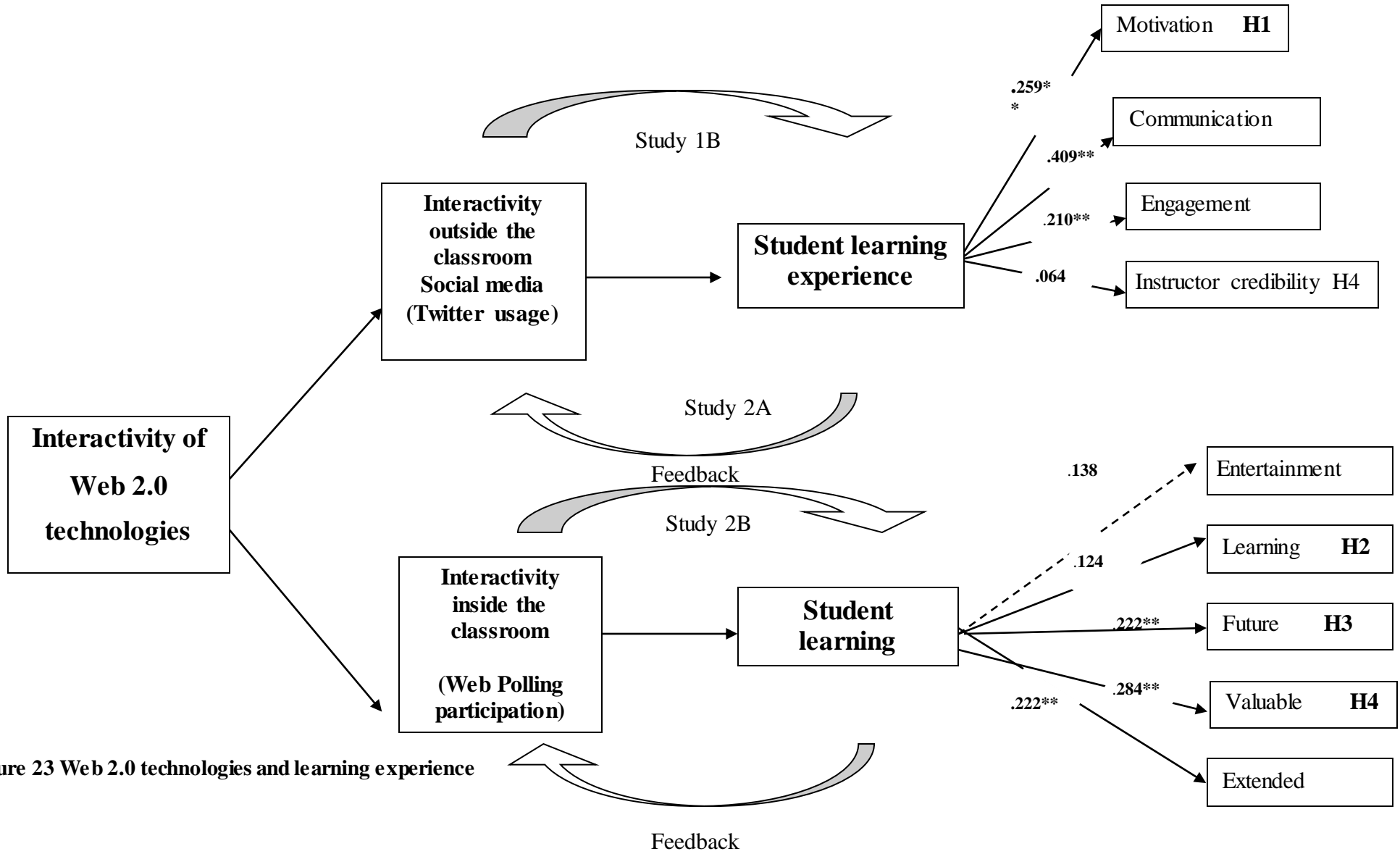
Figure 23 Web 2.0 technologies and learning experience

7.2.1. Interactivity of Web 2.0 Technologies outside the Classroom

Usage of Web 2.0 Technologies has a positive impact on Students' Motivation

In both studies, the correlational analysis showed that there was a significant relationship between Web 2.0 usage and students' overall motivation. The use of Web 2.0 tools has been shown to increase students' motivation. Staff and students felt their motivation was enhanced by posting things on Twitter. Staff 3 described the motivation by pointing out that "*for our students to voice any concerns or any feedback about the actual module of learning*". Also, staff and students demonstrated that training in relation to using Twitter is essential to motivate both parties, as stated by staff 2 "*they might not feel that Twitter can be a useful tool for them. We or someone has to show them these examples of how it can be utilised or to guide them*". In addition, Student 5 pointed out that "*By putting links to Twitter in Blackboard, or having a workshop on how to use Twitter*". Motivation is also one of the key components affecting student learning (Zhang, 2013; Reinhardt, Wheeler & Ebner, 2010; Cole, Feild & Harris, 2004; Ryan, 2001). The analyses conducted in this thesis are supported by the findings of Krathwohl (2002). These results are similar to studies carried out by Cole, Feild & Harris (2004); Ryan (2001); Mazer, Murphy & Simonds (2007), which explored the role technological tools play in motivating students. This research concludes that using Web 2.0 technologies to make postings and read postings from other peers improves students' motivation.

However, increased motivation does not mean that learning objectives of students are accomplished. Motivation to share information on Twitter or posting on Twitter does not necessarily enhance critical thinking in students. Posting or sharing on Twitter may be just the basic objective in which students may ask queries relevant to different topics and this may result in more dependency on teachers, as the students may not want to take the initiative. Rather, they may use this tool as an easy way to get feedback from teachers and peers. Alexander (2006) noted that sharing information on Twitter may not result in thoughtful deliberations and reflection and it does not offer a guarantee of successful achievement of learning objectives. Moreover, as Kennedy (2009) proposed, not all the university students may be experts in Web 2.0 technologies. The results may also differ if analysed using demographic features of the participants as noted by Kennedy (2009), who suggests that the net-generation is different in terms of their learning preferences and

demographic features. Learning objectives may vary across courses, ethnic and religious backgrounds and culture (Väljataga & Fiedler, 2009). Therefore, despite the fact that the use of Twitter has been found to increase motivation to share and post information on Twitter, it can be argued that it does not guarantee the successful achievement of learning objectives. Nevertheless, motivation to share and engage through Twitter can be a way forward towards the achievement of learning objectives.

Usage of Web 2.0 Technologies has a positive impact on Students' Communication

The research shows that there was a significant relationship between Twitter usage and students' communication. The correlational analysis for both studies showed that there was a significant relationship between Web 2.0 usage and students' overall communication. Staff reported using Web 2.0 (Twitter) as a communication tool, and they think it will be used more in future, staff 1 said "*It has already widely spread as a communication tool.*" Staff 3 added that *"I think it's going to be a huge turning point in terms of communication tools"*. This opinion is supported by Charnigo and Barnett-Ellis (2007), who suggested that "by exploring popular new types of internet service such as Facebook instead of quickly dismissing them as irrelevant, we might learn new ways to reach out and communicate better with a larger segment" (p. 31). Staff found their use of these technologies to be a pleasurable activity that entertained them; Staff 1 highlighted that *"Twitter has proved to be an interesting"*. The respondents have mentioned that Web 2.0 technologies help them to communicate with tutors, friends and followers, which is consistent with the results of studies conducted by Schroeder (2009); Borauet al. (2009), Kabilan, Ahmad & Abidin (2010), Ajjan & Hartshorne (2008) and Brady, Holcomb & Smith (2010). This research concludes that communication increases and improves by using Web 2.0 technologies through interaction with peers.

This finding of this thesis concurs with that of O'Shea et al (2006), who found that the use of Web 2.0 such as Wikis enhanced students' learning experience and enabled the student to review and make decisions regarding new content. In addition, it extended the work of Ebnar, Lienhardt, Rohs & Meyer (2010) that students' use of Microblogging as a means of communication supported formal and informal social interaction. That is, the enhanced communication has resulted in offering suggestions about the course content.

Moreover, enhanced communication can be a source of group learning and teamwork. This kind of interpretation is similar to the findings of Harris and Zeng (2008) that suggested that enhanced interactions through Web 2.0 bring in new ideas not only about the content but also on teaching methods and pedagogies and how to improve the use of new technologies. Many other studies have offered similar results. For example, Foley and Chang (2006) found that Web 2.0 technology improves communication and writing skills of the students and plays an important role in the professional development of the students.

However, it can be argued that this communication is consistent with the learning objectives because many studies have found that Web 2.0 cause frustration amongst students. The results of this thesis are contrasted with such studies. For example, Canole et al (2006) revealed that students misuse Web 2.0 and it wastes a lot of the students' time and results in making them frustrated. The frustration is also caused by the inappropriate support by the instructors. This also shows that students become more dependent on teachers and wait for their response instead of taking more independent initiatives, which is the sole purpose and requirement of the Web 2.0 technology (Kennedy at al., 2009).

Previous studies suggest that enhanced communication does not mean that communication is focussed on a particular purpose and that purpose is being achieved too. For example, Zurita (2006) showed that Web 2.0 receives inconsistent feedback from peers and teachers and these inconsistencies resulted from the lack of management of the groups on behalf of teachers and delivery of the instructions to the students. Students failed to work independently and were not comfortable in a learner-centred approach (Zurita, 2006). Nevertheless, this thesis found somewhat different results in comparison with those of Zurita (2006) and Canole et al (2006) in that this thesis found the students were motivated to use this technology instead of being frustrated and its use has also enhanced the communication amongst them.

Usage of Web 2.0 Technologies has a positive impact on Instructor Credibility

The research found that there was a significant relationship between social media usage and students' instructor credibility: when teachers disclosed links, messages and opinions

about topics, students identified more closely with the teacher. Student1 indicated that "*you can connect with their tutor outside the classroom in a different environment*" Moreover, Staff 1 indicated that "*You feel you're always there, reading something related to them; you can Tweet it to them*". This result is consistent with the study done by Myers and Bryant (2004) showing that instructor caring, an important factor in credibility, is conveyed through responsiveness, accommodation, and accessibility. The results of this thesis confirm findings in previous studies that show that sharing personal information with students can increase the perceived credibility of the instructor (Li & Pitts, 2009; McCroskey, Valencic & Richmond, 2004; Schrodt et al., 2009; Brann, Edwards & Myers, 2005; Hosek & Thompson, 2009; Mazer, Murphy & Simonds, 2007). The research concludes that Web 2.0 technologies allow teachers to be more approachable outside the classroom. This can lead students to perceive the teacher as more credible.

On the other hand, many studies have offered contrasting findings. For example, Väljataga & Fiedler (2009) found that the way Web 2.0 is being used merely for the purpose of enhanced interaction and asking questions from the students; the result is teachers are overburdened. The teachers spend lot of time in answering queries and if some of them do not answer, they become less popular and credible than those who respond. Väljataga & Fiedler (2009) thus argue that the appropriate use of technology needs to change the approach of the students and make them realise that the aim of these technologies is to provide platforms to reduce their dependency on teachers and make them independent learners. Nevertheless, the finding of this thesis seems in contrast with Väljataga & Fiedler (2009) in that this thesis found that Web 2.0 enhances teachers' credibility amongst the students and it improves the relationship between teachers and students, which results in improved learning by the students, in which this thesis extended the work of Jonson et al. (2012), when they argued that it is important to study the instructor credibility on student learning.

Usage of Web 2.0 Technologies has a positive impact on Students' Engagement

The research shows that there was a significant relationship between Twitter usage and students' overall engagement. From this, we can conclude that using social media in learning had a positive effect on students' engagement. Student 5 identified that it actually

helped them "*personally i use Twitter as an educational tool*". This is consistent with the results of a study by Harrison (2011) that focused on whether classroom learning was reinforced by college-student participation in a blog communication outside class hours. Harrison's findings demonstrated that students perceived that the use of blogs outside classroom hours increased engagement in course material. In addition, a study done by Chen et al. (2010) found significant correlations between the use of educational technology and student engagement. The result of this thesis proved the outcomes of the previous studies that show using educational technologies has a significant correlation with students' engagement (Sadaf et al., 2012; Heiberger & Harper, 2008; Hughes, 2009; Annetta et al., 2009). The research concluded that the more use of Web 2.0 technologies for learning that occurred, the more students engaged in the learning process.

However, the results of this study seem in contrast with Poortman and Sloep (2005), who argued that blogs are asynchronous communication sources, which means that there are delays in response and these responses are also indirect. This results in impeding students' learning. This study has also shown that since some forms of Web 2.0 require the use of formal and sophisticated language, some students may not have the necessary writing and argument development skills and consequently may be hesitant to engage in discussions (Poortman and Sloep, 2005). In addition, Junco, (2012) found negative relationship between the use of Facebook and the student engagement. Moreover, Suwannatthachote (2012), found no relationship between Facebook usage and engagement of the group Thus, the result of this thesis is in contrast with the study by Poortman & Sloep (2005), Junco (2012) and Suwannatthachote (2012) in that this thesis found that the use of Web 2.0 enhances engagement of the students

7.2.2. Interactivity of Web 2.0 Technologies inside the Classroom

The use of Web 2.0 Technologies is Entertaining

In this research, correlational analysis showed that there was no significant relationship between the interactivity of Web 2.0 technologies and students' entertainment. Several

students mentioned the financial cost, the delays, that this was their first time using the technology, the type of mobile phone they were using and also the speed of the Internet in the lecture room. This result is inconsistent with the studies of Mayer et al. (2009) and Draper and Brown (2004) on the use of clickers in college lectures, which found that students reported liking them. The research concludes that the use of Web 2.0 technologies for learning may not be perceived as enjoyable.

However, this result concurs with previous studies that show that the students lose interest in Web 2.0 when these technologies become an essential part of their learning, as they find them a part of a monotonous routine instead of entertaining. For example, Kennedy (2009) argued that Twitter or a Wiki do create some interest from the students; however, students lose their interest after some time as they find it a burdensome activity. Moreover, students are not equally used to using these Web 2.0 technologies because of their different backgrounds, skills and interests (Väljataga & Fiedler, 2009). Väljataga & Fiedler (2009) further suggest that students who are involved in outdoor sports are less involved in using Web 2.0; instead they spend much time in gyms and other fitness-related activities and watch their favourite sports to hone their skills and satisfy their thirst for the sports.

The use of Web 2.0 Technologies Contributes to Student Learning

Correlational analysis showed that there was a significant relationship between the usage of Web 2.0 technologies and learning. This is consistent with the findings of Irwin et al. (2012) that Web 2.0 technologies (eg. Facebook) could be an effective learning tool. This is supported by research showing that Web 2.0 technologies can facilitate learning by engaging learners in a real task (Sim & Hew, 2010; Kabilan et al., 2010; DfEE, 1999). It is also supported by a study by Harrison (2011) in which blogging helped students direct their own learning. From the interviews, the research found that students think Web 2.0 technologies can be used to achieve in-depth learning and that they add knowledge. The research concludes that the use of Web 2.0 technologies contributes to students' learning.

The results of this study, however, differ from the studies that found that despite the fact the Web 2.0 offers a huge potential for learning, the students have not found as useful as

it should be. For instance, Lohnes and Kinzer (2007) argued and found that although the current generation can be seen as enthusiastic Web 2.0 users, they may avoid using it for a purpose forced on them; that is using it for the educational purpose. Similar have been the findings of Väljataga and Fiedler (2009) who revealed that Web 2.0 can enhance learning but in practice this is not happening due to lack of interest of the users for using these technologies for educational purposes, as they have a built-in perception that these technologies are used for other social purposes. Indeed, the respondents suggested a number of barriers that impede even the use of Web 2.0 in teaching and learning. For example, the interviews from teachers suggested that that there were some obstacles preventing them from using Twitter in their teaching. One of the barriers is the time the teachers spend on thinking about what to write on Twitter, as it is not used in the university as a formal tool and they are not used to this kind of technology. Another interviewee mentioned that what you post should be interesting and relevant to the audience and if you don't post anything interesting, no one is going to be bothered to follow you.

The Use of Web 2.0 Technologies Should be Continued in Future Classes

This research found through the correlational analysis that there was a statistically significant relationship between the usage of Web 2.0 technologies and whether they should continue in future classes. This is supported by a statement by Kvavic (2005) asserting that the use of Web 2.0 tools holds particular promise for the creation of learning settings that can interest students and support their engagement, while at the same time addressing the social elements of effective learning (Chan & McLoughlin, 2008). The interviewed students highlighted that this method should be implemented in class frequently in order to encourage the students to use it and be familiar with it. It also receives support from Selwyn (2009), who explains that currently the use of Web 2.0 tools is a rather new concept and continues to be a controversial topic on the landscape of digital education. It is also supported by Malita (2008), who argues that technologies are of great importance to educational institutions as e-learning or technology-enhanced learning is fast becoming an essential part of future education. The research concludes that Web 2.0 technologies should be continued in future classes.

This finding is also in keeping with Robinson (2006), who asserted that the use of Web 2.0 such as Wikis helps students work together in a space that can be updated any time. The use of Web 2.0 in the classrooms is appropriate for all levels of students and teachers because of its simplest features and the ways it encourages teamwork among students as it allows them to read and edit each other's work. Students enjoy, and learn by, sharing their experiences with their peers (Ben-Zvi, 2007). Thus, Web 2.0 enhances students learning experiences by facilitate ongoing discussions and arguments. Therefore, the participants of this study suggests that these technologies should be used in future classes too.

Seen in this way, this finding is in contrast with the studies that suggest that students do not feel comfortable in using these technologies for educational purposes. For example, Canole et al (2006) found that students find it hard to use an uncongenial technology for learning purposes and if they are forced to do so, they can misuse it. As a result, their productivity and learning are impeded. Zurita (2006) explains that many students were prepared and more comfortable with a teacher-centred course against a learner-centred course in which the student was expected to create some of the learning materials with peers, such as a wiki. Students are not interested in Web 2.0 technology, inclusive of wikis (Cann, et al. 2006).

The Use of Web 2.0 Technologies Makes a Valuable Contribution to the Class

The research found that the correlational analysis showed that there was a significant relationship between using Web 2.0 technologies and whether they made a valuable contribution to class. This is consistent with the study undertaken by Brown (2012) and supported by Ebner and Schiefner (2008), who stated that the use of microblogging for fast exchange between people with similar interests is highly valuable. Despite the descriptive results, the interview revealed that using Web 2.0 technologies is a valuable learning tool. The research indicates that students perceived the use of Web 2.0 technologies in the classroom was a valuable contribution to their class.

This finding is also in line with Carnaghan et al (2012), who proposed that the use of Web 2.0 enhances participation, which creates students' engagement with the class and a wider

community. The reason for enhanced engagement is the way the Web 2.0 operate and the ways it improves the 'architecture of participation' (O'Reily, 2005). That is, these technologies offer open space for co-creation of knowledge and learning through a community of learners through these technologies. Moreover, as argued by Vlachokyriakos et al (2014), Web 2.0 technology such as electronic voting led to more interactivity and enhanced decision-making in the learning process. These positive aspects of building a community can result in increased student learning and thus students have suggested that the use of these technologies add value to the class.

The Use of Web 2.0 Technologies Should be Extended to Other Modules

Correlational analysis showed that there was a significant relationship between using Web 2.0 technologies and whether it should be extended to other modules. This is consistent with the research by Harrison (2011) and Rodrigo & Nguyen (2013) that Web 2.0 technolgies help the students in their learning in which it should extend to other courses. They conclude that the participation by using Web 2.0 technologies increases the student's learning experience (Garcia et al., 2013). Watson (2008) suggests an "open classroom" model using wikis, blogs and other "open" technologies to create knowledge products that more completely engage the students and provide value to education. This research indicates that students perceived that using Web 2.0 technologies inside the classroom should be extended to other modules and courses for their learning.

This finding suggests, that responses regarding the Web 2.0 technologies usage were more positive than neutral about the student learning experience in terms of flexibility of participation and easier access to knowledge across time and space. Furthermore, these technologies offer a huge space for sharing experiences with ease and these experiences have convinced the research participants in this thesis that these technologies can contribute to the change in traditional teaching and learning concepts and pedagogies. Therefore, these technologies should be used in other modules. The interviewees suggested that they can take initiatives using these technologies and can explore new ideas

and innovative solutions to the existing issues in different fields by working in a constructive and cooperative way through these technologies.

However, this finding does not show consensus with the findings of the studies that suggest that the use of the Web 2.0 should be made with caution, as the students may feel lonely and isolated. They can also miss other different important aspects of learning that can only be experienced in their face-to-face interaction with teachers and peers (Kennedy, 2009).

The interviewees suggested that Web 2.0 such as Twitter promotes discussion. Moreover, Twitter is a source of providing links to useful materials which students might want to view in their own time. They might find more information which might be relevant not just to their question and there may be other people asking other questions which might be useful. Thus, students find it useful and have shown intention for it to be used in other modules.

Sims' (2003) interactivity framework

According to Sims (2003), the five areas that were highlighted in Chapter 2, regarding measuring the interactivity when it was considered in any research, were covered in this thesis to find out the interactivity inside and interactivity outside the classroom in higher education. This thesis discussed the results based on these areas (definition of interactivity, learning theories and learning environment) as follows:

Web 2.0 Technologies and Interactivity

The result of this thesis is consistent with the definitions of interactivity provided by Bannan-Ritland's (2002) categories as follows:

1. The responses regarding the Web 2.0 technologies usage were more positive than neutral about the students' engagement in which interactivity is defined as active

involvement of learners (category 1), where students are involved and engaged in the learning process by reading, posting and making better use of their time.

2. The responses regarding the Web 2.0 technologies usage were more positive than neutral about the students' communication in which interactivity is defined as learner-learner communication (category 2) and considered as social, cooperative, or collaborative exchanges (category 4), using Web 2.0 technologies to enhance social activities and make more personal connections with people.

3. The responses regarding the Web 2.0 technologies usage were more positive than neutral about the Instructor credibility in which interactivity defined based on the patterns of communication among learners-instructors (category 3), using Web 2.0 technologies in their learning makes their teachers more approachable outside the classroom

4. The responses regarding the Web 2.0 technologies usage were more positive than neutral about the students' Learning in which interactivity is viewed as a range of instructional activities and technologies (category 5), where using Web 2.0 technologies (Web Polls) inside the classroom and (Twitter) outside the classroom enhances the interactivity in the learning process.

Web 2.0 Technologies and Chickering and Gamson's (1987) Seven Principles

This research is able to leverage Web 2.0 technologies to support Chickering and Gamson's (1987) seven principles for good practice in undergraduate education:

• Using Web 2.0 technologies encouraged the contact between students and faculty (Principle 1) by providing a credible instructor.

• The use of Web 2.0 technologies also encouraged communication among students (Principle 2); students used Web 2.0 technologies to ask each other questions about the material in the course.

• The use of Web 2.0 technologies encouraged the engagement and promoted active learning (Principle 3 and Principle 5) by helping students to engage with the course

material both inside and outside of the classroom, so students were able to continue discussion and build a strong learning community.

- Web 2.0 technologies contributed to student learning in that students were allowed to have an instant answer or feedback from their tutor after they had participated in an interactive quiz (Principle 4 and Principle 6).

- Finally, the responses regarding the Web 2.0 technologies usage were more positive than neutral about the active participation in discussing diversity issues via the Web 2.0 technologies (Principle 7).

Web 2.0 Technologies and Social Constructivism Learning Principles (1&3)

This research confirms that the interactivity of Web 2.0 technologies aligns with the learning principles of social constructivism (Principle 1) and (Principle 3) as discussed below; Bruner (1973) states that learning is a socially productive and influential process in which learners construct their own new ideas and concepts based on their past and current skills and knowledge. The basic social constructivist principles (1&3) (Schunk, 2004) are:

1. The responses regarding the Web 2.0 technologies usage were more positive than neutral about the learning experiences through students' engagement in which learning occurs when individuals share information and negotiate meaning through participatory and collaborative activities (Principle 1). Students use Web 2.0 technologies to post links and comments, read posts and answer a feedback question using Web Polls.

2. The responses regarding the Web 2.0 technologies usage were more positive than neutral about the learning experiences through students' communication and Instructor credibility in which Knowledge should be co-constructed between two or more individuals (Principle 3). Students use the Web 2.0 technologies to communicate with their peers or with their instructors.

In other words, learners have the capability to collect and select data and information, transforming them into meaningful skills and knowledge, and then further construct thoughts and decisions going far beyond the data and information given. This aspect of constructivism can be found in the interactivity of Web 2.0 technologies in that learners have great opportunities to be educational media creators through finding meaningful ways to utilise Web 2.0 technologies for educational settings, editing, creating, and sharing instructional outcomes with other people. In addition, Web 2.0 technologies offer the users an interactive environment where they can engage, interact and participate in real activities that enhance the learning in the learning process (Ito et al., 2010).

Web 2.0 Technologies and the Principles (1&2) of Connectivist Learning Theory

Siemens (2005) lists eight principles for the theory of connectivism but this research deals with (Principle 1) and (Principle 2) as described in the following:

1. The responses regarding the Web 2.0 technologies usage were more positive than neutral about the students' engagement as connectivist learning theory (Principle 1), contending that learning and knowledge rely on a diversity of opinions. This research found that Web 2.0 technologies provide the student with the tools to get more information, different opinions, comments, posts, useful links and feedback/assessment for their learning through the engagement.

2. The responses regarding the Web 2.0 technologies usage were more positive than neutral about the students' communication and instructor credibility as connectivist learning theory (Principle 2) contends that learning is a process of connecting "specialised nodes", information, ideas and interfaces. The research found that connecting the students with their teacher/instructor (specialised nodes) through a network is significant to their learning experience in which they see their specialised nodes as more approachable when they ask questions or they need more information. Communication between peers as a network with specialised nodes enhances social activities and personal communication.

Web 2.0 technologies tie in strongly with the learning theory of connectivism because the theory emphasises the importance of technology tools for human learning. Connectivism supports critical- and creative-thinking skills, enabling learners to gain further and deeper knowledge, so that learners find the information they need in order to act, process information with other learners collaboratively and cooperatively and then produce their own learning outcomes within the context of social and connective learning circumstances. Siemens (2005) emphasises that the learning needs and principles of 21st century education should be based on social interactions and networks supported by social communications and technologies. Moreover, according to Siemens (2005), learning in connective education systems is a process of creating connections and interacting with other entities, which can be found in the interactivity of Web 2.0 technologies environments. Connections allow learning to occur and allow users the unique affordances of knowledge networks, giving them access to learning communities (Downes, 2007).

This research also confirms one of the issues in the area of Web 2.0 and learning highlighted by Windschitl (1998) and Greenhow, Robelia and Hughes (2009), which is learners' participation attitudes to accessing learning in and out of the classroom; this is one of two overarching themes emerging from their analysis that warranted future research.

7.3. Conclusion

In this research, the purpose of this triangulation mixed methods study was to determine whether the interactivity of Web 2.0 technologies has a positive impact on the learning experiences of students. This research used quantitative data gathered through both an online questionnaire and questionnaire, and the qualitative data gathered through semi-structured interview. Quantitative and qualitative data will provide this thesis with a comprehensive analysis of the problem statement (Punch, 1998). Hypotheses were analyzed using correlational analysis, t-test and Cohen d, where the independent variables was (usage of the Web 2.0 technologies) and the dependents variables was (students Learning experiences).

The responses of the 4 studies revealed that the interactivity of the Web 2.0 technology were more positive than neutral about the credibility of the instructor, the engagement, communication of students, the motivation of students and results in a positive attitude to the use of Web 2.0 for learning. The results of this study may be used to (a) create effective online and face-to face courses using Web 2.0 technologies inside classroom and outside classroom, and to (b) find out the effectiveness of Web 2.0 technologies in the classroom. The results of this research may provide justification for the use of Web 2.0 technologies in the classroom.

The findings of this thesis are relevant and extend the work of some studies that studied the usage or implementing specific Web 2.0 technologies on student learning experiences, namely communication, motivation, engagement, instructor credibility or learning (Ebner et al., 2010; Zhang, 2013; Jonson et al.,2012, Wheeler & Ebner, 2010; Selwyn, 2008; Heiberger & Harper, 2008; Safran et al., 2007; Freenhow et al., 2009; McGee & Diaz, 2007; Purushotma, 2006; Cormode & Krishnamurthy, 2008; Ullrich et al., 2008; Kraemer, 2008; Dooly, 2007).

Constructivist learning theory was used as the guiding theoretical framework for this research. This coincides with a paradigm shift in learning approaches from teacher-centred learning to student-centred learning, especially in higher education. The constructivist approach asserts that learning occurs when students participate in interactive activities in which they are actively engaged in constructing knowledge, participating in active learning (students learning from doing) and forming interactions that are promoted outside the classroom as well as inside at anytime and anywhere. In response to this learning approach, students become active participants or producers rather than passive consumers of content; this is consistent with the view of constructivist learning theory.

This thesis considered interactivity in the learning process. Interactivity is the active involvement and participation of students which allows them to build their learning environment and influence the learning process. From the constructivist perspective, learning is viewed as interactive and constructive. With the development of technology, the features of Web 2.0 technologies can support this and provide opportunities for immediate interactions.

Web 2.0 technologies have been used in this thesis to provide the interaction between all parties in the learning process. Web 2.0 implies a paradigm shift from a static technology towards a participatory and socially driven technology that changes the way the Web was originally designed .Web 2.0 is considered as more interactive and collaborative and focuses on the interaction between the learners-learners and learners-instructors and provides the learners with the opportunities to be engaged effectively. This Web 2.0 learning has allowed a large number of people to exchange content and knowledge as being advocated by the constructivist learning theory. Web 2.0 technologies provide an opportunity to develop student-centred learning, communication improvement, social collaboration and improved learning experience.

In this research, the learning experiences of students were considered as the factors that might be enhanced by the interactivity of Web 2.0 technologies in learning. This has always been regarded as the force behind the successful integration of technology in learning. Here, the learning experiences of students are viewed as an important component, particularly when it comes to interacting with technology. Web 2.0 tools can play a large role in supporting the construction of experience, through providing mediated communication channels and the ability to create, edit, share and view content with others.

The use of the interactivity of Web 2.0 technologies in education is recommended as a way to support the students' learning experience. This technology can also help in understanding the barriers in education to using such technologies and providing equal opportunities for the learners to come to terms with the learning process. It is important to highlight that the groups were more positive than neutral about the students' learning experience is exclusively derived from the interactivity of Web 2.0 technologies and

participation in interactive activities. This research considers that the interactivity of Web 2.0 technologies enhances the learning experience and supports the relationships between the concepts included in the conceptual framework. The thesis suggests the adoption of interactivity of Web 2.0 technologies has the potential to enhance learning experiences of students in the learning process in higher education.

7.4. Significant Contribution

This thesis is the first to find that the use of interactive Web 2.0 technologies were more positive than neutral about students' learning experiences inside and outside the classroom in higher education. It is evident from the literature that Web 2.0 in learning is a developing and significant area in educational practice; however, what is known about it from the users' perspective is still limited (Manca & Ranieri, 2013), especially where Web 2.0 tools are used hand-in-hand with face-to-face classroom delivery.

7.4.1. Theoretical Contribution

This thesis provides a holistic view of the impact on students' learning experience of the interactivity of Web 2.0 technologies inside and outside the classroom. It reveals the obstacles facing the staff and students using the Web 2.0 technologies. The thesis has proposed a framework regarding the interactivity of Web 2.0 technologies inside and outside the classroom in relation to students' learning experience. It identifies 10 dependent variables for measuring the students' learning experience and two independent variables for measuring the usage of Web 2.0 technologies in learning, as shown in Figure 23. This thesis has contributed towards the understanding of existing learning approaches, particularly in using Web 2.0 tools in a blended learning setting, by examining in detail the interactivity of Web 2.0 technologies and students' experiences and learning theories. This area is still underexplored as pointed out by Merchant (2012) and scholars continue

to investigate how students construct learning communities in the Web 2.0 learning environment (Vance, 2012).

The thesis also used a replicated mixed-methods field-study research design in the technology-enhanced learning area. The research design used in this study has combined the findings from different methods of data collection, where data has been captured from four different field studies governing the two areas – interactivity of Web 2.0 technologies and learning experience. This thesis has undertaken to combine data from different perspectives using a replicated study, which provided a thorough review of issues in various field studies. This thesis has also contributed answers to a number of issues related to students' and teachers' adoptions of Web 2.0 tools and how the tools were being implemented in learning. This thesis makes a timely contribution as higher education institutions seek to embrace Web 2.0 technologies for changes in digital learning.

7.5. Limitations of this Study

This thesis presents some limitations that need to be addressed in further research.

1. Self-reported data from a questionnaire might lead to a bias. A social desirability bias can be described when the respondents will choose to answer the questionnaire with the option that is most socially desirable and that makes them look good (Mortel, 2008). Some of the respondents might have the fear that their answer might seen by their teachers. As Donaldson and Grant-Vallone (2002) state, "research participants want to respond in a way that makes them look as good as possible. Thus, they tend to under-report behaviors deemed inappropriate by researchers or other observers, and they tend to over-report behaviors viewed as appropriate" (p.247). Moreover, self- report data might present if the research uses mono-methods, in which only one method was conducted to collect the data such as questionnaire (Donaldson & Grant-Vallone, 2002). This might affect the validity of the research. In this research, the mixed-methods approach was used to moderate this bias, in order to have more elaboration on the topic from two

different methods. In addition, more than one question was used to measure the construct rather than a specific question. Therefore, the self-report data in this research was minimised.

2. Closed question bias. The author tried to maintain a reasonable length of questionnaire to reduce the bias. In addition, Smith et al. (2002) pointed out that the use of an open question should help to avoid bias. This study used mixed methods (questionnaire and semi structured interview) in collecting the data in which open questions were asked.

3. This research was conducted in a UK context and in a single setting. The findings of this research may not generalise to other contexts. Accordingly, a further research might be conducted to replicate these studies in different contexts in different countries in order to generalise the findings. Furthermore, this research used a convenience sampling technique. Thus, the sample consists only of the learners that used Twitter and Web polls (as medium of Web 2.0 technologies) in their learning; consequently, the results of this research cannot be compared with learners that did not use Twitter or Web polls as a control groups in which it avoids this research to provide other indicators such as tools preference. Thus, a promising avenue for further research would be to develop an experiment design to test the proposed framework across two different student groups: users of Web 2.0 technologies and non-users. This comparison may help to better understand not only the benefits provided by the interactivity of Web 2.0 technologies, but also the effects that this technology would have on students' entertainment.

4. This thesis used cross- sectional, in which it is difficult to find the direction of the causality among the variables. However, the relationship was covered in (Chapters 2 and 3) and by the mixed methods research (Chapters 5 and 6). To understand the impact of Web 2.0 technologies in universities in depth longitudinal approach should be used.

5. The limitations of the triangulation mixed-methods research design is the complexity of evaluating two different results of two analyses using different methods for collecting data. In which there might be a bias from one result affect the result of the other data (Creswell & Clark, 2006).

7.6. Recommendations for future / practical research

This thesis presents some limitations that need to be addressed in further research.

1. This study has certain limitations. For example, the sample size can be argued to be small. Moreover, the context of the study can be argued to offer implications that are relevant to a particular context such as the UK and other developed countries. Thus, more studies are required to be conducted with large sample size in different contexts in order to enhance the understanding of the use of Web 2.0 in educational institutions. This study has also used cross-sectional data. Therefore, it has not been possible to bring to the fore if there is any change/improvement in the use of Web 2.0 in education. Thus, future studies can focus on such changes and developments by using a longitudinal approach.

2. Moreover, this study has focused on two different Web 2.0 technologies. In order to gain rich insights, the future research should focus on one particular Web 2.0 technology that is being used practically in an educational institution instead of focusing on two Web 2.0 technologies. That is, the future studies should explore the already implemented technology in educational institutions and its impact on students' learning outcomes and learning experiences. The analysis of the literature also reveals that the majority of the studies have focused on different aspects of the Web 2.0 tools themselves and how these technologies can be used for better results. Furthermore, because this study was limited to an on-campus learning environment, future research efforts could include a similar design based in an online learning environment. After having looked at the student learning

experience in classroom learning, it is also necessary to study the student learning experience in an online classroom as well as use other classes in other disciplines in order to identify the students for whom these technologies are most beneficial. In addition, continued research into the level of facilitation by instructors in these courses should also be considered.

3. This study did not focus on the demographics of the students such as age, IT skills, and the programme of the study in which they were enrolled. As it has been argued by Kennedy et al (2009), it is not necessary that students who are good at using Web 2.0 in their life also faced difficulties in using these tools in their learning. That is, they were not able to consume the information and were not able to offer critical arguments on the topic. The results may vary across gender, age and ethnic backgrounds. Thus, it would be interesting to look at how different students with different demographic features make use of these technologies. Moreover, in terms of any such issues, how the teachers and administration facilitate students to make better use of these technologies for educational purposes. Thus, in essence, the Web 2.0 offer huge opportunities but these opportunities are not without challenges. The success would be to overcome these challenges and streamline the use of Web 2.0 to make it part of the educational environment instead of considering them optional choices.

7.6. Summary

The thesis has successfully addressed the initial aim, which was to determine whether the interactivity of Web 2.0 technologies enhances students' learning experience. Through the usage of Web 2.0 technologies, students were provided with a chance to embrace these new technologies in their learning. This thesis provides the first published attempt at reviewing the interactivity of Web 2.0 technologies used inside and outside the classroom and students' learning experience. The methodology includes the creation and utilisation of existing assessment instruments (online questionnaire, reflective online questionnaire, questionnaire survey and semi-structured interview) and a selection of

data-analysis tools, including the use of descriptive, inferential analysis and interpretive statistics: correlational analysis and student's *t*-test.

Results from the statistical analysis suggest the interactivity of Web 2.0 technologies significantly enhances students' learning experience. Research findings based on the student interviews also suggest that not all students have positive experiences using Web 2.0 technologies.

This chapter has summarised the thesis and provided an overview of the research. Findings have been discussed and statistical analysis has been reviewed. Thesis conclusions, based on research questions, have been provided, as have the limitations of this research effort. Lastly, future research suggestions based on the mentioned limitations have then been presented. It is anticipated that future Web 2.0 adoptions in learning will be more meaningful if teachers consider the recommendations and models as outlined in this thesis.

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APPENDIX A: TWITTER FOR LEARNING ONLINE QUESTIONNAIRE ONE

Dear Participant:

The purpose of this questionnaire is to find out the impact of the interactivity of web 2.0 technologies in student learning experience. I am inviting you to participate in this research thesis by completing the online questionnaire. The following questionnaire will require approximately 10-15 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please *do not* include your name. If you choose to participate in this thesis, please answer all questions as honestly as possible. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my thesis.

Sincerely,

Afaf Buqawa

Afaf.bu-ghawa@brunel.ac.uk

Personal Information

1. What is your gender?
   a. Male
   b. Female

2. What is your age?
   a. Below 18
   b. 18-21
   c. 22-24
   d. 25-28
   e. 29-35
   f. 36-42
   g. Above 42

Twitter usage

3. Did you have a Twitter account before your first lab class?
   a. No
   b. Yes

4. How many people do you follow on Twitter?
   a. 10 or less
   b. 11-50
   c. 51-100
   d. 101-200
   e. 201-300
   f. 301-500
   g. 501-1000
   h. More than 1000

5. How many people are following you on Twitter?

   a. 10 or less
   b. 11-50
   c. 51-100
   d. 101-200
   e. 201-300
   f. 301-500
   g. 501-1000
   h. More than 1000

6. How often do you log on to your Twitter account?
   a. Continuously
   b. Several times a day
   c. Once a day
   d. Less than once a day but more than once a week
   e. Once a week
   f. Less than once a week but more than once a month
   g. Once a month
   h. Less than once a month

7. How often do you log on to your Email account?
   a. Continuously
   b. Several times a day
   c. Once a day
   d. Less than once a day but more than once a week
   e. Once a week
   f. Less than once a week but more than once a month
   g. Once a month
   h. Less than once a month

8. How often do you log on to your Facebook account?
    a. Continuously
    b. Several times a day
    c. Once a day
    d. Less than once a day but more than once a week
    e. Once a week
    f. Less than once a week but more than once a month
    g. Once a month
    h. Less than once a month

9. How often do you log on to your u-Link account?
    a. Continuously
    b. Several times a day
    c. Once a day
    d. Less than once a day but more than once a week
    e. Once a week
    f. Less than once a week but more than once a month
    g. Once a month
    h. Less than once a month

10. On average, how many Twitter posts (including retweets) do you make per week?
    a. Less than one per week
    b. 1-5
    c. 6-10
    d. 11-20
    e. 21-30
    f. More than 30 per week

11. Which of the following do you use most often to access Twitter?

a. Desktop computer and web browser (e.g. Internet Explorer)

b. Laptop computer and web browser (e.g. Internet Explorer)

c. Mobile phone web browser

d. Mobile phone app (e.g. twitter, Twitterdeck)

e. Mobile phone SMS

f. Tablet web browser (e.g. iPad and Safari)

g. Tablet app (e.g. iPad and Twitter, Twitterdeck)

12. I have the following type of phones:

a. Blackberry

b. iPhone

c. Samsung

d. Motorola

e. Nokia

f. Sony Ericsson

g. HTC

h. LG

i. Other

13. If you selected "other" for phone make, please specify:

14. I have the following type of operating system on my mobile phone:

a. Blackberry

b. iOS (iPhone)

c. Symbian

d. Android

e. Microsoft Windows Mobile

f. Don't know

Motivation

15. Twitter is a good way to post things as soon as I think of them.

   1. Strongly disagree

   2. Disagree

   3. Neutral

   4. Agree

   5. Strongly Agree

16. Twitter is good way to keep a record of what I learn.

   6. Strongly disagree

   7. Disagree

   8. Neutral

   9. Agree

   10. Strongly Agree

17. Twitter is a good way to get information

   1. Strongly disagree

   2. Disagree

   3. Neutral

   4. Agree

   5. Strongly Agree

Communication

18. I enjoy using Twitter.

   1. Strongly disagree

   2. Disagree

   3. Neutral

   4. Agree

   5. Strongly Agree

19. I use Twitter for social activities.

   1. Strongly disagree

   2. Disagree

   3. Neutral

   4. Agree

   5. Strongly Agree

20. I use Twitter to make personal connection with people.

   1. Strongly disagree

   2. Disagree

   3. Neutral

   4. Agree

   5. Strongly Agree

Instructor credibility

21. Using Twitter enabled me to communicate with my tutor outside the scheduled class.

   1. Strongly disagree

   2. Disagree

   3. Neutral

   4. Agree

   5. Strongly Agree

22. Using Twitter reduces the boundaries between students and tutors.

   1. Strongly disagree

   2. Disagree

   3. Neutral

   4. Agree

   5. Strongly Agree

23. Using Twitter makes the tutor more approachable.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly Agree

Engagement

24. Using Twitter has enabled me to make better use of class time.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly Agree

25. Being able to read posts by other students was a positive aspect of using Twitter.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly Agree

26. I would like to see more use of Twitter for Learning in my modules.
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly Agree

27. Use of Twitter means it is not necessary to attend as many classes.

   1. Strongly disagree
   2. Disagree
   3. Neutral
   4. Agree
   5. Strongly Agree

28. Twitter can be an effective tool for Learning.

   1. Strongly disagree
   2. Disagree
   3. Neutral
   4. Agree
   5. Strongly Agree

APPENDIX B: TWITTER FOR LEARNING ONLINE QUESTIONNAIRE TWO

Dear Participant:

The purpose of this questionnaire is to find out the impact of the interactivity of web 2.0 technologies in student learning experience. I am inviting you to participate in this research thesis by completing the online questionnaire. The following questionnaire will require approximately 10-15 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please *do not* include your name. If you choose to participate in this thesis, please answer all questions as honestly as possible. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my thesis.

Sincerely,

Afaf Buqawa

Afaf.bu-ghawa@brunel.ac.uk

Personal Information

1. What is your gender?

   c.   Male

   d.   Female

2. What is your age?

   h.   Below 18

   i.   18-21

   j.   22-24

   k.   25-28

   l.   29-35

   m. 36-42

   n.   Above 42

Twitter usage

3. Did you have a Twitter account before your first lab class?

   c.   No

   d.   Yes

4. How many people do you follow on Twitter?

   i.   10 or less

   j.   11-50

   k.   51-100

   l.   101-200

   m. 201-300

   n.   301-500

   o.   501-1000

p. More than 1000

5. How many people are following you on Twitter?

i. 10 or less

i. 11-50

j. 51-100

k. 101-200

l. 201-300

m. 301-500

n. 501-1000

o. More than 1000

6. How often do you log on to your Twitter account?

a. Continuously

b. Several times a day

c. Once a day

d. Less than once a day but more than once a week

e. Once a week

f. Less than once a week but more than once a month

g. Once a month

h. Less than once a month

7. How often do you log on to your Email account?

i. Continuously

j. Several times a day

k. Once a day

l. Less than once a day but more than once a week

m. Once a week

n. Less than once a week but more than once a month

    o.   Once a month

    p.   Less than once a month

8.   How often do you log on to your Facebook account?

    i.   Continuously

    j.   Several times a day

    k.   Once a day

    l.   Less than once a day but more than once a week

    m.   Once a week

    n.   Less than once a week but more than once a month

    o.   Once a month

    p.   Less than once a month

9.   How often do you log on to your u-Link account?

    i.   Continuously

    j.   Several times a day

    k.   Once a day

    l.   Less than once a day but more than once a week

    m.   Once a week

    n.   Less than once a week but more than once a month

    o.   Once a month

    p.   Less than once a month

10. On average, how many Twitter posts (including retweets) do you make per week?

    g.   Less than one per week

    h.   1-5

    i.   6-10

    j.   11-20

    k.   21-30

    l.   More than 30 per week

11. Which of the following do you use most often to access Twitter?

    h.   Desktop computer and web browser (e.g. Internet Explorer)

    i.   Laptop computer and web browser (e.g. Internet Explorer)

    j.   Mobile phone web browser

    k.   Mobile phone app (e.g. twitter, Twitterdeck)

    l.   Mobile phone SMS

    m. Tablet web browser (e.g. iPad and Safari)

    n.   Tablet app (e.g. iPad and Twitter, Twitterdeck)

12. I have the following type of phones:

    j.   Blackberry

    k.   iPhone

    l.   Samsung

    m. Motorola

    n.   Nokia

    o.   Sony Ericsson

    p.   HTC

    q.   LG

    r.   Other

13. I have the following type of operating system on my mobile phone:

    g. Blackberry

    h. iOS (iPhone)

    i.   Symbian

    j.   Android

    k. Microsoft Windows Mobile

    l.   Don't know

Motivation

14. Twitter is a good way to post things as soon as I think of them.

1. Strongly disagree

2. Disagree

3. Neutral

4. Agree

5. Strongly Agree

15. Twitter is good way to keep a record of what I learn.

11. Strongly disagree

12. Disagree

13. Neutral

14. Agree

15. Strongly Agree

16. Twitter is a good way to get information

6. Strongly disagree

7. Disagree

8. Neutral

9. Agree

10. Strongly Agree

Communication

17. I enjoy using Twitter.

6. Strongly disagree

7. Disagree

8. Neutral

9. Agree

10. Strongly Agree

18. I use Twitter for social activities.

6.   Strongly disagree

7.   Disagree

8.   Neutral

9.   Agree

10. Strongly Agree

19. I use Twitter to make personal connection with people.

6.   Strongly disagree

7.   Disagree

8.   Neutral

9.   Agree

10. Strongly Agree

Instructor credibility

20. Using Twitter enabled me to communicate with my tutor outside the scheduled class.

6.   Strongly disagree

7.   Disagree

8.   Neutral

9.   Agree

10. Strongly Agree

21. Using Twitter reduces the boundaries between students and tutors.

6.   Strongly disagree

7.   Disagree

8.   Neutral

9.   Agree

10. Strongly Agree

22. Using Twitter makes the tutor more approachable.

6. Strongly disagree

7. Disagree

8. Neutral

9. Agree

10. Strongly Agree

Engagement

23. Using Twitter has enabled me to make better use of class time.

6. Strongly disagree

7. Disagree

8. Neutral

9. Agree

10. Strongly Agree

24. Being able to read posts by other students was a positive aspect of using Twitter.

6. Strongly disagree

7. Disagree

8. Neutral

9. Agree

10. Strongly Agree

25. I would like to see more use of Twitter for Learning in my modules.

6. Strongly disagree

7. Disagree

8. Neutral

9. Agree

10. Strongly Agree

26. Use of Twitter means it is not necessary to attend as many classes.

6. Strongly disagree

7. Disagree

8. Neutral

9. Agree

10. Strongly Agree

27. Twitter can be an effective tool for Learning.

1. Strongly disagree

2. Disagree

3. Neutral

4. Agree

5. Strongly Agree

APPENDIX C: WEB POLLS QUESTIONNAIRE

Dear Participant:

The purpose of this questionnaire is to find out the impact of the interactivity of web 2.0 technologies in student learning experience. I am inviting you to participate in this research thesis by completing the online questionnaire. The following questionnaire will require approximately 10-15 minutes to complete. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please *do not* include your name. If you choose to participate in this thesis, please answer all questions as honestly as possible. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my thesis.

Sincerely,

Afaf Buqawa

Afaf.bu-ghawa@brunel.ac.uk

Module Number:

1. What is your Age?

☐ Below 18

☐ 18-20

☐ 21-23

☐ 24-27

☐ 28-34

☐ 35-42

☐ Above 42

2. What is your Gender?

☐ Male

☐ Female

3. What level are you studying at?

☐ BSc.

☐ MSc.

☐ PhD.

☐ Other

4. Do you have a mobile phone?

☐ No

☐ Yes

5. What make of mobile phone do you have?

☐ BlackBerry

☐ iPhone

☐ Other

6. Can your phone connect to the Internet?

☐ No

☐ Yes

7. Who is your service provider?

☐ T-mobile

☐ Vodafone

☐ O2

☐ Orange

☐ Virgin

☐ Three

☐ Other

8. Do you get a free data allowance for accessing the Internet?

☐ No

☐ Yes

9. Are you willing to use some of your data allowance in class?

☐ No

☐ Yes

10. Do you have a phone signal in this room?

☐ No

□ Yes

11. Did you participate in voting on the Web Polls in class?

□ No

□ Yes

12. The use of Web Polls was entertaining

□ Strongly Disagree

□ Disagree

□ Neutral

□ Agree

□ Strongly Agree

13. The use of Web Polls contributed to my learning

□ Strongly Disagree

□ Disagree

□ Neutral

□ Agree

□ Strongly Agree

14. The use of Web Polls should be continued in future classes

□ Strongly Disagree

□ Disagree

□ Neutral

□ Agree

□ Strongly Agree

15. The use of Web Polls made a valuable contribution to the class

□ Strongly Disagree

□ Disagree

□ Neutral

□ Agree

□ Strongly Agree

16. The use of Web Polls should be extended to other modules

□ Strongly Disagree

□ Disagree

□ Neutral

□ Agree

□ Strongly Agree

<u>Thank you for your participation.</u>

APPENDIX D: INFORMED CONSENT FORM

Brunel UNIVERSITY LONDON

Brunel Business School

Research Ethics

Participant Information Sheet

1. Title of Research: [The Impact Interactivity of Web 2.0 Technologies in learning in higher education]

2. Researcher: AFAF Buqawa on Management studies, Brunel Business School, Brunel University

3. Contact Email: afaf.bu-ghawa@brunel.ac.uk

4. Purpose of the research: The aim of this thesis is to whether the interactivity of Web 2.0 technologies enhance learning experience of students in higher education.

5. What is involved: The thesis adopts triangulation mixed methods in which the participants were involved in the process of evaluating their own experiences in using a new technology with a view to improving it. This design will allow the researcher to separately collect both forms of data (questionnaire and Interview).

6. Voluntary nature of participation and confidentiality. Please note that your participation in the Questionnaire is voluntary and will be treated in confidence. You can withdraw from the Questionnaire at any time and no obligations. Your answers are valuable to us. Take your time to answer the questions; there are no right or wrong answers and we would simply like to seek your opinion. The Questionnaire should take between 10-15 minutes to complete.

APPENDIX E : INTERVIEW QUESTIONS

Staff interview

1. *Do you think Twitter has a future as a communication tool?*
2. *Do you think Twitter has a future as an educational tool?*
3. *In what ways do you think Twitter might be used in Learning?*
4. *What is the best way to encourage lecturers to use Twitter?*
5. *What is the best way to encourage students to use Twitter for Learning?*
6. *What is the biggest barrier to lecturers using Twitter?*

Student interview

1. *Do you think Twitter has a future as a communication tool?*
2. *Do you think Twitter has a future as an educational tool?*
3. *In what ways do you think Twitter might be used in Learning?*
4. *What is the best way to encourage students to use Twitter?*
5. *What is the best way to encourage students to use Twitter for Learning?*
6. *What is the biggest barrier to students using Twitter?*

Web Polls student interview

6. *Do you think Web Polls have a future as Learning tools?*

7. *In what ways do you think Web Polls contribute to students' learning?*

8. *What is the best way to encourage students to use Web Polls in class?*

9. *What are the biggest barriers to students using Web Polls in class?*

APPENDIX F: CODES IN NVIVO

Codes

Name	Sources	References	Created On
Barrires not using twitter	8	28	05/10/2012 12:10 م
obstacles	8	26	05/10/2012 12:11 م
Communication	9	30	05/10/2012 12:03 م
communication tool	8	18	05/10/2012 12:49 م
enjoy or fun	3	3	05/10/2012 12:05 م
Personal connection	5	5	05/10/2012 12:05 م
Social activities	3	4	05/10/2012 12:05 م
Engagment	8	38	05/10/2012 12:03 م
better use of class time	2	2	05/10/2012 12:06 م
interaction	6	7	05/10/2012 12:52 م
neccessary to attend as many class	0	0	05/10/2012 12:07 م
read post by others	3	5	05/10/2012 12:06 م
see more use for teaching	3	7	05/10/2012 12:06 م
teaching tool	7	17	05/10/2012 12:07 م
Instructor credibility	7	12	05/10/2012 12:03 م
more approchable	4	5	05/10/2012 12:09 م
outside the schedule class	4	5	05/10/2012 12:08 م
reduces the boundries	2	2	05/10/2012 12:09 م
Motivation	8	22	05/10/2012 12:03 م
Get information	5	6	05/10/2012 12:04 م
keep record	1	1	05/10/2012 12:04 م
post things	7	11	05/10/2012 12:04 م
training	4	4	09/10/2012 01:30 م