# An Investigation into the Acquisition of Tacit Knowledge in e-Learning Environments: An Experimental Study

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# Declaration

I hereby declare that this thesis is the result of my own independent and original work and investigation. I have duly acknowledged all the sources of information that have been used in the thesis.

I further declare that this thesis has not been previously accepted for any degree in any university and is not being concurrently submitted for any other degree.

Finally, I hereby give consent for my thesis, if successful, to be made available for interlibrary loan or photocopying (subject to the law of copyright), and that the title and abstract to be made available to outside organizations.

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Date: 27th May 2019

# Abstract

Given its soft nature and the fact that it's difficult to make explicit, tacit knowledge is certainly the most critical form of knowledge to deal with. Often referred to as know-how, practical experiences and insights; tacit knowledge is known to have a significant impact on one's quality of work and professional efficacy.

A review of the literature has revealed that many studies address the questions related to the capacity of e-Learning environments to create conditions that are conducive for participants to share, acquire and retain tacit knowledge. Still, there is debate about learners' ability to gain tacit knowledge in settings that are devoid of face-to-face contact, simply because of the lack of empirical or experimental studies on the subject. Assuming it's even possible, there is a lack of models and practical guidelines addressing the acquisition of tacit knowledge at the individual level in online education.

This study applies adult learning principles, Knowledge Management and e-Learning design best practices to posit a subject-specific e-Learning model based on Knowledge Objects and learning activities led in the spirit of Community of Practice. The model is tested in order to assess learners' tacit knowledge and influencing factors that impact the acquisition of this knowledge. The business presentation field was chosen to meet the objectives of the research since the mere memorization of facts does not make an effective presenter. Using a control group design, learners' tacit knowledge of the experimental group (*n=231*) and control group (*n=212*) was examined via a validated instrument (TKIBP). Twenty-three learners were closely monitored, and a panel of experts evaluated their performances at three different stages. Learners' perceptions of the model were also examined on a number of variables like delivery effectiveness and knowledge acquisition.

Results showed that a well-prepared e-Learning environment can create a strong potential to support the activities and learning processes necessary for learners to acquire tacit knowledge. The model proposed in this study is a viable approach to facilitate the acquisition of tacit knowledge in e-Learning environments; in a given field. Experience in the field, English as a first language, self-competence, perceived usefulness, self-directed learning and motivation all play a major role in learners' capacity to acquire tacit knowledge in e-Learning environments. This study unveils evidence-based information for the better implementation of e-Learning. It also gives a conceptual framework for scholars to advance research related to tacit knowledge acquisition in online education.

# Table of Contents

# List of Abbreviations

**BP**: Business Presentation

**CMI**: Close Monitoring Initiative

**CMS**: Course Management System

**CoP**: Community of Practice

**DIKW**: Data Information Knowledge Wisdom

**EL**: E-Learning

**EJKM**: Electronic Journal of Knowledge Management

**ICT**: Information and Communication Technology

**IS**: Information Systems

**ISD**: Instructional Systems Design

**KM**: Knowledge Management

**KO**: Knowledge Object

**LO**: Learning Object

**MOOC**: Massive Open Online Course

**MOODLE**: Modular Object-Oriented Dynamic Learning Environment

**NAS**: National Apprenticeship Service

**NoP**: Network of Practice

**QDA**: Qualitative Data Analysis

**SECI**: Socialisation, Externalisation, Combination and Internalisation

**SCORM**: Sharable Content Object Reference Model

**SJT**: Situational Judgement Test

**SNA**: Social Network Analysis

**TK**: Tacit Knowledge

**TKS**: Tacit Knowledge Sharing

**TKI**: Tacit Knowledge Inventory

**TKIBP**: Tacit Knowledge Inventory for Business Presenters

**TKIM**: Tacit Knowledge Inventory for Managers

**VLE**: Virtual Learning Environment

# List of Figures

# List of Tables

## Dedication

This Doctoral dissertation is dedicated to the loving memory of my lovely grandmother, *Christine Yougnia*. She raised me to love, hope, believe and achieve, but did not live to see this great achievement.

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# Chapter 1: Introduction

## 1.1 CHAPTER INTRODUCTION

The rich discussion of tacit knowledge shows that it is a crucial component of Knowledge Management. According to Abidi et al. (2005), tacit knowledge is the most valuable and significant part of human knowledge. Generally, there are two types of knowledge found in organizations and between individuals: *explicit knowledge* and *tacit knowledge*. Explicit knowledge is formal, written down and documented knowledge whereas tacit knowledge is informal knowledge that resides in an individual's head in the form of mental models, personal experiences, know-hows, rules of thumb, insights and so forth. Tacit knowledge plays a crucial role in improving individual and organizational productivity as well as giving a competitive advantage. It is perceived as an important asset for improving quality of work, decision-making, productivity, competitiveness, accuracy of task performances, and professional effectiveness. It is a major time saver for individuals and organizations (Haldin-Herrgard, 2000; Hisyam, Selamat and Choudrie, 2004). As such, it is vital to harness and facilitate the transfer of tacit knowledge between experts and novices from individuals' and organizations' perspectives.

Tacit knowledge originated from Polanyi's popular dictum: *"we know more than we can tell"* (Polanyi, 1966) which has led to much research. As noted by Gourlay (2006a, b), Tsoukas (2005) and Oguz and Elif Sengün (2011), the concept of tacit knowledge is largely underspecified and it carries several meanings. Since then, there have been various definitions and perspectives of tacit knowledge, and there have been debates about capturing, codifying, and transferring this sort of knowledge. Although some studies argue about the feasibility to pass on tacit knowledge from one person to another, Nonaka and Takeuchi (1995) are among many researchers who have a different opinion and they even suggested means and mechanisms to convert tacit knowledge to an explicit form and vice versa.

The shift to the digital era has brought up another area of contention related to the use of Information and Communication Technology (ICT) to externalize and pass on tacit knowledge. Today, the majority of working people have individual daily constraints that inhibits learning, and online learning (or, e-Learning) is the most accessible path. With the current generation, e-Learning has included online communities and learning management systems that engage each user to be more effective. On the other hand, organizations are increasingly adopting e-Learning as the main delivery method to train employees (Simmons, 2002). Higher education institutions are also moving towards the use of the internet to deliver courses both on campus and at a distance. Although e-Learning grows consistently as a medium for knowledge delivery in many sectors, there are still arguments that its reliance on Information and Communications Technology (ICT) impedes its capacity to support the effective transfer of tacit knowledge among instructors, or subject matter experts, and students due to the lack of face-to-face contact. This is the most cited reason for saying that tacit knowledge cannot be effectively shared and acquired virtually.

With the advent of new technologies such as Web 2.0, social media tools, virtual reality, gaming, simulations, 3D worlds, etc; many studies claim that e-Learning environments now have potent tools to provide better opportunities to mitigate the lack of face-to-face contact. They facilitate and enrich interaction, and collaboration among people and add comfort to externalize and share tacit knowledge (Yi, 2006; Falconer, 2006). While some researchers are still discussing the feasibility of ICT-mediated tacit knowledge sharing; others have claimed its effectiveness through concepts and ideas based on the best practices of Knowledge Management, the spirit of the Community of Practice and/or Knowledge Objects for content design. Unfortunately, these claims remain untested and they are purely theoretical claims. This situation freezes the debate and the research related to tacit knowledge in e-Learning. There is no research today that studies the factors that influence the acquisition of tacit knowledge at the individual level in e-Learning environments. Venkitachalam and Busch (2012) and Panahi et al. (2013) noted that there should be a shift of descriptive research to carry out more empirical studies in the subject of tacit knowledge.

The primary goal of this research is to investigate the acquisition of tacit knowledge at the individual level in an e-Learning setting. The research consists of establishing conditions conducive for students to cultivate subject-specific tacit knowledge in an e-Learning environment, using key concepts found in related literature. The research also conducts an experiment over a long period of time; and examines the development of students' tacit knowledge in the field, and students' influencing factors that positively impact their ability to capture and retain tacit knowledge in an e-Learning environment.

This chapter provides background information on the research problem. The research objectives, questions, scope, and significance of the study are also outlined. Finally, an overview of the research design, working terms and definitions used in the study, as well as the structure of the thesis, are provided.

## 1.2 BACKGROUND OF THE PROBLEM STATEMENT

According to Peter Drucker, *"knowledge"* is a strategic resource that gives sustainable competitive advantage (Drucker, 1993). With this realization, organizations are now attempting to manage knowledge in a more systematic and effective way. organizations use Knowledge Management to encourage the creation and sharing of knowledge that results in improving productivity, innovation, competitiveness and better relationships among people in those organizations (Ubon and Kimble, 2002).

Today, education is subject to the same pressures of the marketplace. According to Duguid and Brown (2000), profound changes in competition have forced institutions of higher education to think like businesses. Educational markets are becoming global as universities attempt to expand their curriculum and offer high quality programs to students, regardless of location. To respond to the rapid changes in technologies and the increasing demands of stakeholders, many universities have turned to e-Learning.

Although e-Learning is a fast-growing means of instruction, there are still unanswered questions about the efficacy of sharing, and the acquisition of both soft and complex skills, on such a channel compared to the traditional face-to-face model of education. The National Apprenticeship Service has reported a 32% increase in demand for apprenticeship programs in the United Kingdom from 2012 to 2013 (NAS, 2014). This suggests that acquiring hands-on skills and practical knowledge is highly valued by students; and therefore it is an important criteria in selecting the best model of instruction for the best possible return on investment.

The most serious obstacle in e-Learning is the constraint of time and space (Ubon and Kimble, 2002). Online distance education means that there is less opportunity for people to engage in face-to-face meetings. It may also involve social, cultural and language differences. Due to time and space constraints, there is also the loss of physical interaction and contextual cues among participants. These problems can result in a lack of trust and so, people are less willing to share knowledge and collaborate with others in online learning communities. According to Nonaka and Takeuchi (1995), knowledge is transformed from an individual to a collective dimension, and from the tacit to explicit form. Transforming tacit knowledge into explicit communication messages can only be achieved by creating opportunities for people to engage in face-to-face, group or other social activities. It is in such social occasions that people are most likely to talk, discuss and convey their tacit knowledge to others.

Although inherent challenges in e-Learning tend to impede upon tacit knowledge sharing initiatives, new developments in interactive technologies are blurring the lines between place, time and distance. These technologies are mitigating the need for in-person communication with the application of tools such as video-based lectures, virtual seminars, multimedia browsers and chat facilities. These advancements demonstrate a neat transition from the reliance on face-to-face education to the acceptance of multimedia, web-based learning. These changes in distance education improve students' learning experience and enhance the flexibility, interactivity and social aspects of the learning process that relies heavily on the externalization of knowledge, creation of new knowledge and transfer of knowledge (Islam et al., 2011). Many studies give examples of the success in disseminating tacit knowledge in online environments. They argue in favour of the capacity of Information and Communication Technology tools, which permit people to share, capture and retain tacit knowledge effectively (Yi, 2006; Falconer, 2006; Hildrum, 2009; Harris, 2009; Al-Qdah and Salim, 2013; Panahi et al., 2012a, b, 2013; Panahi, 2014).

Many organizations have applied Knowledge Management techniques to improve their efficiency and encourage the creation, capture and sharing of tacit knowledge among people in the organization. This idea has also been extended to e-Learning to leverage the transfer of tacit knowledge (Ubon and Kimble, 2002; Wild et al., 2002; Qwaider, 2011; Islam et al., 2011). For instance, Liebowitz and Frank (2011) advocated for Knowledge Management and e-Learning synergy, and suggested the concept of Knowledge Objects and Communities of Learners to encourage and stimulate tacit knowledge creation and retention in a Virtual Learning Environment. Using natural inquiry as the methodology of their study, Tee and Karney (2010) claim that purposefully developing a *ba*-like online environment is a useful approach to facilitate e-Learning, and creates strong potential to support learning processes necessary for students to cultivate tacit knowledge. They added that such conditions encourage processes and creates conditions consistent with Nonaka and Takeuchi's SECI model of knowledge creation and the concept of *ba* (or shared context). Such an environment encourages students to share and construct knowledge through socialization, externalization, combination, and internalization.

This study subscribed to the school of thought that claims of successful tacit knowledge sharing and acquisition in online environments. The study also aims to shed light on this untested and unexplored claim by looking at the development of students' tacit knowledge through an experiment using a method of enquiry that is not offered in literature. In other words, the study aims to explore whether a purposefully designed e-Learning environment can be a viable space for people to share, cultivate and retain tacit knowledge. If so, to identify the conditions or factors at individual level that have a major role in the process of acquiring such knowledge. Therefore, a review of the literature on general learning theory, adult learning theory, Knowledge Management, tacit knowledge and e-Learning was conducted in order to identify concepts, techniques and ICT mechanisms that positively contribute to the cultivation and dissemination of tacit knowledge among participants in an e-Learning environment. An e-Learning system to be used as a research testbed was then designed, using this literature.

Among other aspects, it was found that three convictions underpin the current research: the capacity of ICT tools in supporting tacit knowledge sharing in e-Learning; the importance of Knowledge Objects in designing e-Learning content and, adopting teaching and learning activities based on Community of Practice mechanisms; and the capacity of measuring the tacit knowledge of individuals in a specific subject.

### 1.2.1 Sharing and Acquiring Tacit Knowledge in E-Learning Environment

E-Learning instruction is the use of Information and Communication Technology to learn and teach. It can be synchronous or asynchronous in terms of the communication among participants. Regardless of the chosen method of communication, e-Learning is characterized by indirect contact and heavily relies on ICTs. It is for this reason that there is division among researchers as to whether e-Learning is an adequate means of sharing tacit knowledge between instructors and students.

Debates on whether ICT can enable individuals to externalize and internalize tacit knowledge in an e-Learning environment are pervasive in the literature. According to some researchers, ICT supports codified and explicit knowledge rather than tacit knowledge. Information and Communication Technology is too limited to support tacit knowledge sharing (Haldin-Herrgard, 2000; Johannessen et al., 2001; Hislop, 2002). Apprenticeship, mentoring, meeting and chatting, direct observation, storytelling, learning-by-doing and learning-by-using are always cited as effective ways to share and acquire tacit knowledge because they involve face-to-face contact (Alavi and Leidner 1999; Smith 2000; Jacob and Ebrahimpur 2001; Busch, 2008). The argument aligns with the information richness theory (also known as the media richness theory). This theory was pioneered by Daft and Lengel (1986) and it suggests that communication cues, gestures and the tone of the voice can augment interacting and understanding in a face-to-face setting. Moreover, Hansen et al. (1999) stated that the use of ICT can have disruptive effects since it resorts to the use of emails and phone calls which has an absence of body language. Busch (2008) studied tacit knowledge diffusion in three types of small, medium and large organization structures, and he found that employees using phones and emails resulted in less transfer of tacit knowledge.

On the other hand, many researchers such as Yi (2006), Falconer (2006), Hildrum (2009), Tee and Karney (2010), Panahi et al. (2012b) contend that traditional mechanisms are no longer suitable in the current digital era. They argue that the development of technology provides potent tools to reinforce interaction, collaboration and knowledge sharing initiatives among people. In fact, technology comprising of social web tools, game simulators, 3D virtual world, innovative videos, and so on, can better assist experts in the preparation, illustration, explanation and demonstration of a particular skill or concept to novices. This also allows novices to visualize and practice what has been taught in endless ways and scenarios. For instance, IBM Innov8 2.0 is an example of a 3D game simulator that helps students to develop Business Process Management skills that are vital in the real business world (IBM, 2010). Panahi et al. (2012b, p. 882) asserted that: "...traditional mechanism of tacit knowledge sharing, such as apprenticeship/mentoring, face-to-face meetings/chatting, direct observation, etc. is no longer cost effective and feasible in the new fast growing business models." Similarly, Venkitachalam and Busch (2012) state:

> "Advocates and critics suggest the influence of information technology in the Knowledge Management domain support codified knowledge rather tacit knowledge. Yet, there is evidence in the current literature that presents the use of technologies and applications to support the articulation and flow of tacit knowledge between individuals." (Venkitachalam and Busch, 2012, p. 365).

In e-Learning particularly, there are also noticeable efforts and strategies developed in order to promote and strengthen tacit knowledge sharing among students and instructors. Online education generally takes place within a Learning Management System also called a Virtual Learning Environment, such as *Moodle* and *Blackboard* that are very popular on the market. These Virtual Learning Environments are built and they function under some standards and specifications such as SCORM (Sharable Content Object Reference Model) and principles drawn from the instructional design theory that provides guidelines to design and orchestrate e-Learning materials. For instance, there has been a large adoption of the video format in online courses that are perceived to be powerful to elucidate some concepts and to enhance learner retention. Geri (2012) first admitted that imparting new knowledge and skills in a distance learning environment seems harder than conducting the instruction in a face-to-face scheme. She pointed out student retention as being the major concern aligning with other studies like Copley (2007). By investigating video lectures, Geri concluded that videos may be a helpful and suitable solution to increase retention and mitigate the distance learner loneliness (inactivity) which are two factors that influence skills acquisition and application. At this state, video lectures are easy to conduct within the majority of existing Virtual Learning Environments. Additionally, there are many other tools supporting digital workshops in such environments.

Another issue in online learning is interaction that has also been enhanced recently with social networking tools, web conferencing, synchronous chat, wikis, etc. In fact, there are three types of interaction in online learning, *learner-content, learner-learner* and *learner-instructor* (Sher, 2009). However, many studies show that only learner-learner and learner-instructor interactions are critical for learning effectiveness and student satisfaction (Sher, 2009; Chao et al., 2011). Furthermore, a study by Davies and Graff (2005) revealed that students who failed in their online program interacted less frequently, as opposed to students who achieved a higher performance. In the same vein, Hrastinski (2009) asserted that improving online learning starts with enhancing online learner participation. Luckily, the majority of Virtual Learning Environments are now well-equipped with collaborative tools and mechanisms to facilitate participants' interaction and engagement, vital for tacit knowledge sharing. For instance, Hildrum (2009) studied online tacit knowledge sharing within Cisco's[1] e-Learning platform and concluded that e-Learning activities (content network, chat groups, remote labs) facilitate the sharing of tacit knowledge. Hildrum stated:

[1] Cisco is a multinational technology company that designs, manufactures, and sells networking equipment. Cisco also trains people how to use their devices and products, and deploys their solutions through their e-Learning platform and certification scheme high in-demand over the world.

> "If ICTs are really inadequate as a means of diffusing tacit knowledge, it is peculiar that Cisco's extensive network of remote labs continues to exist and grow after eight years of operation. Although the knowledge shared in Cisco's remote labs represent a very small part of Cisco's total knowledge base, the experiences from remote labs still represent an important counterexample to the claim that face-to-face interactions are indispensable for interpersonal sharing of tacit knowledge." (Hildrum, 2009, p. 214).

The discussion above has highlighted the role of ICT in tacit knowledge sharing within virtual spaces and online environments in particular with examples found in the literature. This shows the feasibility and capacity of Information and Communication Technology tools in tacit knowledge sharing; yet another school of thought disapproves it. Nonetheless, admitting that e-Learning suffers from some pitfalls and challenges pertaining to learners' engagement and interaction, a number of concepts and ideas have emerged to mitigate those issues. Many studies suggest the application of Knowledge Management principles in e-Learning, leading to Knowledge Management and e-Learning synergy. Liebowitz and Frank (2011) developed further interest in Knowledge Objects to first improve e-Learning content, which is the basis of learning activities and discussions.

### 1.2.2 Knowledge Objects and CoP Learning and Teaching Strategy

Knowledge Management and e-Learning have received a lot of interest in the literature and they have had remarkable development and growth separately. However, it has been noted that both are concerned with the creation, acquisition, capture, sharing and use of knowledge. Specifically, Knowledge Management is about capturing and managing knowledge while e-Learning is about delivering and acquiring knowledge. As such, there has been a growing trend of applying Knowledge Management methods in e-Learning environments in order to leverage knowledge transfer and augment learning effectiveness (Ubon and Kimble, 2002; Chatti et al., 2007; Liebowitz and Frank, 2011; Qwaider, 2011).

The combination of both disciplines favours the decomposition of online learning content into small chunks called *Learning Objects*. In the literature, Learning Objects are operationally defined as interactive web-based tools that support the learning of specific concepts by enhancing, amplifying and guiding the cognitive processes of learners (Agostinho et al., 2004; Wiley et al., 2004).

From an instructional systems design perspective, Learning Objects facilitate participants' interaction and increase the focus on learning. Learning Objects also improve knowledge retention, which is seen as one of the major challenges in online distance learning (Liebowitz and Frank, 2010, Geri, 2012).

According to the Web-Based Training Information Center (2009), Learning Objects will have the biggest impact on online learning in the coming years. The goals of Learning Objects are: reusability, interoperability, durability and accessibility. In addition, Lytras et al. (2005) and Merrill (1998) alleged that Learning Objects that possess tacit knowledge characteristics have a positive influence on learner development. In the same vein, Longmire (2000) stated that: "Building an entire course of study around these Learning Objects can satisfy both immediate learning needs, as in a knowledge-based or skills-based course, and current and future learning needs that are not course based." However, all of these studies remain purely theoretical and they have not been suitably tested to better understand the impact on personal tacit knowledge growth.

Remarkably, there are many applications of Learning Objects on the online learning market. For example, the giant tech company, Cisco, has introduced this concept of Learning Objects on its distance learning platforms. It is claimed that by packaging Learning Objects within an online learning environment, learning will become more powerful and agile. Liebowitz and Frank (2011, p. 8) believe that: "If some of these Learning Objects are actually Knowledge Objects whereby a student has access to interactive pools of knowledge, then the e-Learner can augment personal knowledge through these knowledge bases for a deeper understanding of specific knowledge." Authors see Knowledge Objects as a mechanism to enrich online content with a relevant, deep and interactive knowledge base of the field. Knowledge Objects then adhere to knowledge content considerations of online learning to transfer tacit knowledge as explained by Wild et al. (2002). The authors suggest that those considerations are based on deep knowledge, insight and expertise. This dynamic can be maintained and enriched through the Community of Practice, meaning a group of participants sharing a common interest in a topic that Hildrum (2009) and Busch (2008) say it stimulates and generates relevant knowledge in the subject.

Communities of Practice are groups of people who share a concern or a passion for something they do, and interact regularly to learn how to do it better (Wenger, 2006). Their intention is to provide a safe and supportive space for members to share resources and ideas, explore and question their understandings, solve challenges, and form common commitments to action for improvement.

Despite cases and features exhibited in the literature to justify effective knowledge sharing in e-Learning, there is still a lack of empirical studies proving or disproving these arguments. There is also no evidence of the role played by Knowledge Objects and Community of Practice in the creation or development of tacit knowledge for individuals in the e-Learning context. Moreover, none of the available studies shows how Knowledge Objects and Community of Practice concepts with the new ICT tools can be organized in e-Learning environments in order to fulfil tacit knowledge sharing and acquisition.

### 1.2.3 Tacit Knowledge Measurement

To justify the effectiveness of e-Learning and the performance of learners regarding tacit knowledge transfer, some studies use academic or intelligence tests. However, these methods are not meant to measure tacit knowledge (know-how, practical experience or practical intelligence) according to Somech and Bogler (1999) and Sternberg et al. (1995). Researchers argue that academic tests measure academic intelligence (know-how or explicit knowledge). They further contend that measuring tacit knowledge is not an intelligence test in disguise and therefore, another approach should be considered. Sternberg and his colleagues (psychologists from Yale University) postulated an approach for testing tacit knowledge in any professional field or activity from which tacit knowledge measurement for managers or management skills is popular in practice.

The test consists of evaluating participants on day-to-day issues and challenges faced by professionals in a particular field and comparing respondents' answers with a typical expert's answer prototype. Practically, the test results in a questionnaire with a set of scenarios and answer options. This is also called the tacit knowledge inventory for the field 'Tacit Knowledge Inventory for Managers' (TKIM). Respondents have to use a Likert scale system to reveal their tacit knowledge score. Other successful and widely adopted tacit knowledge testing instruments developed by the Yale group include military leadership, sales, teaching, etc. Busch (2008) subscribed to the Yale group approach and developed a tacit knowledge testing instrument for Information System and Information Technology managers to then assess tacit knowledge diffusion within an organization.

There are numerous critics of Sternberg and his colleagues' testing of knowledge. Gottfredson (2003) provided a detailed critique on Sternberg and his team practical intelligence theory claiming that the authors misreported data, consistently overstating supportive results, and they ignored evidence that contradicts the theory. McDaniel et al. (2001) argued that Sternberg and his colleagues' technique has more resemblance to Situational Judgment Tests where there is little research on their validity.

Testing tacit knowledge is challenging and currently, there is no consensus on a method to test that kind of knowledge. In the history of scientific psychological measurement, there are two important quotes from the famous psychologist Thorndike (1918). "Whatever exists at all exists in some amount. To know it thoroughly involves knowing its quantity as well as its quality." McCal (1939) asserts that: "Anything that exists in amount can be measured."

With the development of science and technology, we make more accurate measurements about length, weight, temperature and other physical properties, but we can also attempt to use various methods to measure psychological characteristics such as thinking, mood, personality, temperament, etc. Since tacit knowledge is an objective reality and it is relatively stable for the individual, it is possible to conduct a quantitative analysis with special measuring methods. Given its subtle nature, tacit knowledge cannot be measured as easily as physical properties, despite the robustness of methods. We can only speculate the level and characteristics of the individual's tacit knowledge and enhance it with complementary methods. For instance, Busch et al. (2006) provided a triangulated approach to test tacit knowledge and its diffusion. The Busch's methodology tests individual tacit knowledge from a quantitative angle (following the Sternberg/psychology approach) and qualitative angle (using formal concept analysis theory) to assess the diffusion of tacit knowledge among people in an organization or learning community (using social networking analysis).

Although tacit knowledge is highly individualized, there are studies that have shown that it can be effectively measured providing methods and opening doors for reflections and improvements. Unfortunately, we noticed that authors who strongly argue that tacit knowledge can be transferred either face-to-face or virtually seldom endeavour to measure the tacit knowledge acquired or transferred at individual level. The literature is left with theoretical arguments and a vague direction for practice.

A major gap in tacit knowledge research in e-Learning is the scarcity of empirical or experimental studies that measure and compare tacit knowledge at the individual level to answer whether people are able to gain tacit knowledge from learning and interacting with their peers and subject matter experts in an e-Learning platform devoid of face-to-face contact. Engaging in tacit knowledge testing research in e-Learning is then crucial to clarify the adequacy and usefulness of the e-Learning mode as Özdemir (2008) warned that:

> "If 'traditional e-Learning' environments are insufficient for tacit-knowledge transfer and creation, there is a potential danger for the next generations. While they may gain codified knowledge anywhere and anytime, they will probably be devoid of the knowledge hidden within their master (teacher) or peers" (Özdemir, 2008, p. 554).

The three convictions discussed above established the rationale for the current study and they led the researcher to define the problem as follows.

## 1.3 PROBLEM STATEMENT

A review of relevant literature showed that there are two conflicting schools of thought regarding the use of Information and Communication Technology to share tacit knowledge within a virtual space, including the social media space, virtual learning environment, etc. The first school of thought asserts that externalizing and transferring tacit knowledge in an online environment results in ICT reliance which cannot be as effective as the face-to-face learning model in which participants benefit from social cues, body language, live demonstration, etc, which enables better understanding and retention. On the contrary, the second school of thought provides counterexamples of the adequacy and success of sharing and acquiring tacit knowledge in online environments without face-to-face contact.

Although there are significant theoretical underpinnings and examples in the second school of thought, they remain unsatisfactory leaving three major gaps. Firstly, given the plethora of concepts and ICT features suggested to share and capture tacit knowledge in online environments, there is a need to establish a typical framework to effectively achieve the target within a Virtual Learning Environment. Secondly, studies investigating the sharing and acquisition of tacit knowledge in online distance learning lack empirical evidence. Specifically, the nature of knowledge shared among online participants as well as the amount of tacit knowledge gained, if any, by knowledge seekers in such environments, remains blurred and not appropriately assessed. Thirdly, the potential contribution of ICTs, Knowledge Objects and various other concepts claimed to facilitate and increase tacit knowledge transfer and retention within a virtual learning environment has not been examined. Hence, current research aims to bridge these gaps and focus on the acquisition of tacit knowledge at individual in e-Learning. It does this by examining the nature of participants' exchanges in an e-Learning platform, testing tacit knowledge at the individual level and exploring participants' influencing factors.

Practically, this study aims to review and consolidate concepts and factors purported to facilitate and increase online tacit knowledge acquisition, in order to propose and design a conducive adult learning environment to promote the development of tacit knowledge of the field in question among participants. Knowledge objects are primarily taken on board to enhance and maximize personal knowledge growth as claimed in the literature. Following that, participants, comprised of students and subject matter experts, are invited to collaboratively learn and exchange ideas and experiences in the business presentation field. Afterwards, students' tacit knowledge and their perceptions are assessed and examined through three methods that are detailed and justified in the research methodology chapter. Business presentation was chosen as the field for the experiment, since tacit knowledge played a vital role in the game rather than a mere mastering of facts and rules. Being successful in delivering business presentations requires the ability to speak with confidence, professionalism and quality in front of an audience in business (Stowe et al., 2010; McLean, 2011). Wagner and Sternberg (1991, p. 2), the pioneers of tacit knowledge testing, also see the possession of tacit knowledge to be an important ingredient in giving successful oral presentations.

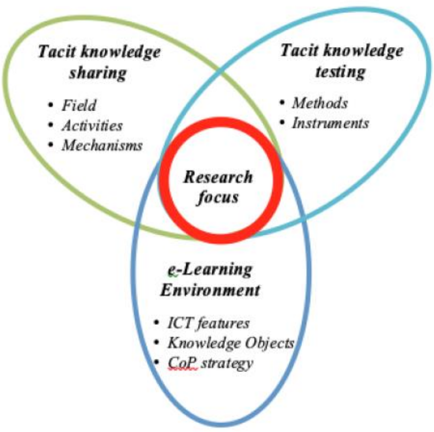



*Figure 1. 1 Research focus*

Figure 1.1 illustrates the mains areas of concerns and the focus of the study. As it is shown, this study is placed at the intersection of three areas: e-Learning environment design and ICT support, tacit knowledge sharing and tacit knowledge testing.

E-Learning represents the context of the research and the principal unit of investigation. Understanding the role played by ICT features, Knowledge Objects and learning activities in the process of sharing and acquiring tacit knowledge in an e-Learning context constitute another unit of the study. Similarly, understanding methods and instruments to test for tacit knowledge of a subject is also an important unit of the study to achieve its objectives and answer all research enquiries. The scope of the study will be discussed further.

## 1.4 RESEARCH AIMS AND QUESTIONS

The research gaps identified in the literature helped to define the research problem. They also assisted in defining the overall aim, main research question, and set of objectives to answer the question. The overall aim of the study is to shed light on the question related to the ability of students to gain tacit knowledge in e-Learning environments characterized by the use of ICT (without face-to-face contact) to interact and collaborate with peers and instructor(s).

In the context of education, the value of understanding how tacit knowledge is cultivated in online environments can significantly move the field of e-Learning forward. There are some inherent qualities about e-Learning environments that make the learning experience different and more effective than conventional means. Yet, there is little understanding about what makes for an effective or less effective e-Learning environment, particularly from the standpoint of how tacit knowledge is stimulated, transferred or developed. Given the myriad of concepts, techniques and tools in the literature claimed to facilitate students' acquisition of tacit knowledge in e-Learning, it is crucial to propose a valid model with clear evidence.

This leads to the broad research question: *Can e-Learning environments provide conditions that facilitate the acquisition of tacit knowledge?* And if so, *how?*

A number of sub questions emerged out of this broad question. For example, from a process standpoint and conditions of an e-Learning environment:

**RQ1:** Can tacit knowledge be cultivated and retained in e-Learning environments? And if so, how?

**RQ2:** Do the use of Knowledge Objects to design e-Learning content and the coordination of learning and teaching activities in the spirit of Community of Practice facilitate the acquisition of tacit knowledge in e-Learning environment?

The other guiding question relates more to each learner's individual characteristics and influencing learning factors:

**RQ3:** Among the following: age, gender, ethnicity, specialty, experience in the field, English as a first language, familiarity with e-Learning environments, self-competence, perceived usefulness, self-directed learning, motivation, perception of the proposed e-Learning model; what are the major factors or characteristics that positively influence learners' ability to acquire tacit knowledge in an e-Learning environment (based on RQ2)?

To achieve the research aim and answer the research questions, the following research objectives are pursued:

- **O1:** To critically analyze the literature related to tacit knowledge acquisition and its dissemination in e-Learning, and examine whether people are able to capture and retain tacit knowledge using the e-Learning channel [RQ1] (Chapters Two and Six).
- **O2:** To review the learning theory, adult learning theory, learning styles, Knowledge Management and e-Learning literature for an in-depth understanding of the learning process and knowledge development. To identify concepts or ideas concerning e-Learning implementation in order to propose practical guidelines for developing an e-Learning system that promotes the externalization and internalization of tacit knowledge. Finally, to establish core concepts for the experiment [RQ1, RQ2] (Chapters Two and Three);
- **O3:** To develop a conceptual framework for e-Learning implementation offering an in-depth understanding of the concept of Knowledge Object and learning strategy based on Community of Practice principles, and factors that play a major role in learners' ability to capture and retain tacit knowledge in an e-Learning environment [RQ2] (Chapters Three);
- **O4:** To validate the proposed conceptual framework through an experiment followed by an examination of the development of students' tacit knowledge of the business presentation field at the individual level and influencing factors [RQ3] (Chapter Five and Six);
- **O5:** To revise and modify the conceptual framework based on empirical findings to propose practical guidelines for a successful design and management of e-Learning environments. Additionally, to explore evidence (findings) and ideas (conceptual

framework, methodology) in order to advance the debate on tacit knowledge related research in e-Learning, and to encourage scholars to seek further experimental and empirical studies in the field (Chapters Seven and Eight).

## 1.5 CLAIMS EMERGING FROM RESEARCH QUESTIONS

According to research questions, the following claims were formulated:

- **Claim 1** - Learners can acquire tacit knowledge in a well-prepared e-Learning environment [RQ 1]. A properly coordinated program in an e-Learning environment creates conditions to support the activities and learning processes necessary for learners to acquire tacit knowledge.
- **Claim 2** – A viable model to facilitate the acquisition of tacit knowledge in e-Learning environments consists of preparing content using Knowledge Objects and applying Community of Practice strategy to coordinate learning and teaching activities. This approach promotes collaboration and helps students locate and connect with like-minded peers to exchange ideas and to develop deeper insights and understandings filled with tacit knowledge [RQ 2].
- **Claim 3** - Among the following: age, gender, ethnicity, specialty, experience in the field, English as a first language, familiarity with e-Learning environments, self-competence, perceived usefulness, self-directed learning, motivation, perception of the proposed e-Learning model; there are important influencing factors or characteristics that positively impact the learners' ability to acquire tacit knowledge in an e-Learning environment [RQ3].

## 1.6 DELIMITATION AND RESEARCH SCOPE

The scope of the study is defined as follows; first, the study adopted an organizational rather than philosophical definition of tacit knowledge. As mentioned in section 1.1, it is debatable as to whether or not tacit knowledge can be articulated, codified, formalised and operationalized. Polanyi viewed tacit knowledge as inexpressible knowledge residing in human minds (Polanyi, 1966). From this perspective, it may not be easily accessible and transferable using ICT (Haldin-Herrgard, 2000; Johannessen et al., 2001; Hislop, 2002; Flanagin, 2002).

Polanyi's philosophical view of tacit knowledge has evolved in organizational Knowledge Management studies, particularly by the work of Nonaka and Takeuchi (1995). To some extent, tacit knowledge is now known to be articulable and expressible in certain situations, and is classified into different types of tacit knowledge based on its degree of tacitness and expressibility (Richards and Busch, 2000; Busch, 2008; Oguz and Elif Sengün, 2011). To meet the research objectives of the study, the organizational definition of tacit knowledge is adopted. In this research, tacit knowledge refers to articulable tacit knowledge possessed by an expert in the field. The term "tacit knowledge" rather than "implicit knowledge" is used, to allow comparison with previous studies conducted by Hedlund et al. (2003), Sternberg et al. (2000), Busch et al. (2003) and Berman et al. (2002). This aspect is further discussed in the literature review chapter (section 2.6.2, pages 63-66). This Organizational Knowledge Management's view of tacit knowledge also allows a better understanding of the phenomenon of tacit knowledge sharing using ICT than Polanyi's view, which seemingly does not see a role for ICT in tacit knowledge sharing.

By adopting an organizational definition, the tacit knowledge under examination is mainly based on the types of tacit knowledge that field experts acquired personally in their workplaces, practices and routines. It is based on knowledge that can be shared to some degree through conversation, or knowledge that can be demonstrated. Having chosen 'business presentation' as the subject for the experiment, tacit knowledge is related to the practical experience, skills, personal/professional opinions and perspectives; and other job-specific knowledge and experiences exhibited by experienced business presenters. Therefore, the main focus is to assess the amount of that knowledge that could be passed on successfully to a novice using ICT in an online learning environment. Inexpressible and less articulable types of tacit knowledge in the forms of mental models, gut feelings, hunches and intuitions that may not be articulated were not considered.

Second, e-Learning enables learners to learn everywhere and at any time. It normally takes place within an e-Learning environment fitted with ICT features allowing interaction and collaboration among participants. The study's participants were students from an educational institution that provides additional support to students in an e-Learning environment. This study was set to conduct learning and teaching activities in that environment where participants would resort to ICT tools and devices to connect, collaborate, practice and learn. Expanding the scope of this research to "pure" e-Learning is presented in the final chapter and remains for future work.

Third, the study was set to investigate tacit knowledge acquisition in an e-Learning environment with adult learners. Hence, the study applied learning theory and adult learning principles to design the e-Learning testbed environment and to conduct learning and teaching activities. Additionally, the study investigated one set of the influencing factors identified in the literature, which may impact the students' ability to acquire tacit knowledge in e-Learning environments. Other factors are out of the scope of this research. They are presented in the final chapter and also remain major themes for further research.

Fourth, the selection and recruitment of experts was based on a set of criteria defined in Chapter Four (page 164). It was not limited to specific geographical locations and it was expected that the results would not be affected by geographical location. The selection of subject matter experts was also based on a set of criteria defined in Chapter Four (page 176). The learners were second year, undergraduate business students. They were invited to work interactively and collaboratively with instructors in the e-Learning environment in order to exchange ideas and experiences in the 'business presentation' field of interest.

Fifth, it was assumed that honest and candid responses were given by the participants through the interviews and questionnaires; and that and the students relayed their true stories, experiences and perceptions. Weaknesses or limitations identified in the research findings will be discussed in the final chapter of the thesis.

## 1.7 OVERVIEW OF THE RESEARCH DESIGN

The research design refers to the overall strategy chosen to integrate different components of the study to answer the research questions. The design should be developed on the basis of the research aim and corresponding questions (Onwuegbuzie and Teddlie, 2003; Tashakkori and Teddlie, 2010). The main purpose of the study is to explore the development of students' tacit knowledge using the e-Learning channel. Few studies have already addressed issues or questions related to the capacity of e-Learning environments to create conditions conducive for e-Learners to cultivate or develop tacit knowledge. Numerous authors have postulated a multitude of concepts and techniques to increase the development and dissemination of tacit knowledge in e-Learning environments. This study proposes a model based on Knowledge Objects and learning activities in the spirit of the Community of Practice, and evaluates its efficacy on students' tacit knowledge via an experiment in a way not previously offered in the literature. The business presentation field is used for the experiment, and will provide deep insights into the students' ability to gain tacit knowledge in a purposefully designed e-Learning platform.

Busch (2008) proposed a step-to-step guide to conduct empirical research on tacit knowledge that has inspired this study. Hence, the study consists of seven stages at a macro level. They are defined as follows:

**Stage 1: Defining the research topic**

This stage consists of understanding tacit knowledge and its importance in the context of e-Learning. It consists of defining the research problem, defining the research aim and objectives, deriving the main research question and sub-questions, explaining the significance of the study and defining the scope and limitations of the study.

**Stage 2: Conducting literature review**

This stage involves critically reviewing the existing and relevant literature, getting a deeper understanding of the topic, determining the research gaps and revising the research question and scope.

**Stage 3: Developing a conceptual framework**

This stage comprises of developing a theoretical framework based on the literature, identifying and establishing conditions, factors and activities that claim the successful sharing and creation of tacit knowledge in e-Learning environments. It also comprises of defining assumptions and hypotheses, and drawing the conceptual framework. This justifies the adoption of key concepts implemented in the e-Learning environment used as the testbed of the experiment.

**Stage 4: Research design**

This stage justifies the overall methodology of the study and choice of control group design found appropriate to explore and compare, if any, the development of students' tacit knowledge in the experimental or treatment group, before and after the exposure to the proposed e-Learning environment, compared to the control group. This implies designing and orchestrating learning within the proposed e-Learning environment derived in stage 3, developing instruments and methods to assess the development of students' tacit knowledge in the area of business presentation, taking different samples size, recruiting participants, obtaining ethical clearance and collecting data.
Overall, this stage consists of three (3) steps:

*Step 1: Constructing research instruments and methods to assess tacit knowledge*

Capturing, eliciting or assessing tacit knowledge is challenging but not impossible. However, there is not agreement in the ways to assess field-specific tacit knowledge and no instrument deals with our subject of interest. The study opted for a triangulated approach to mitigate weaknesses and criticisms seen in one technique or another by applying both qualitative and quantitative measures.

- The first approach is based on popular techniques from psychologists from The Yale group. They feel that tacit knowledge can be articulated at a certain level of abstraction. They claim that novices and experts differ in the amount and organization of field specific knowledge. Therefore, the more expert-like knowledge a person possesses, the more tacit knowledge the person has. Tacit knowledge is measured through the development of inventories, typically based on a Situational Judgment Test format designed to capture specialized, subject-specific or job-related knowledge acquired from experience. The process of developing a Tacit Knowledge Inventory in this way begins by eliciting experienced-based tacit knowledge from successful practitioners and experts in a particular field and finishing with a validated and revised instrument.

  Following the author's recommended guideline, we defined selection criteria and recruited experts and practitioners in the area of business presentation using snowball sampling. We then developed the Tacit Knowledge Inventory for Business Presenters (TKIBP) instrument by interviewing 12 experts and practitioners in the field using semi-structured interviews. The TKIBP instrument was converted into a questionnaire and issues pertaining to the Situational Judgement Test format were fixed following findings and recommendations of McDaniel and Whetzel (2009) and others detailed in the literature chapter (pages 120-122). The end result was found to have a high reliability and it was validated at three main levels including content validity, internal and external validity using three groups of participants (see pages 149-154).

  The validated TKIBP questionnaire was then administered to an experimental group of students (*n*=231) and a control group (*n*=212) before and after the e-Learning experiment to compare TKIBP scores.

- The second approach is inspired by Herbig et al. (2001) supporting the action-related nature of tacit knowledge to accomplish tasks with quality as a way to tell who has it, and who does not. It also aligns to Matosková et al. (2013) emphasizing that tacit knowledge is "...practical know-how, which is formed in the minds of people in the course of time on the basis of experience and interactions with their surroundings. The individual is not often aware of it because they gain it without conscious attention and use it spontaneously. There is an obvious connection with routines actions..." (p. 4). Pacovský stressed that "…because tacit knowledge is stored in our sub-consciousness and it has a tendency to be activated when an incentive appears." (cited in Matosková et al., 2013).

Twenty-three (23) students, randomly recruited for the Close Monitoring Initiative, were asked to present a topic in conditions similar to a real-world setup at three stages, beginning, middle and end of the experiment, in which they were recorded acting and dealing with issues and incidents that happened. At the end of their performances, students were asked to explain or justify decisions made and actions taken during their performances; and they were asked their opinions on what they thought they achieved. Facilitators assisted in taking notes of the students' attitudes and behaviours. A panel of ten (10) then assessed all notes and recordings. A pseudo Delphi method was used. This consisted of evaluating student performances and giving their opinions on the extent to which students are drawing upon their tacit knowledge to deal with critical workplace situations. The experts were also asked to provide their opinion about the students who dealt successfully with critical situations during the Close Monitoring Initiative; and whether or not they differed in their tacit knowledge from students who dealt less successfully with the same situations.

- The third approach consists essentially of examining the experiences and perceptions of participants in-depth for a number of variables, including: the effectiveness of the e-Learning platform, enabling conditions for tacit knowledge cultivation and sharing, and tacit knowledge development. Twenty-four (24) randomly selected students from the experiment group agreed to participate in an in-depth interview. This was meant to better understand conditions, ways or factors that help them acquire new ideas and insights laden with tacit knowledge in the field.

These three approaches are further detailed and discussed in chapter four (Research Methodology). The data obtained from these methods has enabled this research to mix the quantitative and qualitative analysis to answer all research questions in a more advanced way than is present in the literature.

*Step 2: Conducting the experiment*

This step involves setting up the e-Learning venue with Knowledge Objects, establishing activities in the spirit of Community of Practice with related components, and recruiting students to launch the e-Learning process. In line with the research design, the experimental group was made of $n$=231 students selected randomly to work collaboratively with instructors in the proposed e-Learning platform for 14 weeks. Each student in the experimental group was assessed for their knowledge in the field prior to, and upon completion of the experiment; and it was compared to that of the control group. The control group was made of $n$=212 students who did not receive any intervention and exposure in the e-Learning program.

*Step 3: Collecting data*

Before and after the e-Learning experiment, the validated TKIBP questionnaire (Appendix H) was administered to students followed by a survey (Appendix J) including students' demographic and background information as well as their post-experiment feedback.

Students' video-recordings and notes of their performance during the Close Monitoring Initiative program were consolidated in folders for assessment, scores and comments from the panel of experts.

In-depth interviews related to the students' experiences and perceptions of the e-Learning system and process were conducted at the end of the experiment, following the guide in Appendix K.

**Stage 6: Data analysis**

This stage encompasses methods and techniques applied to analyze the data collected in the previous stage. The data was analyzed from three (3) different angles; the first of which consists of applying statistical techniques to evaluate TKIBP scores quantitatively, and compare both student groups (experimental versus control) against an expert profile score. It also includes exploring factors that have a major influence on improving students' tacit knowledge, if any. The second angle focused on the Close Monitoring Initiative, which consists of evaluating the improvement of students through real-life performance, as well as decisions and actions taken while performing. Students' scores that were given by experts were based on an agreed-upon evaluation rubric (Appendix I). They were compared at three different stages, and their comments and feedback were analyzed qualitatively using thematic analysis. Finally, students' experiences and perceptions of the proposed e-Learning system were also analyzed qualitatively using thematic analysis. The feedback from the three dimensions provides an in-depth understanding of the phenomenon being investigated.

**Stage 7: Reporting data, findings and recommendations**

This stage consists of reporting the research results, discussing the findings, revising the conceptual framework, suggesting recommendations and limitations, and making theoretical and practical contributions.

## 1.8 RESEARCH RELEVANCE AND SIGNIFICANCE

Uncovering people's ability to share and acquire tacit knowledge in e-Learning environments is vital to enhancing and sustaining e-Learning education and research (Özdemir, 2008). Instead, authors employ a multitude of concepts, tools and techniques to argue about the effective transfer and retention of tacit knowledge in virtual environments where there is no face-to-face contact.

Managing and transferring knowledge have captured the attention and interest of both researchers and practitioners (Edgar, 2005; Kumar and Ganesh, 2011; Hung et al., 2011). These topics occupy the top lines of managers' agendas in organizations that increasingly seek to improve their efficiency and effectiveness (Ringberg and Reihlen, 2008; Luftman and Zadeh, 2011). E-learning environments have been introduced and widely adopted in many organizations to train employees and streamline knowledge flow where stakeholders are not always in the same location. Also, they help to establish close links and build connections with outside business partners in order to transfer new knowledge and skills, and learn from the experiences of the others (Argote and Ingram, 2000; Darr and Kurtzberg, 2000; Hackney et al., 2008).

Skills, expertise and know-how are the most important forces to survive in the current knowledge economy and competitive environment. This puts a strain on online learning institutions to develop strategies that help and promote effective knowledge transfer between instructors and students and students among themselves, in order to challenge negative opinions and critics.

Recently, Panahi and colleagues have presented five factors to enable and facilitate tacit knowledge sharing in a social media space. There are *social interactions*, *experience sharing possibilities*, *informal relationship and networking*, *observation and listening*, and *mutual swift trust* (Panahi et al., 2012a, 2012b; Panahi, 2014). Additionally, Liebowitz and

Frank (2011) suggested Knowledge Objects in e-Learning environment to enhance knowledge retention. While these studies show significant progress towards tacit knowledge transfer in an online setting, there is still no consistent research on the contribution of those conditions for acquiring and developing tacit knowledge from students’ perspectives. Tee and Karney (2010) argue a *ba*-like online learning environment referring to Nonaka and Takeuchi’s SECI model to share and cultivate tacit knowledge. This is problematic due to the critics surrounding the SECI model, discussed in the literature chapter (pages 80-82). Also, Tee and Karney’s evidence is not enough to claim that students can acquire and develop further tacit knowledge in such a space.

To clarify how effective sharing and acquiring tacit knowledge within a virtual learning environment is, a more holistic and empirical approach is required. Therefore, this study is considered to be relevant and timely to online education. Based on andragogical and heutagogical principles combined with Knowledge Objects and Community of Practice concepts, the study aims to involve students in a purposefully designed e-Learning platform with subject matter experts as instructors. The instructor’s role is to drive engagement, encourage students, conduct webinars and provide feedback to students. Our hypothesis is that students will be able to share and most importantly capture and retain tacit knowledge that will be tested through validated instruments and methods.

This study contributes to a deeper understanding of the acquisition of tacit knowledge in e-Learning environments, with attention to concepts and techniques that are claimed to facilitate tacit knowledge transfer and dissemination. The value of this research is also realized in its practical contribution to be achieved. For instance, evidence-based information is provided about tacit knowledge acquisition in e-Learning environment to develop a strategy for the enhancement of online education and to guide further empirical studies in the subject.

## 1.9 DEFINITION OF KEY TERMS

**Andragogy:** art and science of helping adults learn in contrast to pedagogy, the art and science of helping children learn (Knowles, 1980, p. 43).

**Business Presentation**: process of presenting an idea, a topic or a product to an audience. It requires the ability to speak in front of an audience (Stowe et al., 2010). It is typically a speech meant to inform, persuade, engage the audience, inspire action, sell ideas and make profit in business (Duarte, 2012).

**Community of Practice**: group of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on ongoing basis (Wenger et al., 2002, p. 4).

**Field Expert:** person with a high level of knowledge or skills in a particular area of endeavour; a specialist (Cambridge Dictionary, 2008).

**Heutagogy**: study of self-determining learning with practices and principles rooted in andragogy (Blaschke, 2012).

**Instructional System Design**: practice of creating instructional experiences which make the acquisition of knowledge and skill more efficient and appealing. Instructional design requires answering two major questions: What to teach and how to teach (Merrill, 1998).

**Knowledge Object:** Bellenger (2004) states that this is highly structured interrelated set of data, information, knowledge, and wisdom concerning some organizational, management or leadership situations, which provides a viable approach for dealing with the situation (as cited in Di Maio and Paola, 2013).

**Learning Object**: learning content decomposed into separate and distinct pieces of reusable online learning materials such as text, audio, video, graphics and interactive files (Chyung and Swanson, 2009).

**Tacit Knowledge:** subject-specific knowledge and skills that people usually gain individually through on-the-job experiences, as opposed to published academic knowledge. It is an aspect of practical intelligence and provides insight into an important factor underlying the successful performance of real-world tasks (Sternberg et al., 1999).

## 1.10 ORGANIZATION OF THE THESIS

This thesis is organized using recommendations from the seminal book *"How to Get a PhD" (*Phillips and Pugh, 2010). A brief summary is presented in Table 1.1 below.

*Table 1. 1 Thesis structure*

| | | |
|---|---|---|
| Background theory | Chapter 1 | *Introduction* |
| | Chapter 2 | *Literature Review* |
| Focal theory | Chapter 3 | *Conceptual Framework* |
| Data theory | Chapter 4 | *Research Methodology* |
| | Chapter 5 | *E-Learning Set Up and Participants* |
| | Chapter 6 | *Research Findings and Analysis* |
| Novel contribution | Chapter 7 | *Discussion and Research Synthesis* |
| | Chapter 8 | *Conclusion* |

Chapter One, *Introduction*, is an introduction to the research, providing a background and outlining the broad field of study. It aims at orienting the reader and setting the foundations of the thesis. The chapter includes a brief description of the research background and research problem, the aim and objectives of the research, and an overview of the research design. It also justifies the relevance and significance of the research, its values and originality. It ends with a thorough outline of the thesis.

Chapter Two, *Literature Review*, aims to build a theoretical foundation for the research through a critical review of existing and relevant literature on the topic. It consolidates learning theories and adult learning theories and collates the studies based on mechanisms, factors and ICT potentials to facilitate the transfer of tacit knowledge within virtual spaces and indirect contact. There is a special focus on the e-Learning environment. Examining these studies establishes the boundaries of the research defined by Knowledge Management, e-Learning, Knowledge Objects, Community of Practice and tacit knowledge measurement techniques. The chapter reveals a significant research gap and thus provides direction for the study.

Chapter Three, *Conceptual Framework*, presents a model with artefacts for successful tacit knowledge acquisition in a Virtual Learning Environment. Based on an extensive review of relevant literature, the model consolidates factors, mechanisms and means that cause the success of tacit knowledge sharing and its acquisition in a Virtual Learning Environment from a theoretical or conceptual perspective. The model is to be implemented in order to verify claims related to learners' ability to acquire tacit knowledge in e-Learning environments..

Chapter Four, *Research Methodology*, discusses the research design and it outlines the methodology employed in the study. The chapter presents the research approach and methods used to conduct the empirical investigation, with a detailed explanation of the rationale behind the choice of the field and particular methods. The chapter also explains the data analysis techniques used in this study and it addresses the criteria for judging its methodological rigour.

The findings of the study are presented in two chapters (Chapter Five and Six). Chapter Five, *E-Learning Set Up and Participants*, starts by presenting the process that led to the tacit knowledge inventory, summarizing critical workplace scenarios in the field and the development and integration of key concepts in the e-Learning system. The student's profile is presented to start the main analysis.

Chapter Six, *Research Findings and Analysis*, provides the main findings of the study in relation to the research questions, including students' tacit knowledge assessment before and after the experiment followed by exploring factors or characteristics that played a major role in the improvement, if any.

Chapter Seven, *Discussion and Research Synthesis*, discusses findings of the study against claims made and previous literature in the subject. Chapter Eight, *Conclusion*, concludes the thesis by presenting the limitations of the study as well as its contributions and implications. The chapter also makes practical recommendations towards online education and future research.

Finally, the *Appendices* contain further information related to steps and activities covered during the experiment, data collection and data analysis processes used in the study. References of some papers published in a peer-reviewed journal and presented at conferences are also provided.

### 1.11 CHAPTER SUMMARY

The current chapter has laid the groundwork for the thesis. It has provided a background to the study including ICT tools, concepts and mechanisms that sustain the externalization and internalization of tacit knowledge in e-Learning environments. It has also highlighted the need for a deep understanding and a model to support the acquisition of tacit knowledge and, the assessment of tacit knowledge gained at the individual level in a *"real"* e-Learning environment to shed light on the debate in the literature. The chapter also outlined the main objectives of the study, the research questions and briefly described the research design. Finally, the relevance of the research was also addressed and the content of the thesis was outlined. On these foundations, the next chapter will present a review and synthesis of the literature.

# Chapter 2: Literature Review

## 2.1 CHAPTER INTRODUCTION

As outlined in the previous chapter, the main purpose of this study is to explore the development of tacit knowledge of students within a proposed e-Learning environment, that apply the concepts and tools claiming to support the transfer, capture and forming of tacit knowledge; through e-Learning. To quote Eisenhardt and Graebner, verbatim: “sound empirical research begins with strong grounding in related literature” (Eisenhardt and Graebner, 2007, p. 26). This chapter presents the relevant literature commencing with a review of learning theories and adult learning theories; then defines online learning (or, e-Learning) with a focus on the theories and practices, benefits and challenges,knowledge sharing and information transfer in e-Learning. Also introduced are means and practices to ease knowledge acquisition in e-Learning.

The chapter continues with a review of the concept and forms of tacit knowledge, the tacit knowledge conversion process, and tacit knowledge sharing. It also explores arguments about the contribution of Information and Communication Technology (ICT) to the externalization and internalization of tacit knowledge. Specifically, the different schools of thought regarding the usage of ICT to impart and acquire tacit knowledge are presented. The difficulties of tacit knowledge sharing through ICT are then discussed. Following that, examples of studies that examined tacit knowledge management in online environments are introduced.

Next, the chapter emphasizes tacit knowledge sharing and acquisition in e-Learning. It reviews and discusses ICT potentials, practices as well as theoretical and conceptual ideas developed in the literature for the success of tacit knowledge cultivation and retention in an e-Learning environment. As the study core is to assess the development of tacit knowledge at individual level, the chapter also covers tacit knowledge testing methods and instruments. The chapter concludes by discussing the findings drawn in the literature and by revealing knowledge gaps of relevance to the current research.

## 2.2 LEARNING THEORIES, STYLES AND STAGES

Today, educators are tasked with developing lifelong learners who can survive in the current economy and have the capacity to effectively and creatively apply skills and competencies to new situations in an ever-changing, complex world (Kuit and Fell, 2010).

However, Spencer (2008, p. 165) noted: "…it is remarkable how seldom learning theory is even referred to in the KM literature". Knowledge Management researchers have been focusing on concepts and techniques to create, capture and transfer knowledge with little consideration of how individuals acquire, retain and recall new knowledge. This is not an isolated opinion as it has been emphasized in the Human Resource Development literature by Edwards and Rees (2006, p. 167) stating that: "It is clear that managing behaviour, learning and knowledge cannot be separated from one another". This section aims to deepen our understanding of learning theories, learning styles and learning stages.

### 2.2.1. Learning Theories

Learning theories are set of principles explaining how people learn and develop knowledge. Mastering the different learning theories is vital to understand how learning occurs. Learning theory principles are guidelines to help to select instructional strategies, techniques and tools that promote learning. In the literature, there are three broad categories of learning theory known as behaviourism, cognitivism and constructivism. A new model has emerged more recently with the advent of social media technology known as connectivism.

**Behavioural Learning**

Behavioural learning theorists believe that learning actually occurs when new behaviours, or changes in behaviours, are acquired through associations between stimuli and responses. The learner is reactive to conditions in the environment rather than taking an active role in discovering the environment. The learner's role is largely passive and virtually entirely dependent on the instructor and the use of teaching aids such as video demonstration, etc. This learning theory is found effective in facilitating learning that involves recalling facts, defining and illustrating concepts, applying explanations and automatically performing a specified procedure.

Traditional teaching method is largely based on the behavioural learning theory. This learning theory does not tend to employ problem solving, reasoning and thinking; but instead, focuses on what the teacher does rather than the student. However, lecturing can be a part of the enquiry-based learning experience, if students listen to the lecture in a critical way and process what the lecturer is teaching.

The strength of the behavioural learning theory is that students are focused on a clear goal and can respond automatically to the cues of that goal. Its weakness is that students may find themselves in a situation where the stimulus for the correct response does not occur and therefore they cannot respond. In practice, an employee who has been trained and conditioned to respond to a certain cue at work will stop operating when an anomaly occurs.

**Cognitive Learning**

Cognitive learning theorists believe that learning occurs through internal processing of information. Unlike behaviourism, cognitive information processing is governed by an internal process rather than by external circumstances. This learning theory focuses on the processes of thinking, concept formation, reasoning and problem-solving. Its core tenets are: learning improves as the quality of cognitive engagement increases (Uden and Beaumont, 1996), cognitive engagement enables the intentional and purposeful processing of lesson content (Hannafin, 1989), engagement requires strategies that promote manipulation of information rather than memorization (Hannafin, 1989), learning takes place most effectively when students are actively engaged and learn in the context in which the knowledge is to be used (Uden and Beaumont, 2006).

Brainstorming, problem-solving, research projects and creative visualization are examples of teaching methods of this learning theory. The strength of cognitive learning theory is that the goal is to train students to do a task the same way to enable consistency. In practice, when employees are trained to perform a function the same way based on specific cues, their behaviour will be consistent. Its major weakness is that the student learns a way to perform a task that may not be the best way for the situation or suitable to the student.

**Constructivist Learning**

Constructivist learning theorists believe that learning is an active process in which students construct new ideas or concepts based on prior knowledge and/or experiences. Students create their own meaning and understanding rather than simply memorising or taking on others' conceptions of reality. The construction of knowledge is a function of the prior experience, mental structures and beliefs that one uses to interpret objects and events. This learning theory sounds unfavourable for novice students with little experience and/or subject-specific knowledge. Kirschner et al. (2006) advocate the use of strong instructional guidance rather than constructivist-based minimal guidance during the instruction of novice to intermediate students. Kirschner and his colleagues have ignored the notion of scaffolding from the work of Vygotsky (1978) on the Zone of Proximal Development or Bruner (1978). Other researchers such as Cronbach and Snow (1977), Klahr and Nigam (2004) suggest that novice students should be provided with direct instructional guidance on the concepts and procedures required by a particular discipline and not left alone to discover such procedures.

Some applications for this learning theory include reflective logs and journals, experiential learning, laboratory and practical work, action learning, role play, and small group work. Its strength lies in a student's ability to interpret multiple realities and to deal with real life situations. Schuman (1996) argues that if a student can problem solve, he/she may better apply his/her existing knowledge to a novel situation. However, in a situation where conformity is essential, divergent thinking and action may cause problems which is a weakness of this learning theory.

Social constructivist learning theory is a variety of cognitive constructivism that emphasizes the collaborative nature of much learning. It is viewed as a social process in which meaningful learning occurs when individuals are engaged in social and collaborative activities. Group work, discussion and debate are examples teaching methods related to this learning theory.

**Connectivist Learning**

Connectivism is a learning theory proposed by George Siemens and Stephen Downes. According to Siemens (2004), connectivism is a learning theory for the digital age, a successor to behaviourism, cognitivism and constructivism. Limitations of these theories viewed by Siemens include their intrapersonal view of learning, their failure to address the learning that is located within technology and organizations, and their lack of contribution to the value judgments that need to be made in knowledge-rich environments. The concept of network is prominent in this learning theory that characterizes knowledge as a flow through a network of humans and non-humans (artifacts). A network comprises connections between entities (nodes), where the nodes can be individuals, groups, systems, fields, ideas, resources or communities.

Within this learning theory, students are no more required to attend classes physically as they can learn the same content online. Massive Open Online Course (MOOC) is a model implementing this learning theory for delivering learning content online to any person who wants to take a course without boundaries.

The key principles of this learning theory are: that learning and knowledge rests in diversity of opinion; that learning is a process of connecting specialized nodes or information sources, in which learning may reside in non-human appliances; that the capacity to know more is more critical than what is currently known; that nurturing and maintaining connections is necessary to facilitate continual learning; that the ability to see connections between fields, ideas, and concepts is a core skill; that accurate and current knowledge is the intent of all connectivist learning activities; that decision-making is as much a learning process as choosing what to learn; and that the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

With the internet covering many areas of the globe, this learning theory has a lot of strength as people can benefit from each other through internet networks. Also, Spencer (2004) mentions some advantages of using internet technology, and states that ideas and discussions among students can continue beyond the classroom. However, connectivism learning theory also has some weaknesses. Since it depends highly on networks, students may find it harder to focus on learning. Additionally, the entertainment options on their connected device may distract them from their studies.

There are two learning concepts related to the connectivism learning theory: Communities of Practice and the social learning theory. Communities of Practice emphasize teamwork in learning and argue that people who work in groups and share their ideas and experiences can have better results than working individually. Since Communities of Practice leans toward the importance of collaborative spirit, it has some similarities with the connectivism learning theory because they both demonstrate the idea that connection between people is important regardless of distance. The social learning theory believes that in society, people learn from each other through communication, observation and instruction. The society provides people with opportunities to broaden their understanding and effectively share information.

### Conclusion

There is no right or wrong learning theory. It boils down to opinions and beliefs about learning to enhance a student's ability to acquire and develop knowledge. One approach may look more appropriate than another in certain circumstances, and we believe that combining different approaches can leverage learning process.

### 2.2.2. Learning Stages

Kolb's learning cycle (1976) is a well-known theory which argues that effective learning occurs when a student progresses through a cycle of four stages (*feeling*, *watching*, *thinking* or *doing*) depicted on Figure 2.1. This involves having a concrete experience; followed by the observation of, and reflection on that experience; leading to the formation of abstract concepts and generalizations, which are then used to test a hypothesis in future situations, which results in new experiences. The cycle can commence from any one of the four stages and connect to any other stage.

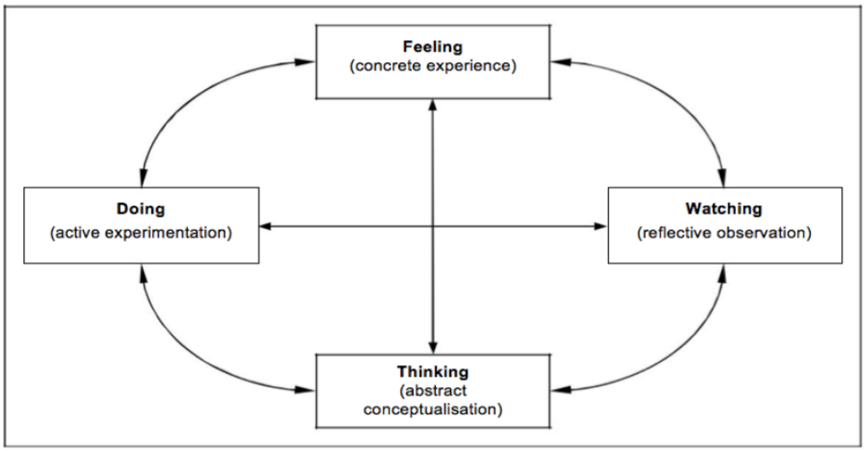



*Figure 2. 1 Kolb's learning cycle*

Kolb's four-stage model has been used as the basis for a typology of learning styles addressed in the next section. Although its popularity and use for improving performances, especially in higher education, it is not exempt from criticisms. Students tend to differ in their tendencies and learning preferences due to a set of factors; including but not limited to; personality, cognitive processes and prior experiences. Taking these factors into consideration can enhance the learning experience for a broad range of students. Hudak (1985, p. 402) claims: "when students are matched with their preferred instructional mode, achievement and satisfaction with learning will be enhanced". Combining various ways of teaching can help meet the need of every student, but teachers should be cautious to not reward or needlessly value particular stages of learning.

### 2.2.3. Learning Styles

Students often have a preferred method of learning that dictates the way they take in, understand, express and recall information. Some students learn best by seeing (visual), others by hearing (auditory) and others by touching and moving (kinesthetic). Some students do not have a strong preference, while others' preference may vary depending on the situation and type of information. This suggests that teachers should recognise these differences and should vary instruction accordingly to enhance learning and skills development.

Kolb (1981) agrees, arguing that learning environments which fail to match students' preferred learning styles are likely to be unsatisfactory. Ash (1986) claims that professional and corporate training can reach trainees more effectively by identifying their cognitive or learning style with appropriate instructional strategies. Kolb (1984, 1985) classified learning styles into four categories known as the Learning Style Inventory, *feel and do*, *feel and watch*, *think and watch* and *think and do*; to which students respond most positively. Kolb's learning style can be viewed as a matrix. Therefore, a student who has dominant learning stages of "doing" and "feeling" will have a learning style that combines and represents these processes, namely "feel and do" (accommodating).

**Feel and do** also known as **accommodating** (style 1)**:** the process by which students modify what they already know to take into account new information. Students respond most positively to new experiences and problems as well as excitement and freedom in their learning.

**Feel and watch** also known as **diverging** (style 2)**:** students respond most positively to structured learning activities when they are provided with time to observe, reflect, think and work in a detailed manner.

**Think and watch** also known as **assimilating** (style 3)**:** incoming information is changed or modified in students' minds so that they can combine it with what they already know. Students respond most positively to logical, rational structured and clear aims, when they are given time for methodical exploration, and opportunities to question and stretch their intellect.

**Think and do** also known as **converging** (style 4)**:** students respond most positively to practically based, immediately relevant learning activities, which allow scope for practice and the use of theory.

Critics of Kolb's Learning Style Inventory contend that the theory lacks psychometric rigour. Empirical studies also report a lack of verifiability using the measure in pilot studies (e.g. Freedman and Stumpf, 1981; Allinson and Hayes, 1988; Cornwell et al., 1991; Veres et al., 1991; De Ciantis and Kirton, 1996). However, Kolb (1976) and Kolb, Baker and Gish (1979) stress that the inventory is only a starting point for understanding one's approach to learning, that should be supported by other data about how one learns.

Honey and Mumford (1986, 1992) developed a learning styles system which is a variation on Kolb's model.

1. *Having an experience* similar to concrete experience (stage 1) and *activists* similar to accommodating (style 1): students learn best from activities where there are new experiences or problems. This brings excitement, drama, crisis and collaboration with peers to bounce ideas and solve problems as part of a team.

2. *Reviewing the experience* similar to reflective observation (stage 2) and *reflectors* similar to divergent (style 2): students learn best from activities where there is encouragement to watch and think over activities. This creates the opportunity to listen to or observe a group. This also enables students to reach a needed decision without pressure and tight deadlines.

3. *Concluding from the experience* similar to abstract conceptualization (stage 3) and *theorists* similar to assimilating (style 3): students learn best from activities where there are structured situations with a clear purpose. This requires an understanding and participation in complex situations as well as time to explore the associations and interrelations between ideas, events and situations.

4. *Planning the next steps* similar to active experimentation (stage 4) and *pragmatists* similar to converging (style 4): students learn best from activities where there is an obvious link between the subject matter and a problem set. It also requires applying techniques relevant to the real world and practicing with coaching and feedback.

It is interesting to note that Honey and Mumford's learning styles system has never been completely validated for viewpoints on the Learning Styles Questionnaire that determines preferred learning styles put forward by Honey and Mumford (1986) as seen in Allinson and Hayes (1990) and Furnham (1995).

Other approaches to learning styles have been put forward with emphasis on orientation to study (e.g. Approaches to Study Inventory (Entwistle, 1979)); instructional preference (e.g. Learning Style Inventory – Price et al. (1976, 1977); Dunn et al. (1989)); and cognitive skills development (e.g. Cognitive Style Delineators – Letteri (1980)). A critical review of different style models is discussed in Riding and Rayner (1998).

In summary students tend to have preferred learning styles. Such preferences can vary from time to time, and situation to situation (Kolb, 1981). Knowing the learning style can assist in not repeating mistakes by undertaking activities that strengthen other styles. There can also be a danger in using learning style types as fixed traits, as individuals and their behaviour can become stereotypes (Kolb, 1981). Furthermore, some students may struggle and take time to adjust to learning styles with which they are not familiar.

Rush and Moore (1991) argue that matching the learning style and learning activity may improve learning performance within a specific context, although it will do nothing to help prepare the learner for subsequent learning tasks where the learning activity does not match the individual's preferred learning style. In relation to the assumption that matching learning style with learning activities will promote learning, Honey and Mumford (1986) offer advice on how individuals might choose learning activities to suit their style and how they can be helped to identify learning opportunities and exploit them in ways that are congruent with their preferred style. However, studies by Allinson and Hayes (1988, 1990) did not provide any support for the hypothesis that matching learning style and learning activity improves learning achievement.

As some learning environments can appeal to those with a specific learning style, and hinder those with a preference for a different approach to learning (e.g. Kolb, 1981); it is useful to consider a variety of approaches when planning a module, to take various learning styles into consideration for fully effective learning. This may involve developing a range of learning activities designed to offer the same learning content or modifying instructional treatment or verbal and visual content to accommodate a wider range of learning styles within a single learning activity (Hayes and Allinson, 1996). Care also needs to be taken not to needlessly reward or value a particular learning style.

### 2.2.4. Conclusion

According to Riding and Rayner (1998) people learn in different ways which tends to depend on their personality, cognitive processes and previous learning experiences. Therefore, it is essential to take this into consideration when planning modules, so that a range of learning theories (e.g. behavioural, cognitive, constructivist and connectivist learning), stages (e.g. Kolb's learning cycle theory) and styles can be accommodated. This is particularly significant for the greater diversity of students studying at higher education level.

As this study targets on adults, the next section will focus on the adult learning theory. Adults have specific learning requirements. Unlike children, adults are more discerning in what they are willing to learn, more questioning and more resentful of being told what to learn.

## 2.3 ADULT LEARNING THEORY

Learning is much more utilitarian for adults than it is for children. The manners and conditions in which adult students learn have been questioned and researched since the 1920s, when adult education became a professional field of practice (Merriam, 2001). Several theories and models have attempted to explain how adults learn. One of the most popular adult learning theories is Malcolm S. Knowles' learning theory of andragogy (the art and science of helping adults learn) in contrast with pedagogy (the art and science of teaching children).

Andragogy learning theory is designed to address the particular needs of adults. Its core idea is that there are significant differences in learning characteristics between adults and children (Knowles, 1980). Andragogy has five assumptions about adult learners to consider in a learning environment.

- The adult learner moves from dependency to increasing self-directedness as he/she matures and can direct his/her own learning;
- The adult learner draws on his/her accumulated reservoir of life experiences to aid learning;
- The adult learner is ready to learn when he/she assumes new social of life roles;

- The adult learner is problem-centred and wants to apply new learning immediately; and
- The adult learner is motivated to learn by internal rather than external factors.

Implications for practice inherent in these assumptions are given in Knowles (1984) suggesting that adult educators:

- Set a cooperative climate for learning in the classroom;
- Ask the learner's specific needs and interests;
- Develop learning objectives based on the learner's needs, interest and skill levels;
- Design sequential activities to achieve the objectives;
- Work collaboratively with the learner to select methods, materials and resources for instructions; and
- Evaluate the quality of the learning experience and make adjustments as needed, while assessing needs for further learning.

Lieb (1991) reported that respect should be shown to all learners, no matter what age. Adult learners respond positively when the learning environment is comfortable and safe. Additionally, the author added that self-reflection is important for the adult learner. The instructor should provide a space for the learner in the learning environment that permits guided reflection about his/her performance of new competencies.

Andragogy is not without criticisms. According to Brookfield (1995), it is now very clear how adults learn. However, the theory does not address all aspects of how adults learn as many variables influence how individuals develop as adults which relate to culture, physiology, cognitive style, learning style and personality. Merriam (2001) and Merriam and Caffarella (1999) argued that andragogy primarily describes what the adult learner may be like which is supported by the debate as to whether the assumptions of andragogy are principles of good practice rather than a theory. Merriam (2001, p. 5) highlighted that "Knowles himself came to concur that andragogy is less a theory of adult learning than a model of assumptions about learning or a conceptual framework that serves as a basis for an emergent theory". Knowles eventually represented these assumptions on a continuum "ranging from teacher-directed to student-centred learning" (Merriam, 2001, p. 6). Adults will depend on the teacher more if they limited knowledge. That means adults' dependence on the teacher is based on their previous level of knowledge of the subject.

Andragogy does not give a full picture of how adults learn as Pratt (1993) stressed that "while andragogy may have contributed to our understanding of adults as learners, it has done little to expand or clarify our understanding of the process of learning, "nor has it achieved the status of a theory of adults learning" (p. 21). Smith (2002) concluded that Knowles's concept of andragogy is a beginning attempt to try to build a theory (or model) of adult learning, and that it "is anchored in the characteristics of adult learners" (p. 3).

It seems widely accepted that andragogy contributes to the understanding of adults as learners, and their characteristics that are helpful in order to design and conduct educational programs that are more suited to them. Given its weaknesses, other theories have emerged.

**Adult Learning Theories related to Andragogy**

**Self-Directed Learning** is another core concept of adult education, which suggests that the focus of control in learning lies with the adult learner, who may initiate learning with or without assistance from others (Lowry, 1989). Some students need varying degrees of support and direction while others are ready to be self-directed. Self-directed learners' characteristics include independence, willingness to take initiative, persistence in learning, self-discipline, self-confidence and the desire to learn more.

Self-directed learning underlies Knowles's andragogy theory. Andragogy acknowledges that, as a person grows and matures, his/her self-concept changes from that a dependent personality toward that of a self-directed individual. Self-directed learning has many benefits; one of which is that learning can easily be incorporated into daily routines, and occur both at the learner's convenience and preferences. It can involve the learner in isolated activities or in communication with experts and peers. It can, however, be difficult for adults with low-level literacy skills who lack independence, confidence, internal motivation or resources. Brookfield (1985) states that not all adults prefer the self-directed learning option and that many students who engage in self-directed learning also engage in more formal education programs.

To facilitate self-directed learning, teachers can help students conduct a self-assessment of skill levels and needs to determine appropriate learning objectives. They can also help identify the starting point for a learning project, match appropriate resources and methods to the learning goal; as well as negotiate a learning contract that sets learning goals, strategies and evaluation criteria. The assessment should include the acquisition of strategies for decision-making and self-evaluation of work, development of positive attitudes and independence relative to self-directed learning and reflection on the course material.

**Experiential Learning** is also a core concept to andragogy. It consists of three components: knowledge of concepts, facts, information and experience; prior knowledge applied to current, ongoing events; and reflection with a thoughtful analysis and assessment of learners' activity that contributes to personal growth. These three concepts are the pillars of experiential learning and they should provide the basis of any adult learning experience. Brookfield (1995) subscribed to the importance of experience for adult learning and states that "... adult teaching should be grounded in adults' experiences, and that these experiences represent a valuable resource, is currently cited as crucial by adult educators of every conceivable ideological hue".

To teach adults, their experiences should be taken into consideration to allow them to connect what they have learned in the past, in order for them to see possible future implications. This is emphasized by Merriam and Caffarella (1999): "experiences that provide learning are never just isolated events in time. Rather, learners must connect what they have learned from current experiences to those in the past as well as see possible future implications" (p. 223).

In a nutshell, experiential learning considers learners' experience. Recommendations for teachers to help students with this approach include: provide a needs assessment and self-assessment prior to class starting and then relate this information to the class while recognising the value of experience; include tasks that let students use their knowledge and experience; tell why the topic is important; provide practical information; open class with an introduction that includes personal and professional background; and involve students in diagnosing their own needs.

Although experiential learning shows a very beneficial way to learn, it has a set of drawbacks. It is not helpful to inexperienced students, it implies too much trial and error that may result in loss of focus on learning. Other drawbacks include the fact that learning outcomes are not always predictable and the recognition that students' negative experiences can sometimes hinder the learning process.

**Transformative Learning** is considered a constructivist theory of adult learning that changes the way individuals think about themselves and their world, and involves a shift of consciousness. It was strongly influenced by Jack Mezirow. Mezirow (1999) proposed that individual transformation includes a change in one's frame of reference or way of seeing the world. It helps adult learners understand their experiences and how they make sense of their experiences and the dynamics involved in modifying its meaning. Palloff and Pratt (1999) stated that "the goal of transformative learning is to understand why we see the world the way we do and to shake off the constraints of the limiting perspectives we have carried with us into the learning experience" (p. 129).

According to Frey and Alman (2003), transformative learning is a process of critical reflection. The goal of this learning theory is to enable the adult learners to become an autonomous thinker by learning to negotiate his/her own values, meaning and purpose rather than acting on those of others without critical analysis. (Mezirow, 1997, p. 11). However, one major weakness of Mezirow's adult learning theory is its emphasis on rationality. Some studies support Mezirow; where others conclude that Mezirow places too much importance on rational, critical reflection.

Educators seeking to foster this theory should consider creating a climate that supports this learning philosophy. They should know their students and the types of learning activities that will be appealing to them; and use this information to develop and implement learning activities that explore and expose different viewpoints. The current digital and knowledge economy is putting strain on educators to develop lifelong learners who need to adopt the digital world in order to progress. Their role is to help students create and adapt their skills and competencies to new situations in an ever-changing and complex world (Kuit and Fell, 2010; The World Bank, 2003). From this perspective, andragogy and related theories are no longer fully sufficient and should be enforced with a self-determined approach in which learners reflect upon what is learned and how it is learned, while educators teach students how to teach themselves (Peters, 2004, Kamenetz, 2010). This approach refers to the concept of heutagogy.

**Heutagogy (Self-Determined Learning)**

Heutagogy is a form of self-determined learning with principles and practices grounded in andragogy. It has recently resurfaced as a learning approach after a decade of limited attention. This learning concept facilitates the development of capable learners and stresses the development of learners' competencies and development of the learner's capability and capacity to learn (Bhoryrub et al., 2010). Capable people have the following traits: self-efficacy in knowing how to learn and continuously reflect on the learning process, communication and teamwork skills. They are also creative as they apply competencies to new and unfamiliar situations, have an adaptable and flexible approach, and positive values (Kenyon and Hase, 2010; Gardner et al., 2008).

Heutagogy is of special interest to distance education sharing some key attributes such as learner autonomy and self-directedness. A core concept in heutagogy is the double-loop learning concept and reflection. Within double-loop learning, students consider the problem and the resulting action and outcomes, in addition to reflecting upon the problem-solving process and how it influences the student's own beliefs and action.

This learning approach is also viewed as a progression from pedagogy to andragogy to heutagogy, with students likewise progressing in maturity and autonomy (Canning, 2010).

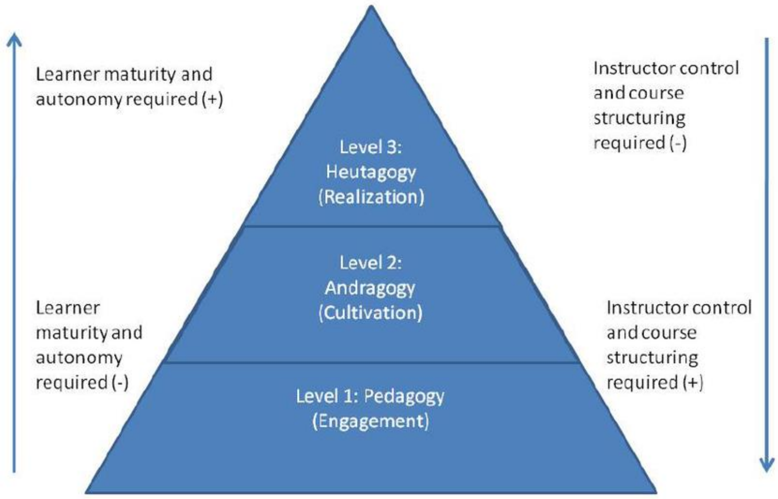



*Figure 2. 2 Progression from pedagogy - andragogy - heutagogy*
(Canning, 2010, p. 63)

According to Anderson (2010, p. 33) creating competent and capable learners is "critical to life in the rapidly changing economy and cultures that characterize postmodern times". By integrating heutagogical principles, educators have the opportunity to better prepare students for the workplace, and to develop lifelong learners in order to boost up their motivation.

Higher education has been somewhat reluctant to implement and embrace heutagogy because of the minimal role the instructor plays in the learning process, and the control the learner has over assessment procedures, which complicates accreditation (Blaschke, 2012; McAuliffe et al., 2008). Given the amount of information that needs to be absorbed and the importance of grades in achieving academic credentials at the university level, many students still seem to prefer pedagogical (teacher-centred) and andragogical (learner-centred) learning where the instructor plays an active role in knowledge attainment (Blaschke, 2012). However, given the growth of online learning, social media, and Web 2.0, assessment and accreditation procedures may evolve sooner than later to allow students at all levels to pursue a more heutagogical, self-determined style of learning.

This section has reviewed several aspects of adult learning with recommendations and implication for practice. It is now clear that there is not only a single theory that can explain how adults learn; but instead, there are many theories, each is compelling and each having its own strengths and weaknesses. The primary theme that has emerged is that "everyone is different and each person is an individual. Adult learners are diverse and have their own histories to consider" (Cercone, 2008, p. 150). The next section will look at online learning (e-Learning) and how this mode of learning addresses learning and teaching for adult learners.

## 2.4 ONLINE LEARNING (E-LEARNING)

*Online learning* usually refers to the delivery of teaching material via the internet using digital devices such as computers. However, there is no unanimous definition of that learning concept (Moore et al., 2011). Online learning, also called *online distance learning,* is a common term used to cover the broad range of learning and teaching events in which participants are geographically dispersed (Hoyle, 2007). Online learning represents a subset of distance education.

Distance education usually occurs when the learner is separated from the instructor and other students, or when students may be in different time zones. In this sense, communications must take place through artificial means, such as printed materials sent by mail, telephone, and more recently, by Information and Communication Technology. In general, technology allows for both asynchronous and synchronous communication sessions. To Kearsley and Moore (1996), distance education is planned learning that normally occurs in a location other than the teaching site. As a result, it requires specific techniques of course design, instructional techniques, and methods of communication via electronic and other technology. It also requires the infrastructure to support the special organization and administrative arrangements.

Historically, practice and theory of distance education has more than 150 years of existence and has evolved through five generations (Taylor, 2001). From the onset, distance education was an individual pursuit defined by infrequent postal communication between student and teacher. The last half of the twentieth century has witnessed rapid developments and the emergence of three additional generations, one supported by the mass media of television and radio, another by the synchronous tools of video and audio teleconferencing, and yet another based on computer conferencing.

It is then possible to distinguish three types of model for distance education: independent study, remote classroom, and interactive model based on ICT (Escamilla, 2008; Boghikian-Whitby and Mortagy, 2008). Independent study, known as correspondent study, is the oldest type based on printed materials. Students learn by themselves using the designated material. The material is written as a guided didactic conversation, so careful review is required since the student is alone with the material (Escamilla, 2008). More recent models enabled by the development of technology have superseded this learning style.

The second model, the remote classroom, is similar to traditional classroom-based instruction; because it is a system where the professor is in a classroom and broadcasts lessons to students via the internet or television. Another name for this model is ‘distributed classroom’, and it is based on technology that allows for synchronous transmission of material to the student (Levenburg and Major, 1998; Bates, 2005). The instructional design for this model is defined by the available technology and depends more on institutional capacity than on student needs (Heydenrych, 2000).

The third model is based on ICT and functions exclusively through the internet. Online distance learning, or simply online learning, is the term used to refer to this model. Learning materials are available in a Learning Management System or Course Management System, or Virtual Learning Environment; and communication takes place in the same place. In this model, all the participants are taught in the same context. The communication can be both ways: asynchronous or synchronous. To be successful, this model requires more specific course or materials design, as well as close and guided communication (Anderson, 2008; Hall, 2001). Table 2.1 recaps the diverse educational models as presented above.

*Table 2. 1 Diverse educational models by time or space flexibility*

| | | **Space** | |
|---|---|---|---|
| | | *Face to face* | *Distance* |
| **Time** | *Synchronous* | Traditional classroom | **Remote classroom** (Satellite, TV) |
| | *Asynchronous* | No model | **Independent study** (Postal)<br>**Online** (Interactive model based on ICT) |

Source: (Heredia and Cantu, 2010)

The third model, online learning, has gained popularity in distance education with the rapid changes in society and technology driving the need for new approaches to deliver trainings and teachings into workplaces and educational institutions (Arman et al., 2009; Haythornthwaite and Andrews, 2011). Online learning is established as the major and dominant subset of distance learning (Escamilla, 2008) and is the fastest growing and promising in the educational and training industry (Hall, 2001). It is essential to understand the theories and practices that underpin that teaching and learning fashion.

### 2.4.1. Theory and Practice of e-Learning

There are various terminologies used for online learning, a situation that makes it difficult to develop a generic definition (Anderson, 2008). Terms that are commonly used include e-Learning, internet learning, distributed learning, networked learning, virtual learning, computer-assisted learning, web-based learning, etc. All of these terms imply that the learner is at a distance from the instructor, that the learner uses some form of technology to access the learning materials, that the learner uses technology to interact with the instructor and other students, and that some form of support is provided to learners. “E-Learning,” however, tends to be the most common term but also sounds complex and attracts a degree of controversy and disagreement as highlighted by (Haythornthwaite and Andrews 2011, p. 45). The authors presented three views on e-Learning by referring to Anderson (2004) who endorsed e-Learning (online learning) as all forms of learning other than face-to-face. The second view narrows it down as learning that takes place in educational settings and through the technologies of virtual learning environments. The last view includes ideas of “open learning” as part and parcel of e-Learning, predicated on the principles of open access and open courseware which has recently emerged under the label of MOOC (Massive Open Online Course).

Anderson (2008) confirms the existence of many definitions and views about online learning (e-Learning) in the literature that reflect the diversity of practice and associated technologies according to the author. He further claimed that online learning involves more than just the presentation and delivery of materials using the web. He urges the student and the learning process should be the focus of e-Learning. Therefore, the author advocates the following definition of online learning:

> "The use of the internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (Ally, 2004, p.7).

The terms online learning or e-Learning will be used interchangeably through the thesis adopting the above definition.

**Theoretical framework in e-Learning**

The use of ICT in the delivery of education has potential benefits for all stakeholders, but remains challenging for e-Learning providers to come up with better strategies for teaching and learning processes to increase learning satisfaction. Questions about the online learning process are fundamental and require implications for learners, instructors and institutions (Meredith and Newton, 2004). Undoubtedly, advancements in ICT and new developments in learning science provides opportunities to create and design learner-centred, engaging, interactive, affordable, efficient, easily accessible, flexible, meaningful, distributed, and facilitated e-Learning environments. However, the online learning process requires thoughtful analysis and investigation of how to use the internet's potential in concert with instructional design principles and issues that are important to various dimensions of the e-Learning environment.

Khan (2001, 2000) proposed a framework for e-Learning delineating eight dimensions, according to the author, that have to be carefully administered for online learning success. Those dimensions are institutional, pedagogical, technological, interface design, evaluation, management, resource support, and ethical (Figure 2.3). Each dimension has sub-dimensions and focuses on particular aspects of the e-Learning environment. According to Noirid and Srisa-ard (2007), Khan's framework can be used to capture an organization's inventory of e-Learning by addressing issues encompassing the eight dimensions of an open and distributed learning environment.

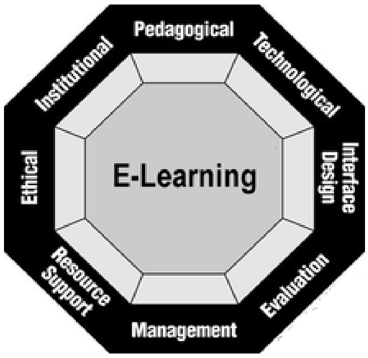



*Figure 2. 3 E-Learning framework*
Source: (Khan, 2000, p. 1)

In addition, Marshall et al. (2003) proposed three types of e-Learning tools: curriculum tools, digital library tools and knowledge representation - concept maps tools, which emphasize the different parts of the online learning process. Curriculum tools provide a systematic and standard environment to support classroom learning; their functions are particularly helpful in the initiation and selection stages. Digital library tools facilitate effective and efficient access to resources to support exploration and collection. Knowledge representation or concept map tools focus on formulation and representation. Irfan and Uddin-Shaikh (2008) specified and claimed two general categories of learning in e-Learning: e-Learning by using explicit knowledge and e-Learning by using tacit knowledge as shown in the Figure 2.4.

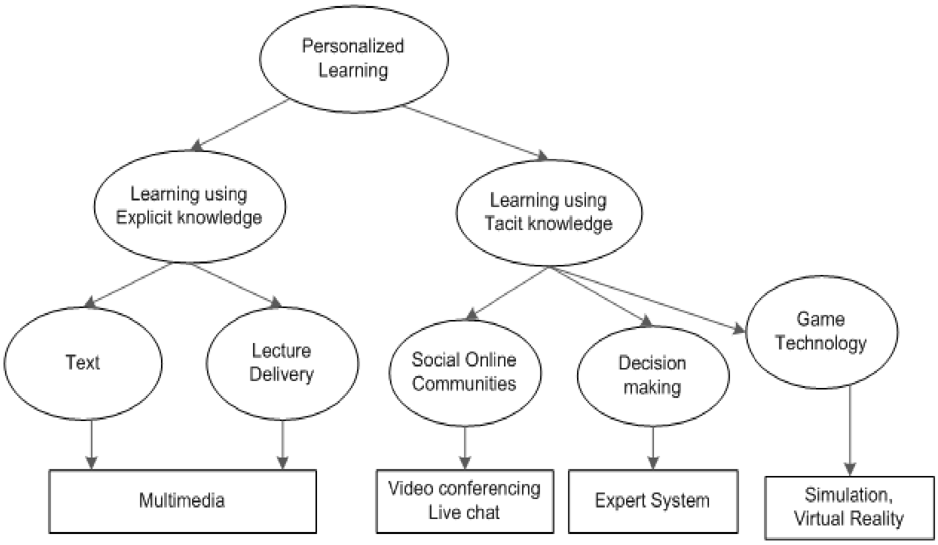



*Figure 2. 4 Personalized online learning model*
*Source: (Irfan and Uddin-Shaikh, 2008, p. 3)*

Online learning programs include both content (information) and instructional methods (techniques) to help participants learn the content and interact with it. Online courses are delivered via digital devices such as computers and smartphones in the form of spoken or printed text, pictures, animation or video. Generally speaking, online learning courses are designed for individual self-study.

**Designing learning materials for e-Learning**

Any instructional system has the premier goal of promoting learning. In line with the work of Irfan and Uddin-Shaikh (2008) who suggest two ways of learning online, Anderson emphases that educators must tacitly or explicitly know the principles of learning and how students learn before developing any learning materials as instructors and learners are geographically separated (Anderson, 2008). Indeed, the development of effective online learning materials should be based on proven and sound learning theories. According to Rovai (2002), course design determines the effectiveness of the learning and the delivery medium is not the determining factor in the quality of learning.

As seen in section 2.2, there are four major schools of thought about learning - behavioural, cognitive, constructivist and connectivist. None of the four schools is used exclusively to design online learning materials. Each school has strengths and weaknesses, therefore there is no single learning theory to follow. A combination of those theories can be used to develop online learning materials; therefore, e-Learning providers should adapt and combine those theories to guide the development of effective learning materials. As e-Learning is a product of the digital age, it is not necessary to adopt a new stand-alone theory or follow exclusively the connectivism approach but rather can integrate old and new theories to guide the design of online learning materials.

According to Anderson (2008), the online learning developer must know the different approaches to learning and their selection of the most appropriate instructional strategies should be based on their intention to motivate learning, facilitate deep processing, build the whole person, cater to individual differences, promote meaningful learning, encourage interaction, provide relevant feedback, facilitate contextual learning, and provide support during the learning process.

Additionally, Wild and his team suggested that the content of e-Learning should be guided by the strategic knowledge requirements of the organization or institution and its targets and objectives. The type of the content of e-Learning can be broadly categorized as content to transfer either the tacit knowledge or explicit knowledge (Wild et al., 2002, p. 375). Practically, the authors specified that knowledge content considerations for e-Learning regarding tacit knowledge involve deep knowledge, insight and expertise; whereas the considerations with respect to explicit knowledge involve factual knowledge, how-to knowledge and incremental knowledge.

### 2.4.2. Benefits of e-Learning

E-Learning continues to grow and is claimed by many people to be cost effective thanks to its benefits, including the ability to support both education and training across geographical and time constraints (Bartley and Golek, 2004). Online learning is increasingly adopted as the main medium to train employees in organizations. At the same time, institutions of higher education are seizing the opportunity to provide learning both on campus and at distance. The major benefits claimed in online learning are outline below.

From the students' perspective, online learning favours self-paced education and allows them to develop knowledge and skills when they need it. Students do not depend on the structure and pace established by the instructor. Time zones, location and distance are not an issue. In asynchronous mode, students can access the online materials anytime from anywhere at any pace, while synchronous mode allows for real time interaction between students and the instructor. Students can access up-to-date and relevant learning materials instantly, and can communicate with the field expert (tutor) when needed. Ubiquitous learning and situated learning are facilitated, which allow learners to complete online programs while working on the job or constrained by any other activity.

From the instructors' perspective, teaching is flexible and can be done anytime and from anywhere. As learning materials are centralised into the online learning environment, once updated students are able to see the changes instantaneously. It is also easier for tutors to guide students to appropriate information based on their needs. Many online learning systems are fitted with tools that can be used to determine learners' needs, to monitor learners' progress and to ascertain their current level of expertise in order to advise and assign appropriate materials to achieve the desired learning outcomes.

McClintock (1999) wrote: "Digital technologies are for education as iron and steel girders, reinforced concrete, plate glass, elevators, central heating and air conditioning were for architecture. Digital technologies set in abeyance significant, long-lasting limits on educational activity". Although online learning arguably offers good prospects for knowledge sharing at a distance, there are important pitfalls to address.

### 2.4.3. Challenges of e-Learning

Information and Communication Technologies are the pillars of e-Learning that continue to support that style of education unfailingly. Many studies predicted a long-lasting growth of online learning but some authors still contend the effectiveness of online education compared to traditional face-to-face instruction. Learning effectiveness and student performance achieved in online learning have been the subject of debates and various studies but still, there is a concern whether or not online learning is adequately and effectively fulfilling the needs of students or organizations (Bartley and Golek, 2004). In fact, time and space constraints were the initial problems identified in online distance learning literature. Moreover, Ubon and Kimble (2002) added several other factors including the lack of face-to-face contacts, interaction, collaboration, trust, and culture and language differences.

**Space and time constraints**

Although online learning is free of time zones, location and distance issues owing to advances in computer and telecommunication technologies (Anderson, 2008), *"space"* and *"time"* remain major concerns and evidence in the literature are numerous. The evidence from case studies and previous research has clearly indicated that geography does matter in the new knowledge economy (Hepworth, 1989; Li, 1995; Jarvenpaa and Leidner, 1998; Hildreth et al., 2000). Additionally, Kimble and his colleague emphasize that the emergence of digital space does not mean the need and the demand of the physical space has fallen (Hildreth et al., 2000). In the same line, Sherron and Boettcher (1997) claimed that people still want to come together for events and interpersonal experiences despite the shift to the digital space and capability to move data and information across distances.

With no doubt, time (time zone) is another major concern in every online environment regarding communication and collaboration. In fact, the difference in time zone among locations still affects online distance activities. For instance, it is a challenge to find the best time to conduct a collaborative web conference and expect participants to contribute actively when the meeting is three o'clock in the morning, their time.

**Lack of face-to-face interaction and social cues**

The absence of face-to-face contacts in online learning is the one of the pervasive arguments in the literature that justifies the limits in online communication. In fact, communication seems most complete and successful when people involved are physically present. This presence is supposed to be the guarantor of authenticity of information and knowledge, and can be enriched with gestures and body languages. Although there are counterexamples in the literature supporting the capacity of ICTs to achieve the same result, people in so-called virtual teams still find that collaborative work is most effective when performed in face-to-face meetings where the issue of trust and ambiguity that surrounds identity in the digital space are most easily overcome (Hildreth et al., 2000).

**Language and cultural barriers**

Online learning success depends on the fluency of the communication among different stakeholders. However, students and instructors may experience difficulty caused by language and cultural differences. In fact, language is always an issue when people from different countries have to come together to communicate. Although English has been established as the scientific and business language worldwide, many people still lack the proficiency in English to understand, reflect and communicate complex concepts (Van den Branden, 2001). The linguistic constraints therefore can make online learning participants unable to transform their tacit knowledge (complex knowledge) into explicitly communicable messages so that other people can easily digest it.

Difference in cultural values may also hinder knowledge creation and sharing among students and instructors in online learning. Learners from different cultural backgrounds may also have different learning behaviours, learning styles, learning goals, frames of reference, and motivation that make it tricky for them to understand what other people are trying to explain.

**Problem of trust**

The essence of effective collaboration is trust (Herriot et al., 1998). However, the pitfalls in communication and social interaction in online learning environments presented above pose a serious challenge to build trust among participants. Personal contact and trust are intimately related (Ubon and Kimble, 2002). In general, good relations among people in a community wipe out the process of distrust and fear, and break down personal and organizational barriers (Nonaka and Takeuchi, 1997). Through well-established relationships, people develop the sense of trust, identity and commitment that allows them to learn from each other, create new knowledge and share.

Trust plays a crucial role in knowledge sharing. Therefore, building trust among online learners is a must to achieve desired outcomes. However, according to Handy (1995), who supports the importance of trust in an online community, trust can only exist between people who are not complete strangers to one another. Handy believes that trust is hard to establish if people have never met previously or worked together.

**Low level of collaboration**

The level of collaboration in the online learning community is determined by the ability of people to come together and discuss issues confidently. Unfortunately, issues described by space and time constraints, and the lack of face-to-face interaction may result in the lack of trust, identity and commitment in online learning. This can make people unwilling or reluctant to share their knowledge and collaborate with others. In the literature, there is strong evidence that a climate that fosters trust, care, and personal networks among people is one of the most important conditions for high level of collaboration, knowledge creation and knowledge sharing (Von Krogh et al., 2000; Kimble et al., 2000).

In online learning, the lack of face-to-face and personal interaction may result in the minimal degree of trust, identity and commitment among students. While some researchers report cases of online education that achieve high rates of learner participation and group interaction (Hiltz, 1986; Harasim, 1987), other researchers found that achieving an active membership has been a problem in online activities (Umpleby, 1986 cited in Ubon and Kimble, 2002).

In a nutshell, online learning is certainly an asset to mitigate the distance issue among learners and connect experts and students worldwide. Online learning enables students to learn from experts with no need to move across the world thanks to the power of ICT. However, major pitfalls and factors surround that learning mode, as presented earlier, which are vital to address to ensure knowledge sharing success between students and between students and instructors.

### 2.4.4. Knowledge Sharing in e-Learning

Competition, innovation and knowledge are three important factors of the current knowledge-based economy. Both individuals and organizations are greatly concerned about securing a job or keeping the business alive. Therefore, the capacity to access, learn and assimilate knowledge from experts in different corners of the world is becoming increasingly important, and all eyes are turned to the new ICT and e-Learning to achieve that need cost-effectively.

E-Learning has emerged as a strategic tool to acquire, impart and share knowledge in many organizations. The giant of computer and networking, Cisco, is a typical example as presented by Hildrum (2009). Additionally, the author highlights that the new generation of tools available in e-Learning systems such as blogs and live chats, webcams and wikis, live online courses, simulation systems and interactive 3D computer game environments improve contacts between students and instructors which facilitates knowledge sharing.

The remote laboratory is another example postulated by Hildrum (2009) to justify the power of ICT in e-Learning to exchange knowledge and expertise. In such remote laboratories, meaning fully equipped physical laboratories but controlled at a distance through ICT, remote master and apprentice can jointly access and use the lab to conduct experiments in various fields such as chemical engineering, microelectronics, and medicine. This has been found to be efficient and effective as remote lab technology is increasingly adopted by advanced educational institutions such as the Massachusetts Institute of Technology (MIT) as a means of extending laboratory work to science and engineering students who are not able to attend their physical laboratory classes. Additionally, remote lab technology is becoming widespread in the corporate sector.

Consistent with the findings of Hildrum (2009), many other studies claim that the new development of ICTs in e-Learning facilitates interaction and close collaboration which enhances effective learning and knowledge acquisition. Panahi (2014) also exemplifies successful ICT-mediated tacit knowledge sharing among physicians in the healthcare sector. However, these conclusions are not unanimous,and there are still divisive opinions as some studies argue that knowledge sharing in virtual learning spaces is incomplete. The lack of face-to-face contact among novice online learners and expert instructors is always seen as a huge issue. Hence, deepening the understanding of the potential contribution of ICTs and e-Learning features supporting the articulation of tacit knowledge and its dissemination in virtual meetings among virtual learners, is in the scope of this research. This involves mastering the concepts of both knowledge and tacit knowledge. The following section will present the notion of knowledge followed by tacit knowledge to help to identify and understand mechanisms, factors and challenges involved in the sharing of that form of knowledge in the online learning environment.

## 2.5 KNOWLEDGE

Knowledge is a strategic and critical asset that organizations rely on, and gives them a sustainable competitive advantage (Drucker, 1993; Choi et al., 2008). The more knowledge a person has, the more valuable they are to their firm; which is true for anyone from manual labourers, to those who focus more on mental creation, and everyone in between. The concept of the knowledge economy has then emerged to represent that *"soft discontinuity"* from the low-skilled force to knowledge intangible capital (Jashapara, 2004, p. 9). Knowledge Management has then become an emerging discipline that has gained enormous popularity in the post-industrial or knowledge economy among academics, consultants and practitioners. However, knowledge is a very slippery concept with many different variations and definitions (Nickols, 2000).

Knowledge has important underpinnings in philosophy from Plato (427-347 BC) to Wittgenstein (1889-1951) whereby different views of knowledge emerged. Plato's opinion of knowledge as a "justified true belief" is considered as a general definition (Nonaka and Takeuchi, 1995, p. 21). Philosophers often divide knowledge in three broad categories: personal, procedural, and propositional. Personal knowledge or knowledge by acquaintance relates to first-hand experience, idiosyncratic preferences, and autobiographical facts. It is the kind of knowledge one claims when saying "I know Mozart' music". Procedural knowledge refers to knowledge on how to do something, such as how to drive. This related to the possession of skills involved. Propositional knowledge or knowledge of facts refers to general truth claims about the world and how we know it. An important difference between the philosophical view and the psychological view about knowledge can be seen in these categories of knowledge. Generally, philosophers have been concerned with general propositional knowledge whereas psychologists have concerned themselves with how people acquire personal and procedural knowledge. Thus, what should be considered as knowledge remains blurred. One of the most used and consistent definitions of knowledge is the one proposed by Davenport and Prusak (1998):

> “Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms.” (Davenport and Prusak, 1998, p. 5).

Davenport and Prusak further identified that knowledge is made up of six components: experience, ground truth, complexity, judgment, rules of thumb and intuition, values and beliefs.

The definition and conceptualization of knowledge have been influenced by the epistemological and hierarchical views.

In the epistemological view, knowledge is considered as an “object” that can be stored, transferred, and manipulated; a “process” that can be applied in practice; a “state of mind” or the fact of knowing and understanding; an ability to *“access to information”*; a *“capacity”* to find and use information; and a *“knowledge vis-a-vis data and information”* (Alavi and Leidner, 2001). Arguments in relation to the meaning of knowledge from the epistemological view are beyond the scope of this research.

Conversely, the hierarchical view of knowledge – also called a knowledge pyramid—is very popular in Knowledge Management and Information and Communication Technology literature and is suitable and helpful in the context of this research (Alavi and Leidner, 2001). In this view, knowledge is distinguished from data, information and wisdom. Data is known facts or things used as basis of inference or reckoning (Jashapara, 2004). Generally, data are raw facts (symbols, letters, and numbers) representing the reality always meaningless. Information is systematically organised data (Meadows, 2001). Information is then considered as processed data with meaning to them for better understanding. Once information is further processed, interpreted, contextualized and combined with understanding, experience, and capability, it becomes knowledge. Knowledge can be considered as “actionable information” and linked to the capacity for action (Sveiby, 1997). Actionable information allows us to make better decisions and provide better input to dialogue and creativity in organizations. Finally, wisdom refers to accumulated and consolidated knowledge, which enables people to anticipate and predict. Wisdom is the ability to act critically or practically in a given situation.

In other words, data alone is *"know-nothing"*, information goes with *"know-what"*, knowledge is about *"know-how"* and wisdom contains *"know-why"*. While data and information can be viewed as human-independent entities, knowledge and wisdom are attached to the human-carrier. Figure 2.5 shows the data-information-knowledge-wisdom (DIKW) hierarchy. The pyramid illustrates the level of complexity of each dimension with the data level being the simplest.

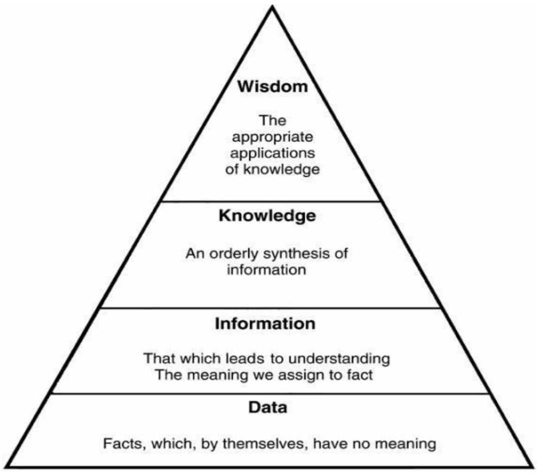



*Figure 2. 5 The data-information-knowledge-wisdom (DIKW) hierarchy*
Source: (Hurwitz et al., 2000)

Knowledge Management literature presents various typologies of knowledge developed to identify the types and dimensions of knowledge. Anderson (1989, 1983) postulated three types of knowledge: declarative, procedural, and working knowledge. Boisot (1995) came up with four types as proprietary, public, personal and common-sense knowledge. Blackler (1995) proposed a typology of knowledge consisting of embodied, embedded, embrained, encultured and encoded knowledge. Lundvall and Johnson (1994) classified knowledge into four categories such as know-what, know-why, know-who and know-how. Nonaka and Takeuchi (1995) specified two types of knowledge, *"tacit"* and *"explicit"* knowledge. Choo (1998) added cultural knowledge to Nonaka and Takeuchi classification.

The most dominant classification within the current Knowledge Management literature is the notion of "tacit" and "explicit" knowledge from Nonaka and Takeuchi research (Jashapara, 2004). The underpinning philosophy of these constructs can be traced back to Gilbert Ryle (1900-1976) and Michael Polanyi (1891-1976). Ryle demonstrated the difference between *"knowing how"* and *"knowing that"*. For him, there is a distinction between intelligence (knowing how) and possessing knowledge (knowing that). Ryle sees intelligence (knowing how) as the ability to perform tasks whereas *"knowing that"* is holding certain bits of knowledge in one's mind. He contends that when a person does something intelligently, they are doing only one thing, not two. "Knowing how" cannot be defined in terms of "knowing that."

Michael Polanyi comes from the same background as Ryle (Behaviourism) and develops the notion of tacit knowledge from a number of experiments in his seminal book, *The Tacit Dimension* (1967). Polanyi's preliminary view of human knowledge is *"we know more than we can tell"*. He uses Ryle's distinction between *"knowing that"* and *"knowing how"* and suggests that each aspect of knowing is ever present with the other. They are not distinct entities and his assumption is that they exist together along a continuum as shown in Figure 2.6. Polanyi uses the example of riding a bicycle and the need to have tacit knowledge to stay upright. For him, staying upright and engaged in the activity of riding is part of *"knowing how"* to ride a bicycle. However, it is difficult for the rider to articulate clearly (knowing that) what keeps him/her upright.

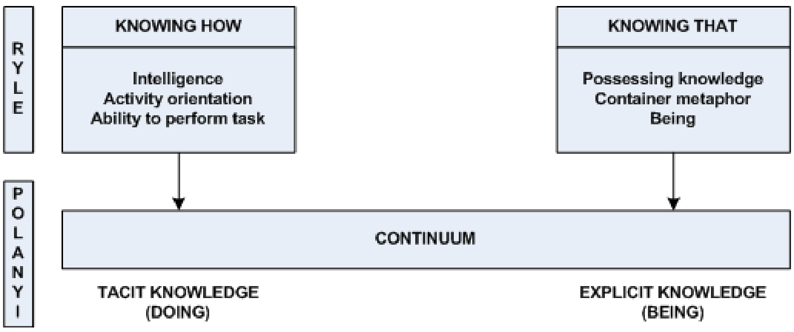



*Figure 2. 6 Philosophy of Gilbert Ryle and Michael Polanyi*
Source: (Jashapara, 2004)

Similar to the definition of knowledge, the classification of knowledge has been influenced by the philosophical and organizational views. In the current Knowledge Management literature, Nonaka and Takeuchi's classification (tacit and explicit knowledge) is the still most practical classification of knowledge (Pathirage et al., 2007). This classification was then adopted for the purpose of this study. According to the Nonaka and Takeuchi (1995), tacit knowledge refers to the personal knowledge residing within an individual's head in the forms of personal experience, know-how, insight, mental modes, and personal beliefs, whereas explicit knowledge refers to well-articulated knowledge that is written down and documented.

Unlike Polanyi's view of tacit knowledge, Nonaka and Takeuchi see tacit knowledge as a knowledge that is, to some extent, articulable and expressible in certain situations, and can be classified into different types of "tacit knowledge" based on the degree of its tacitness and its expressibility (Oguz and Elif Sengün, 2011; Busch, 2008). Nonaka's and Takeuchi's opinion has influenced the literature and has stimulated investigations and representations of both types of knowledge in order to perceive the likeliness and the possible level of expressibility of the tacit knowledge, the most complex knowledge. One way that seems simple to better comprehend and distinguish both types of knowledge has been driven though their properties. Table 2.2 below recaps some properties of both tacit knowledge and explicit knowledge found in the literature.

*Table 2. 2 Properties of tacit and explicit knowledge*

| | Tacit knowledge | Explicit knowledge |
|---|---|---|
| **Characteristics** | Unstructured and difficult to see, codify, estimate, test, formalise, write down, capture and articulate. | Articulated, structured, well-documented, easy to recognise, codify, formalise, store, share, communicate, and use. |
| **Accessibility** | Mostly unconscious and invisible knowledge. | Consciously accessible and visible. |
| **Rationality** | Subjective | Objective |
| **Performance and added value** | Know-how, practical, job specific, experience-based, context-specific, ready for action and defined expertise. | Know-that, know-what, declarative, formal and academic knowledge. |
| **Place** | Rarely documented, highly individuals, resides in human minds and also relations. | Found in books, journals and databases. |
| **Learning** | Difficult to learn. Learn through personal experience and consequence, practice, apprenticeship, observation, imitation and reflection. | Easy to learn. Learn through instruction, procedures, recitation or repetition. |
| **Sharing** | Shared through conversation, storytelling, discussions, analogies, and demonstrations. | Shared using any information sharing medium. |
| **Examples** | Riding a bicycle, scoring a free kick in football, public speaking skills, surgery skills and best means of dealing with a specific customer. | Knowledge of major customers in a region, mass-energy equation ($E=MC^2$), Knowledge of most selling products. |

Source: (Alavi and Leidner, 2001; Smith, 2001; Wild et al., 2002; Panahi et al., 2012b)

With this overview of the concept, typology and classification of knowledge, the next section will focus on tacit knowledge that represents the main concern of the research.

## 2.6 TACIT KNOWLEDGE

### 2.6.1. Definition of Tacit Knowledge

As presented in the previous section, there are various issues surrounding the concept of knowledge; many aspects of which are subjects of debate that promote different views in the literature. A leading one is the tacit dimension of knowledge. In fact, the inarticulate aspect of knowledge (tacitness property) has become a “buzzword” and a slippery notion in the last decade (Oguz and Elif Sengün, 2011).

The term “tacit knowledge” originated from the philosopher Michael Polanyi’s popular dictum, *“we know more than we can tell”* (Polanyi, 1966, p. 5). The essence of that catchphrase is that in order to recognise and make sense of objects to which we are directing our conscious attention, we rely on a complex array of insight and hunches of which we are not consciously aware. Because people are not consciously aware of this knowledge, it does not get articulated or written down but stays hidden and tacit. To illustrate the phenomenon of tacit knowledge, Polanyi takes an example from the face recognition: if we know a person’s face, then we can recognise it among thousands, even if we usually cannot explain how the recognition happens.

On a more specific level, Polanyi argues that knowledge is created as a result of dynamic interaction between focal and subsidiary awareness. Focal awareness constitutes an individual’s explicit knowledge that is what people initially focus on in performing a practical skill, whereas subsidiary awareness constitutes an individual’s tacit knowledge, which is generated subsidiarily using past experiences in the individual’s mind and contributes to the understanding and interpreting of current focal awareness. An example could be playing golf or snooker where knowing the explicit rules does not necessarily give the person the ability to be a good player. Polanyi argues that clinical skills are abundant with tacit knowledge (as cited in Henry, 2006; Lane, 2010).

Polanyi’s work has triggered many discussions and research on tacit knowledge. In general, tacit knowledge is often compared with explicit knowledge to show the fundamental difference between the two. Knowledge that is generally conventional and easy to articulate in a comprehensible language is called explicit (Polanyi, 1966; Nonaka and Takeuchi, 1995). Explicit knowledge is easy to access and transfer and also refers as *“knowing about”* or declarative knowledge (Kogut and Zander, 1992). Explicit knowledge is always regarded as easy to copy or imitate by competitors, thus any competitive edge gained from using explicit knowledge is, as a result, is short-lived (Dierickx and Cool, 1989). Conversely, tacit knowledge is widely embodied in individuals (Küpers, 2005), but not able to be readily expressed. It is expertise, skill or *“know how”*, as opposed to codified knowledge. Alternatively, Casonato and Harris stated that:

> "Tacit knowledge is the personal knowledge resident within the mind, behaviour and perceptions of individuals. Tacit knowledge includes skills, experiences, insight, intuition and judgment, it is typically shared through discussion, stories, analogies and person-to-person interaction; therefore, it is difficult to capture or represent in explicit form. Because individuals continually add personal knowledge, which changes behavior and perceptions, tacit knowledge is by definition uncapped." (Casonato and Harris, 1999).

Tacit knowledge is seen as increasing importance to economic and organizational competitiveness (Fernie et al., 2003). Winter (1998) and Busch (2008) argue that tacit knowledge facilitates competitive advantage for firms because it is much harder for competitors to copy when compared with explicit knowledge. Spender (1996) and Baumard (1999) noted common reasons for analyzing tacit knowledge in Knowledge Management seem to be related to achieving a competitive advantage by effective usage of unique knowledge. This is correct. When a team or organization loses a talented team player without a real knowledge transfer system, they risk a decline in performance. That is why organizations invest in procedures that are best for sharing tacit (personal) knowledge across teams or the entire organization. At an individual level, tacit knowledge associated with quality of work and experience makes the knowledge holder stand out from the mass who relies only on explicit or written knowledge.

There are many views related to the definition of tacit knowledge and the fact it even exists. The first view perceives tacit knowledge as part of the knowledge that has not been codified yet. The second view argues that tacit knowledge is by definition ineffable, therefore any attempt to convert it to an explicit form is futile. Furthermore, tacit knowledge is the background or subsidiary knowledge of the focal knowledge of the act at hand. Because of this, it is not reducible to the level of explicit as it is only relevant to a specific context. The third view contends that every application of tacit knowledge has a *"meta tacit"* dimension (level) which will always stay ineffable and cannot be codified while the bottom level could be explained (Kabir, 2013). From that ground, Collins (2010) suggests and distinguishes different forms or types of tacit knowledge are founded on the ability to articulate.

### 2.6.2. Forms of Tacit Knowledge

Collins (2010) work sets to clarify and demystify the confusion surrounding the term tacit knowledge. The author proposes three distinct types of tacit knowledge: relational tacit knowledge, somatic tacit knowledge, and collective tacit knowledge.

Relational Tacit Knowledge is knowledge that is tacit because some of its attributes are subjected to interpersonal interaction or attention. Examples include tricks of the trade, knowledge kept hidden deliberately and unrecognised knowledge. Somatic Tacit Knowledge is knowledge that is tacit due to our body's inherent physical limitation and abilities. An example is riding a bicycle. Collective Tacit Knowledge consists of knowledge that is ingrained in society and depends largely on how the society works. An example is laughing at a joke.

With this taxonomy, Collins distinguishes tacit knowledge that can be explained with both relational and somatic tacit knowledge falling into this category, from the collective tacit knowledge that is context dependent and cannot be codified.

Different categories of tacit knowledge can also be found in the literature from philosophical, psychological and organizational perspectives. Tacit knowledge is categorized into cognitive and technical knowledge (Nonaka and Takeuchi, 1995); personal and common sense knowledge (Boisot, 1998); embodied, embedded, embrained and encultured knowledge; (Blackler, 1995) implicit and cultural (Choo, 1998, 2006); individual and social/collective implicit knowledge (Spender, 1996), inherently and contingently tacit knowledge (Gourlay, 2006b) and articulable and inarticulable tacit knowledge (Busch and Dampney, 2001; Busch et al., 2001; Busch, 2008).

By adopting Busch and his colleagues' categorization of tacit knowledge into articulable form and inarticulable form, Panahi (2014) suggests a representation of these two types of tacit knowledge with examples as a continuum of tacit to explicit knowledge. Figure 2.7 below shows the continuum of tacit to explicit knowledge as consolidated by Panahi's work with examples in the literature.

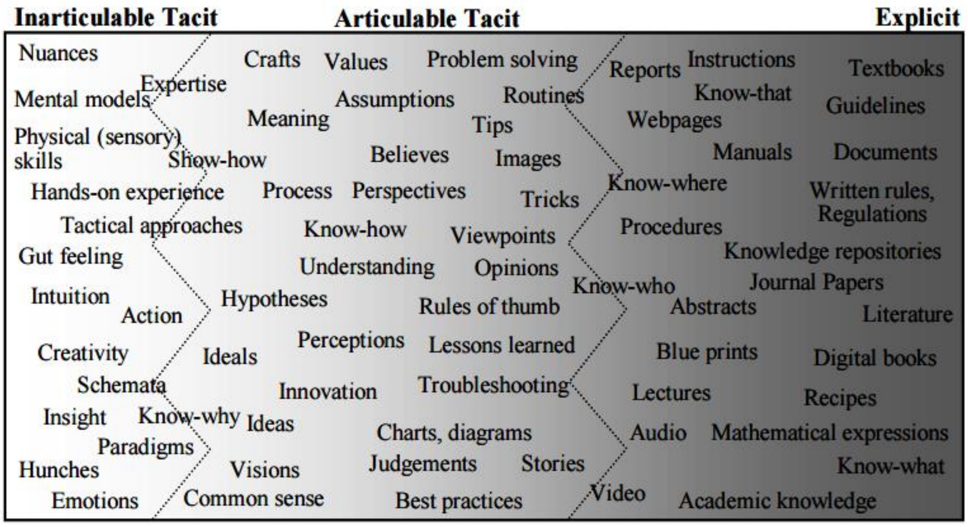



*Figure 2. 7 The tacit explicit knowledge continuum with examples*
Source: (Panahi, 2014)

The inarticulable tacit knowledge is defined by Busch (2008, p. 451) as a *"subset (whether major or minor) of tacit knowledge that cannot be truly articulated"*. This definition aligns with Polanyi's (1966) concept of *"indwelling"* in things and incorporating them into the body as a way of knowing and obtaining skills to perform a particular practice such as riding a bike or playing a musical instrument. The inarticulable tacit knowledge is very difficult to transfer since it is primarily based upon personal physical experience, sensing and feeling. Hence, it may not be easily verbalised and shared.
The articulable tacit knowledge is defined by Busch (2008, p. 450) as a *"subset (whether major or minor) of tacit knowledge that can eventually be articulated"*. This type of tacit knowledge has a low or medium degree of tacitness and might be crystallised, articulated, and shared if asked by the right person under the convenient conditions with appropriate mechanisms. Tips, tricks of the trade, professional opinions, new ideas and demonstrable skills fall into articulable tacit knowledge category and could be shared to some extent.

The tacit-explicit knowledge continuum is not an isolated view. Ambrosini and Bowman (2001) viewed tacit knowledge as experts' knowledge and skills that "have become tacit through time" although it has been acquired explicitly (p. 815). Patel et al. (1999, p. 82) used tacit knowledge to refer to the highly structured biomedical knowledge base of experts acquired through repeated exercise in different contexts that enables them to make immediate non-analytic responses to problems presented to them. While novices engage in relatively lengthy reasoning processes, experts' inference chains are shorter and difficult to "unpack" because "the underlying knowledge has become tacit". Patel and his team found similar characteristics in nurses whose decision-making was described as "pattern recognition" (Patel et. al. 1999, p. 87-88). In these examples, authors claimed that knowledge is tacit in use but it was originally learned explicitly. Furthermore, that explicit knowledge can be "recovered" if for example the immediate non-analytical decisions appear not to work. From this perspective, Patel et. al. (1999) emphasized that doctors' biomedical knowledge remains tacit during clinical decision making, unless problems arise.

In many organizational studies, articulable tacit knowledge is the focus rather than inarticulable tacit knowledge. It is also adopted as a working definition of tacit knowledge for the purpose of this research. The definition and examples shown in the Figure 2.5 are constantly used as a guide in this research. Another less popular form of knowledge cited in sections above is *implicit knowledge*.

Strictly speaking tacit knowledge cannot be codified. Rather, what passes for tacit knowledge is actually the implicit knowledge that we as individuals all make use of to greater or lesser degrees of success. What is meant by implicit knowledge is that component that is not necessarily written anywhere, but we tacitly understand that using such knowledge is likely to lead to greater personal success. Stated another way, tacit knowledge is "knowledge that usually is not openly expressed or taught … by our use of tacit in the present context we do not wish to imply that this knowledge is inaccessible to conscious awareness, unspeakable, or unteachable, but merely that it is not taught directly to most of us" (Wagner and Sternberg 1985, p. 436, 439). Or as Baumard (1999) differentiates, "on the one hand it is implicit knowledge, that is something we might know, but we do not wish to express. On the other hand, it is tacit knowledge that is something that we know but cannot express" (p. 2).

This study acknowledges that tacit knowledge is comprised of articulable and inarticulable properties but focuses on the articulable aspects. Articulable Tacit Knowledge is a term suggested by Dampney et al. (2002) to describe this implicit set of knowledge that refers to tacit knowledge that can be articulated at the certain abstraction. The authors give practical examples that form the part of tacit knowledge (pages 155-156) that will be useful in this research. To meet the research objectives in this research, tacit knowledge refers to articulable tacit knowledge possessed by an expert in the field. The term "tacit knowledge" rather than "implicit knowledge" is used, to allow comparison with previous studies conducted by Hedlund et al. (2003), Sternberg et al. (2000), Busch et al. (2003) and Berman et al. (2002). This direction is also justified by the fact that studies dealing with the measurement for individual tacit knowledge seem to be related to its articulated level of abstraction (e.g. Sternberg et al., 2000, Busch et al. 2003; Taylor et al. 2013) by looking at the bearer's professional expertise as an indicator of the possession of tacit knowledge.

### 2.6.3. Conversion and Sharing of Tacit Knowledge

Tacit knowledge research has been developed from different perspectives, which of course, dictate what can be done about it. Oguz and Elif Sengün (2011) in their work *"The mystery of the unknown"*, made a distinction of tacit knowledge from organizational literature and Polanyi's view and derivatives. The authors contend *"tacit knowledge"* used in organizational literature is closer to Ryle's (1949) view of *"knowing-how"* than Polanyi's view of *"tacit knowing"*. Table 2.3 presents the differences between the two literatures as outlined by Oguz and Elif Sengün (2011).

*Table 2. 3 Tacit knowledge from Polanyi's view versus the organization view*

| Tacit knowledge in Polanyi's view | Tacit knowledge in the organizational view |
|---|---|
| ▪ Is not a realm of knowledge<br>▪ Has an ontological and existential component<br>▪ Is a process<br>▪ Is a primary understanding<br>▪ Is in-dwelling<br>▪ Is unconscious<br>▪ Is inexplicable<br>▪ Is not amenable to well-articulated representation | ▪ Is a knowledge realm<br>▪ Is the opposite of explicit knowledge<br>▪ Can be individual or collective<br>▪ Refers to knowing how, skills and expertise<br>▪ Refers to organizational routines and capacities<br>▪ Is contextual<br>▪ Can complement or substitute explicit knowledge |

Source: (Panahi et al., 2013)

The two views presented above constitute the basis of the argument regarding tacit knowledge sharing in the literature. In fact, there are two main schools of thought regarding tacit knowledge sharing (Gourlay, 2006a, McAdam et al., 2007). The first school mainly follows Polanyi's view and believes that pure or absolute *"tacit knowing"* may not be easily accessible, transferable and shared. Tacit knowledge in that group is highly personal and resides only in the human mind and therefore it would be very difficult to share such knowledge.

On the other hand, the second school of thought is influenced by Nonaka and Takeuchi (1995) and supports the ability to externalize and pass on tacit knowledge to some extent.

Part of the tacit knowledge is believed to be converted and therefore shared to a certain level. This school advocates that tacit knowledge can be shared and passed on in a tacit form through personal experience, apprenticeships, observation, and imitation, and it also believes that tacit knowledge can be externalized and converted to an explicit form through dialogue, social interaction, and storytelling.

To Woelk and Agarwal (2002), the main goal of implementing knowledge management in an organization is to convert tacit knowledge in an explicit form and encourage its sharing amongst employees. While tacit knowledge refers to personal knowledge residing in an individual's head in the forms of experience, know-how, insight, expertise, personal beliefs and so forth, tacit knowledge can be found in everyday discussions, informal meetings, and face-to-face interactions (Busch 2006).

The need of capturing, converting and transferring tacit knowledge has been the focus of various studies in tacit knowledge from organizational perspectives motivated by the new knowledge economy in which tacit knowledge is labelled as the key ingredient of innovation and competitive advantage (Sternberg et al., 1995; Winter, 1998; Horvath et al., 1999; Busch, 2008). Nonaka and Takeuchi (1995) is one of those that explains and suggests mechanisms to create new knowledge and, convert and transmit tacit and explicit knowledge.  The authors postulated the SECI model that demonstrates a dynamic interaction between tacit and explicit knowledge in the transformation process. Nonaka and Takeuchi's SECI model stands for Socialization, Externalization, Combination and internalization comprising of the four continuous processes for knowledge sharing and conversions (from tacit to explicit and vice versa). These four interrelated processes of the SECI model progress in a spiral fashion as shown in Figure 2.8.

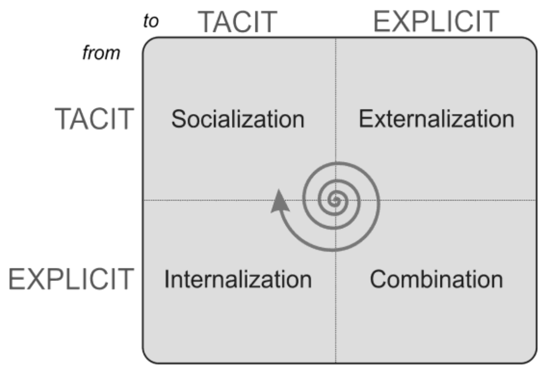



*Figure 2. 8 SECI model*
Source: (Nonaka and Takeuchi, 1995)

According to Nonaka and his colleague, socialization is the process that supports the transfer of tacit knowledge into a tacit form, implying the creation and exchange of new knowledge through shared experiences, hands-on experience, empathising, and participating in an informal social meeting. Externalization describes the transformation of knowledge from a tacit to an explicit form involving crystallization and articulation of tacit knowledge into explicit knowledge. Combination is the process of converting and consolidating explicit knowledge into other systematised explicit knowledge. Finally, internalization indicates the process of converting explicit knowledge into tacit knowledge through reading explicit materials, reflecting upon, applying, practicing and getting experience from lessons learned (success and failures).

Nonaka and Takeuchi (1995) consider that what enables the externalization of tacit knowledge to a large degree is the role played by both metaphors and analogies. The essence of metaphor is, understanding and experiencing one kind of thing in terms of another. The contradictions incorporated in metaphor may be harmonised through the use of analogies. Leonard and Sensiper (1998) claimed that apprenticeships are a time-honoured way to share specific tacit knowledge. Tacit knowledge grows through shared observation and from imitating behaviour, even without knowing why. In fact, the most common application of tacit knowledge is within problem solving situations (Yi, 2006).

According to Lam (2000), tacit knowledge is experience-based knowledge and therefore can only be demonstrated through practice in a particular context, and conveyed through social networks. Durrance (1998) suggested four conditions to facilitate and cultivate tacit knowledge sharing among individuals in an organization: observing possibilities, creating an environment of trust, respect and commitment, letting people learn by doing, allowing time for reflecting and interpersonal exchange in any training exercise.

Davenport (2001) postulated *"Community of Practice"* referring to a flexible group of professionals, informally gathered together by common interest who then interact through interdependent tasks guided by a common purpose thereby embodying a store of common knowledge. Brown and Duguid (1991) argued that people in organization learn the work in *"Communities of Practice"* that de-emphasize canonical practices and promote non-canonical practices. Yi (2006) supports that the exchange and development of information within these evolving communities facilitated knowledge creation by linking the routine dimension of daily activities to active learning and innovation. Storytelling, collaboration and social construction are then the properties of informal organization memory (Yi, 2006, p. 667).

The concept of Community of Practice supporting a shared context to exchange knowledge has been significant. Nonaka et al., (2000) stated: “knowledge needs a context to be created. Contrary to the Cartesian view of knowledge, which emphasizes the absolute and context-free nature of knowledge, the knowledge-creating process is necessarily context-specific in terms of who participates and how they participate”. Therefore, Nonaka and his colleagues updated the SECI model by introducing the context of “*ba*” for each knowledge transformation process. *Ba* means the shared context, time and place in which individuals share their knowledge. Authors stress that *ba* is not limited to only physical context and could be virtual, mental social, cultural and historical. According to the authors, the SECI model takes place in four types of *ba*: originating *ba*, dialoguing *ba*, systemising *ba*, and exercising *ba*, shown in Figure 2.9.

Originating *ba* offers a context for socialization where individuals meet face-to-face and share their experiences, mental modes, and emotions. Dialoguing *ba* is for externalization in which the individual's tacit knowledge is articulated and shared with other people through conversing at a group level. Systemising, also called cyber *ba*, provides a *ba* for a combination process in which people can manipulate and share their explicit knowledge using common information technology tools. Finally, exercising *ba* is for externalization in which people can use virtual media such as written manuals, teleconferences, or simulation programs to embody explicit knowledge and convert it to tacit knowledge.

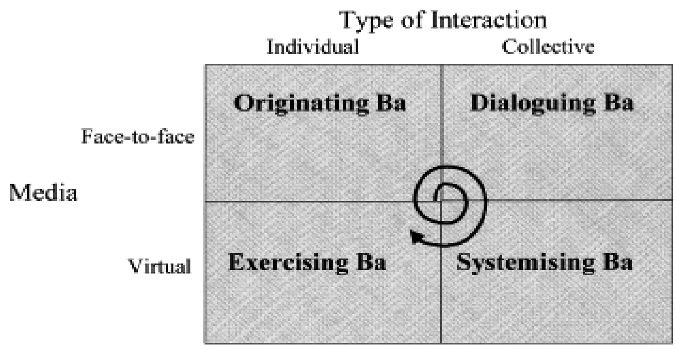



*Figure 2. 9 Four types of ba*
Source: (Nonaka et al., 2000)

Although Nonaka et al. (2000) updated model acknowledged virtual *ba* for knowledge combination, their model did not address the externalization of tacit knowledge during activities that often take place online; including online real-time chatting, commenting, collaborating, and discussing. It only considers the role of information technology in combination (in a systemising *ba*) and internalization (in an exercising *ba*) processes. However, later studies argued that online virtual communities could also act as a virtual *ba* for externalization of tacit into explicit knowledge (Tee and Karney, 2010; Wahlroos, 2010, Curran et al., 2009; Hildrum, 2009; Orzano et al., 2008; Scott, 1998). In other words, while the Nonaka's theory is still valid and commonly used, the interpretations of this theory have changed considerably as new technologies have emerged.

The SECI model has also been criticised by some authors who argue that the model is not complete enough. For example, McAdam and McCreedy (1999) argued that knowledge sharing is more sophisticated than that described by the SECI model. They warned that tacit and explicit knowledge are not the only types of knowledge meaning that other types should be considered. Gourlay (2006a) contended that some of the processes and examples mentioned in the SECI model for knowledge conversions are ambiguous and not supported by sufficient evidence. Moreover, Gourlay argued that the model did not cover inherently tacit knowledge, a type of tacit knowledge that is not completely expressible. Firestone and McElroy (2003) believed that the Nonaka and Takeuchi's SECI model is an oversimplification of knowledge conversions. Wilson (2002) accused Nonaka and Takeuchi of misinterpreting or manipulating the founding work of Polanyi. Polanyi (1969) stated tacit knowledge is inexpressible, whereas SECI model relies on the conversion of the tacit to the explicit knowledge. Wilson, among others, argues that knowledge exists within the human mind, therefore, anything that can be articulated (known to be inside the mind) is purely information. This is not true, according to Zins (2007), who stated "…knowledge is the product of a synthesis in the mind of the knowing person, and exists only in his or her mind. If this is the case, we might well exclude the subfields of knowledge organization and knowledge management from information science" (p. 479).

Zins's (2007) core argument is based on the question "is Albert Einstein's famous equation 'E=MC2' information or knowledge?" (p. 479). It is debatable, but the differentiation between knowledge being held within the person and information existing outside the person could be useful to this research. Similarly, Nonaka and Takeuchi's body of work is debated, but, given his popularity within the Knowledge Management literature, it cannot be disregarded in this study. The SECI model probably discusses tacit knowledge sharing in more detail than other knowledge creation frameworks. Other studies that have criticised the SECI model seem mostly to replicate arguments put forward by its authors. For example, opponents to Nonaka and Takeuchi's work like Wilson (2002) does not make any suggestion of an operational definition of knowledge and finally revert to tacit and explicit notions from Nonaka and Takeuchi.

The SECI model including many other studies from different fields are focusing on expanding our understanding of tacit knowledge concept, thereby making it explicit and vice versa. Only a few studies have tried to provide an explanation of how individuals acquire tacit knowledge or how tacit knowledge develops in individuals in the first place. In the next section, we will look at the acquisition of tacit knowledge and how individuals can acquire tacit knowledge vicariously from others.

### 2.6.4. Acquisition of Tacit Knowledge

Cognition is defined as the mental action or process of acquiring and understanding knowledge through our thought, experience and senses (Miller and Wallis, 2009). It is a process in which information is encoded in the brain by receiving signal from the outer world through the sense organs. Whenever a person sees or hears something new, the person goes through a series of cognitive processes, which are the processes that an individual uses to incorporate new knowledge resulting in learning. Attention, memory, perception, language, reasoning, decision-making are some of these cognitive processes that work together towards intellectual development and experience. Psychology, philosophy, anthropology, neurology have studied cognition, however, it was cognitive psychology that started to delve in depth how processing information influences behaviour and what relation different mental processes had in the acquisition of knowledge. It offers an explanation of different cognitive functions taking place to integrate new knowledge and create an interpretation of the world around us.

**Attention**: allows an individual to concentrate on a stimuli or activity in order to process it more thoroughly later. Attention is used in the majority of tasks that an individual carry out daily. It is considered a mechanism that controls and regulates the rest of the cognitive processes – from perception (one needs attention to position and concentrate towards relevant stimuli) to learning and complex reasoning.

**Memory**: allows an individual to code, store and retrieve information. Memory is a basic process for learning as it is what makes it possible to remember facts, ideas, relationships between concepts and any other type of stimuli that happened in the past. There are many types of memory such as short-term memory and long-term memory. Short-term memory is the ability to retain information for a short period of time; remembering a phone number, for example. If the information is rehearsed for a sufficient amount of time, it will move to long-term memory. Long-term memory is the ability to retain information for a long period of time. It comprises declarative memory and procedural memory. Declarative memory consists of the knowledge that was acquired through language and education; such as remembering the pronunciation of a word; including knowledge learned through personal experiences. Procedural memory refers to learning through routines; like knowing how to make breakfast.

**Perception**: allows an individual to make a meaningful world out of sensory data from sight, hearing, taste, smell and touch. Once the stimuli are received, our brain integrates all of the information, creating a new memory.

**Language**: provides the ability to an individual to express thoughts and feelings through spoken words. It is a tool used to communicate, organize and transmit information.

**Thought**: allows an individual to integrate information received and to establish relationships between events and knowledge. To do this, it uses reasoning, synthesis and problem solving (executive functions).

The cognitive processes work constantly together and can happen consciously or subconsciously. They usually happen fast without us realizing. Crossing a road when walking on a street is typical example in which these cognitive processes take place in just milliseconds. If a person sees that the stoplight is turning red, the cognitive process that dictates the decision to cross or not cross, activates. The person's attention turns to red light through sight; and in milliseconds, they recall from memory that when the light is red, they should not cross. This is probably where the first decision is made to wait until the light turns green or look left and right; shifting attention again to ensure there are no vehicles coming, and making a decision on when and how to proceed.

In an array of settings, individuals can describe and communicate the principles and rules on which their actions were based to perform a task or achieve something. The cognitive processes presented above explain how individuals acquire knowledge. However, Polanyi

(1966) observed that individuals in other areas (arts, sports, craftsmanship, manufacturing, leadership, management, etc.) often had a difficult time describing the principles on which their actions were based. Polanyi notes that it's common for individuals to do something and simultaneously be unable to explain how they did it. Swimmers, for instance, stay afloat by regulating their breathing, yet most swimmers are not aware of this nor can explain how they alter their breathing to stay afloat. Example like this (and many more) led Polanyi to conclude that individuals often know more that we can tell.

To better understand how individuals acquire tacit knowledge, it is first necessary to understand the cognitive processes involved in conceptualization, and how these processes occur subconsciously. Although there are many theories that propose how concepts are formed, Rand (1990) argued that the process of concept formation develops when individuals begin to sense and even before they can communicate. Individuals recognize and identify what they sense as they become aware of their environment. Thereafter, they construct relationships among what they identify by observing their similarities and differences, and transforming the conceptual relationship into common units. Rand defined a unit as an "existent regarded as a separate member of a group of two or more similar members" (Rand, 1990, p. 6), and argued that the manner in which units are classified is a function of how they are perceived in the situation. Concepts are later symbolized by words and refer to "a mental integration of two or more units possessing the same distinguishing characteristic" (Rand, 1990, p. 13). The units can refer to any aspects of what is perceived for example attributes, actions, entities, and so on. In this example of concept definition, it is obvious that our ability to conceptualize is tacit; because our knowledge of the world and the way it is constructed begins early on in life, before we can communicate or identify how concepts are acquired. Given the amount of conceptualization individuals undertake throughout their lifetimes, it is apparent that this process is highly automated, and that individuals are not always aware that it is occurring.

When an individual is first learning how to complete a specific task, they devote substantial attention to each and every element and consideration of the sub-skills associated with the task (Dreyfus and Dreyfus, 1986). For instance, when learning how to drive a car with a manual gear transmission, attention is focused on the speed at which the vehicle is moving, the sound of engine, and so forth; and cognitive resources are explicitly devoted to linking such cues with appropriate actions, such as whether or not to shift gears. As individuals become more practiced and familiar with the task, they no longer need to attend to the particular aspects of the requisite sub-skills. Instead, they can focus their efforts and attention more broadly on whether their actions are achieving the intended outcome; such as whether or not the car is moving from point A to point B. (Dreyfus and Dreyfus, 1986; Tsoukas, 2003). In Polanyi's (1962) terms, individuals at this point have only "subsidiary awareness" of their specific actions, whereas there is "focal awareness" of how such actions influence the intended outcomes of a task. That is, by focusing on outcomes or the task as a "whole", Polanyi (1962) contends individuals are only aware of the particulars and specific actions associated with the task in a subsidiary or indirect way.

According to Sternberg (1988), an individual's knowledge-acquisition components generate knowledge of the external world by selectively encoding, combining, and comparing information. By selectively encoding, individuals attend to relevant information as they acquire new knowledge. Selective comparison entails discovering relations between old and new information. Knowledge can also be acquired by selectively combining information to form a cohesive and integrative knowledge superstructure. The knowledge-acquisition process is analogous to the concept formation process discussed earlier. However, the knowledge-acquisition process is not merely constrained to concept formation; but rather, it extends to represent integrations, relations and the cause and effect process to the concepts representing the phenomena.

Sternberg (1998) argued that the information-processing, knowledge-acquisition components are activated, and work with a higher-order meta-componential processes to solve problems. These meta-componential processes include recognizing that a problem exists, defining the nature of the problem, generating a course of action to solve the problem, selecting appropriate strategies to solve the problem, and monitoring the results. The instructions of the meta-components are executed by the performance components. The components govern inferences that are made about the problem, causal relationships are what link elements of the problem to the application of knowledge gained to solving the problem. These three kinds of components – knowledge-acquisition components, meta-components and performance components – form the foundation of the cognitive function process.

To further explain the practical nature of the aforementioned components and how they apply to practical problem-solving, Schön's (1983) theory of reflective practice suggested that a practitioner's competence appears as nearly spontaneous action that is based more on intuition than on rationality. This proposition is supported by others (e.g., Antonakis et al., 2002; Isenberg, 1985, 1986; McCall and Kaplan, 1985; Mintzerb, Raisinghani and Theoret, 1976), Klein (1995) noted that experienced leaders are characterized by "generating, monitoring, and modifying plan to meet the needs of…situation" (p. 139). Rather than compare contrasting options and then choosing between them, as suggested by some theorists, Klein argued that experienced individuals use their experience to immediately adopt what they think is the best course of action, and then put it to the test. This permits individuals to solve problems with and intuitive or tacit approach, rather than some rigorous analytic cognitive strategy. Shön argued that by recognizing patterns of event in their experiences, individuals create framework and schemata – most of which are latent – to make sense of their experiences. These schemata, and hypotheses are then tested in practice. Individual actions and hypotheses are continually updated as they receive feedback from their actions, and as environmental conditions change (Bandura, 1977; Schön, 1983). In the process of testing different approaches to solving problems, "early mistakes generate information that allows corrective action later", including dealing with side effects of the early actions (Orasanu and Connolly, 1995, p. 9). In this way, individuals are able to understand causal relationships that may occur, and as Senge (2006) noted, are able to understand systems processes and link cause to effect, whether they exist in the same or in a different temporal and spatial dimension.

Through repetition, Schön (1983) noted that individuals produce automatic and spontaneous responses to cases that are similar. However, individuals must also reflect on this implicit knowledge, lest it lead to erroneous outcomes, especially in novel environmental conditions, Thus, when encountering new situations, individuals must test their schemata in practice and reflect on the outcomes to fine-tune their knowledge in those contexts. In this way, they become researchers in the context of practice (Schön, 1983). Individuals must then reflect on their tacit knowledge, particularly when their tacit knowledge is no longer applicable and may result in a mismatch of outcomes and intentions (Argyris et al., 1985).

Based on the above explanations of tacit knowledge, Antonakis et al. (2002) claim that all individuals should be capable of acquiring tacit knowledge. Furthermore, varying degrees of experience should account for individual differences in expertise, assuming that individuals are capable of effectively learning from their experiences. Thus, individuals who are experts in a certain subject must have acquired this expertise as a result of their extensive experience, while lack of experience is more indicative of individuals who are novices in a certain field.

The existing literature provides sufficient evidence to support the importance of tacit knowledge and its growth as a subject of research. However, various discussions on the definition of tacit knowledge and its boundaries are still debated in the literature (Venkitachalam and Busch, 2012; Toom, 2012). Venkitachalam and Busch (2012) pointed out that tacit knowledge transfer via narration, storytelling, communities of practice and knowledge networks need more investigation into their role to impart tacit knowledge effectively. With the domination of digital era, information and communication technology tools have been subjected to many enquiries regarding the use to share and convert tacit knowledge. Even if Nonaka and his team revised the SECI model acknowledging the virtual *ba*, the use of ICT for tacit knowledge sharing added another burden to the tacit knowledge transfer debate. Among the research directions postulated by Venkitachalam and Busch (2012) in their literature review paper, tacit knowledge transfer using information technology also needs in-depth investigation.

### 2.6.5. Sharing and Acquiring Tacit Knowledge over ICT

Knowledge acquisition and knowledge sharing are interrelated concepts. There is an overlap between both in that learning or acquiring knowledge may require the simultaneous sharing of knowledge. Sharing and acquiring tacit knowledge over ICT has been another area of contention in tacit knowledge research. Two main schools of thought have emerged regarding the role played by ICT in tacit knowledge acquisition and sharing among individuals (Panahi et al., 2013). The first school insists that tacit knowledge sharing via ICT tools is too limited if not impossible to achieve (Smith, 2000; Haldin-Herrgard, 2000; Johannessen et al., 2001; Jacob and Ebrahimpur, 2001; Hislop, 2002; Flanagin, 2002; Tsoukas, 2005; Busch, 2008). Hansen et al. (1999) claimed that ICT can have a disruptive effect with regard to sharing tacit knowledge. The authors believed ICT often means employees may email rather than conduct a face-to-face meeting with a colleague. Remarkably, it is worth noting that this school is made up of studies that were conducted before the introduction of social web tools (Panahi et al., 2013). On the other hand, the second school argues that ICT can facilitate tacit knowledge sharing although it may not be as rich as face-to-face interactions (Stenmark, 2000; Marwick, 2001; Alavi and Leidner 2001b; Hisyam Selamat and Choudrie, 2004; Šarkiūnaitė and Krikščiūnienė, 2005;

Yi, 2006; Falconer, 2006; Chatti et al., 2007; Murray and Peyrefitte, 2007; López et al., 2009; Hildrum, 2009; Harris, 2009; Panahi et al., 2012a, 2012b). Each school of thought holds its own arguments and justifications. Figure 2.10 below paints a picture of the two perspectives on tacit knowledge sharing, presented above.

The first school of thought believes that the soft nature of tacit knowledge and the fact it is highly personal knowledge residing in the human brain, makes it difficult and challenging to be expressed and shared by language. Therefore, it is impossible to pass on that type of knowledge more fully through ICT. They view tacit knowledge as that knowledge which is not readily expressible and articulable by using common language. From this school's perspective, tacit knowledge can only be acquired through personal experience at the workplace and can only be shared as tacit without even being converted to explicit. They further proposed that tacit knowledge can only be shared through active and direct communication, mechanisms such as observing, mentoring, apprenticeship, face-to-face meetings and chatting, direct observation, learning-by-doing, learning-by-using, mutual involvement, participation, storytelling, metaphors and analogies, etc. Therefore, this school refutes any major role of ICT in tacit knowledge capturing and sharing. For instance, Johannessen et al. (2001) assert that tacit knowledge cannot be digitised and shared by means of internet, e-mails, etc.

In line with media richness theory developed by Daft and Lengel (1986), the first school emphasizes that face-to-face contacts permit a wealth of communication cues, gestures and tone of the voice to name a few that can augment interaction and understanding. Additionally, Hansen et al. (1999) state the use of ICT can have disruptive effects since it will resort to the use of emails and phones which will lose all kinds of body language and may be desynchronised. Furthermore, Busch (2008) confirmed and concluded that using phone and emails resulted in less transfer of tacit knowledge within three organizations differing in type, size, nature, structure and employees.

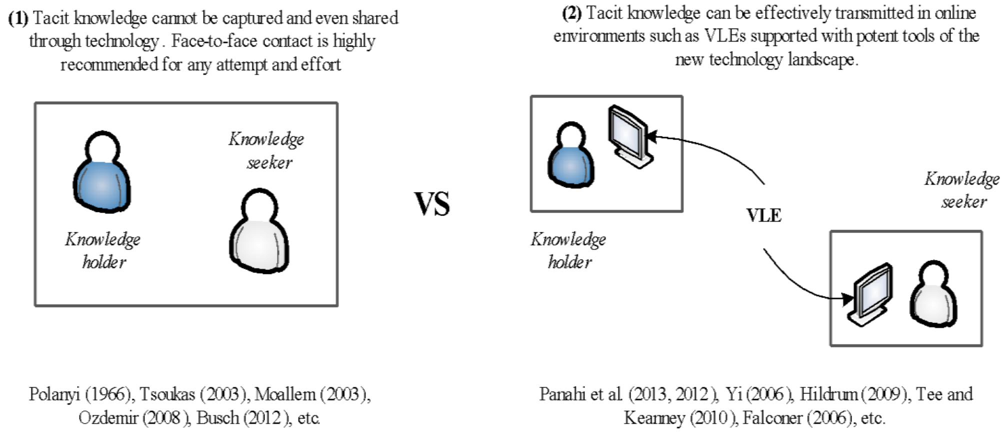



*Figure 2. 10 Opinions in tacit knowledge sharing*

Conversely, the second school argues that ICT can have a positive impact although there is a general consensus that machines process information while knowledge must be processed by humans (Albino et al., 2004). This school refers to the development of ICT tools and admits information technology can contribute to tacit knowledge sharing although this may not be as rich as face-to-face tacit knowledge sharing sessions. This school views knowledge as being a continuum that can have different degrees of tacitness (Chennamaneni and Teng, 2011; Chaharbaghi et al., 2005). It argues that technology innately decreases distance, increases the speed of transfer and provides a means of conformity (Albino et al., 2004). Furthermore, ICT can easily facilitate sharing of knowledge with low to medium degree of tacitness and adequately support the sharing of knowledge with a high degree of tacitness. Nonaka et al. (2000) support this school of thought. They updated their SECI model and acknowledged that knowledge conversion can take place in a virtual *ba* (space) devoid of face-to-face presence. In other words, the authors believe in the feasibility of tacit knowledge sharing through ICT support.

Proponents of ICT-mediated tacit knowledge sharing reveal that information technology can facilitate tacit knowledge sharing processes through supporting various conversions of tacit-explicit knowledge (Panahi et al., 2013). Alavi and Leidner (2001) pointed out ICT can support tacit knowledge creation and sharing on the condition that there is a field that people freely express their personal new ideas, perspectives, and arguments; by establishing a positive dialog among experts; by making information more available and then enabling people to develop new insights and better understandings.

Moreover, McDermott (2000) supports the theory ICT can facilitate tacit-to-explicit knowledge conversion process. Looking at leveraging organizational tacit knowledge, Stenmark (2000) argues that tacit knowledge sharing is not outside the reach of ICT support and capacity. However, the author advises that ICT tools should be designed to provide an environment in which experts can join together, communicate, collaborate and sustain social interactions. ICT tools should not be used to capture and manage tacit knowledge. Yet, enabling social interactions among experts over ICT will facilitate a better flow and exchange of tacit knowledge (Stenmark, 2000). Other arguments in favour of tacit knowledge sharing over ICT can be found in the study of tacit knowledge sharing in e-Learning by Falconer (2006). The author refutes arguments of the first school, disapproving ICT-mediated tacit knowledge sharing, and emphasizes strongly the significant potential of potent ICT tools in swift and effective communication of tacit knowledge. ICT suggests synchronous communication and traditional mechanisms claimed to help tacit knowledge sharing will take the form of online chatting, online discussions, digital storytelling, etc (Yi, 2006; Chao et al., 2011; Hildrum, 2009; Panahi et al., 2012a, 2012b, 2013).

What's more, technology has also provided opportunities for observation and imitation of best practices, expert locating, informal networking, and a friendly space to talk about ideas and ideals.

Panahi et al. (2012b, p. 882) stated: "...traditional mechanisms of tacit knowledge sharing, such as apprenticeship/mentoring, face-to-face meetings/chatting, direct observation, etc. is no longer cost effective and feasible in the new fast growing business models". Besides, Venkitachalam and Busch (2012, p. 365) acknowledged and stated: "... Advocates and critics suggest the influence of information technology in the Knowledge Management field support codified knowledge rather tacit knowledge. Yet, there is evidence in the current literature that presents the use of technologies and applications support the articulation and flow of tacit knowledge between individuals."

Watson and Gemin (2008) argued that web-based environments eradicate, or significantly mitigate, issues that may create social friction, such as appearance, physical disabilities, age, gender, ethnicity, academic history or socio-economic status that are likely to impede face-to-face configuration and undermine collaboration. At the same line, Citera (1998) stated that online discussions encourage more reticent individuals to participle to a greater extent. Furthermore, Warschauer (1997) asserted there is less opportunity for intimidation between individuals online and also less time pressure on them than in face-to-face settings. Chao et al. (2011) highlighted a positive influence of information technology in online learning as far as knowledge transfer is concerned providing there is a consistent interaction among learners.

Yi (2006) asserted it is more consistent and conformable to externalise tacit knowledge in an online environment rather than face-to-face. Her underpinning arguments are that tacit knowledge sharing online involves careful selection of materials, cues, illustrations such as video, audio and images; and provides a control over all kinds of information to convey to others.

Haythornthwaite (2005), noted that early work on online communication and collaboration has been subjected to criticism as it encourages shifting interaction from rich face-to-face venues towards text-based media that create an impoverished communication environment; fraught with misunderstandings, flaming, and antisocial behaviour. Yet, as the online media have become familiar, and their use adapted through common and group conventions, they have come to function as a vital means of maintaining work and social connections. Haythornthwaite pinpoints that more recently the internet has been blamed for disconnecting people from local, family interaction, drawing them into online relationships with people of unknown and unconfirmed identity (Kraut et al., 1998; Nie, 2001 cited in Haythornthwaite, 2005).

Some authors claiming the positive role of ICT in tacit knowledge sharing have adopted the knowledge creation model (SECI) of Nonaka and his colleagues to illustrate how existing ICT tools and mechanisms can be applied (Marwick, 2001; Šarkiūnaitė and Krikščiūnienė, 2005; Chatti et al., 2007; López et al., 2009). These have been well consolidated by Panahi et al. (2013) as shown in Table 2.4 below.

As seen in the table above, existing ICT tools can be used to support each process involved in tacit knowledge conversions as described in the SECI model. Initially, Marwick (2001) argued traditional ICT tools were less efficient than face-to-face meetings regarding tacit knowledge sharing, and that traditional ICT was more suitable for explicit knowledge transmission. However, the author suggested the development of new ICT tools such as synchronous collaboration systems, expertise locators, discussion forums and videoconferencing systems should progress gradually in accommodating human dimension. From Marwick's opinion, this move will contribute to the development and communication of tacit knowledge much better than before. Panahi et al. (2012b) provide evidence that current social web tools are helpful and contribute positively in tacit knowledge sharing.

*Table 2. 4 Mechanisms and technologies for knowledge creation and sharing*

| **Face to face** | | **ICT mediated** | |
|---|---|---|---|
| ***Socialization*** *(tacit to tacit)* | ***Externalization*** *(tacit to explicit)* | ***Socialization*** *(tacit to tacit)* | ***Externalization*** *(tacit to explicit)* |
| – *Team meetings*<br>– *Discussions*<br>– *Interpersonal interaction*<br>– *Apprenticeship*<br>– *Participation*<br>– *Observation* | – *Dialog with team*<br>– *Answering questions*<br>– *Storytelling*<br>– *Metaphors/analogies* | – *Online real-time meetings*<br>– *Synchronous communication (Chat)*<br>– *Online Community of Practice*<br>– *Groupware systems*<br>– *Web 2.0 tools* | – *Answering questions*<br>– *Annotations*<br>– *Blogs/wikis*<br>– *Discussion forums*<br>– *Collaborative systems*<br>– *Groupware systems*<br>– *Phone/video conferencing* |
| ***Combination*** *(explicit to explicit)* | ***internalization*** *(explicit to tacit)* | ***Combination*** *(explicit to explicit)* | ***internalization*** *(explicit to tacit)* |
| – *Books*<br>– *Papers*<br>– *Reports*<br>– *Presentations*<br>– *Indexes* | – *Learning by doing*<br>– *Learning from books, reports, presentations and lectures* | – *All forms of technology*<br>– *Text search*<br>– *Document categorization*<br>– *Podcast/Vodcast*<br>– *Blogs/wiki*<br>– *RSS*<br>– *Mashups* | – *Visualization*<br>– *Video/audio presentations*<br>– *Online learning*<br>– *E-mail*<br>– *Webpage* |

*Source:* (Panahi et al., 2013)

Furthermore, Lopez-Nicolas and Soto-Acosta (2010) findings emphasized ICT can contribute to all processes of knowledge creation and sharing identified in the SECI model. The authors revealed that ICT tools can affect and support the socialization process by facilitating interactions among individuals; the externalization process by developing community based electronic discussions and chat rooms; the combination process by supporting sorting, adding, combining, and categorising existing information; and finally, supports the internalization process by facilitating informal conversations and discussions, and making the information more available. Although there was limited evidence in their study for support of socialization and externalization processes through the use of ICT, Lopez-Nicolas and Soto-Acosta recommended further examination of the interplay of different types of ICT for tacit knowledge sharing. Likewise, Šarkiūnaitė and Krikščiūnienė (2005) use the SECI model but generalize that a high level of ICT usage positively and gradually affects informal relationships between individuals, which in turn facilitate job-related tacit knowledge sharing.

Among the existing schools of thought discussed above, perspectives from advocators of ICT-facilitated tacit knowledge sharing are reasonable and acceptable. Knowledge cannot be regarded as binary digit, that is, pure tacit or pure explicit. The notion of the “degree of tacitness” or “the degree of explicitness” is more meaningful when examining the type of knowledge shared in a specific context (Chua, 2001; Chilton and Bloodgood, 2010). In addition, constraining tacit knowledge sharing to tacit-tacit conversion (socialization) may not be a complete examination of the tacit knowledge sharing phenomenon through ICT tools. Every type of knowledge, explicit knowledge included, has components of tacit dimension (Polanyi, 1966; Hislop, 2001). Therefore, tacit-tacit and tacit-explicit conversions could be regarded as a tacit knowledge sharing phenomenon (Marwick, 2001; Lopez-Nicolas and Soto-Acosta, 2010; McDermott, 2000; Šarkiūnaitė and Krikščiūnienė, 2005). As mentioned by Panahi (2014), this consideration is missing in most investigations of ICT-mediated tacit knowledge sharing.

**Difficulties of tacit knowledge sharing through ICT**

The conceptualization of tacit knowledge sharing has always been subjected to debate among researchers. Some researchers have identified theoretical, individual, cultural, and technical difficulties regarding tacit knowledge sharing. In fact, Haldin-Herrgard (2000) establishes five difficulties in sharing tacit knowledge: perception, or the subconsciousness of withholding knowledge; language and its limitations in expressing expertise that’s difficult to verbalize; time required to process, retain and internalize new knowledge; value, as some types of tacit knowledge are immeasurable; and distance, where there is a need for face-to-face interaction. Hislop (2002) also highlights the embodied nature of tacit knowledge and how it is embedded in social and cultural values, making it more difficult to be shared successfully. However, he agrees the degree of tacitness is the most significant factor that influences tacit knowledge sharing mediated by the use of ICT. The inherent elusiveness of tacit knowledge, unawareness of holding some kinds of tacit knowledge by individuals, unwillingness to share, fear of losing that valuable knowledge and eventually losing competitive advantage are other issues mentioned (Stenmark 2000) as barriers for tacit knowledge sharing.

Some of the above-mentioned challenges making it difficult to share tacit knowledge, are related to personal willingness and organizational ability to accommodate the sharing process. Factors that are inherently applicable to ICT-assisted tools to share tacit knowledge have been of interest of Panahi et al. (2013). Panahi and his colleagues noted four factors: *sharing mechanisms*, *degree of tacitness*, *richness of media and the issue of social cues* and *lack of trust* to be discussed further below.

Panahi et al. (2013) recalled tacit knowledge nature as unstructured, uncodified knowledge which makes it more complicated than explicit or coded knowledge. That is the reason why face-to-face presence is highly advised whereby *sharing mechanisms* include direct interaction, observation, mentoring and personal experience, to empower the knowledge acquisition process. The authors admit face-to-face contact is the ideal way to share tacit knowledge. However, time and space constraint can make it less opportune as people are not always accessible. People simply do not have access to experts or their colleagues all the time (Panahi et al., 2013). Hence, the authors argue that other ways to share tacit knowledge and practical day-to-day experience are doable using ICT, such as live demonstration and imitation of skills through the use of videos, storytelling and online technical discussions.

Regarding the *degree of tacitness of knowledge* reported as the most critical challenge to impart knowledge using ICT, Panahi et al. (2013) leaned on Ambrosini and Bowman (2001) who suggested tacit knowledge can be different in terms of the degree of tacitness. According to Ambrosini and Bowman, tacit knowledge can encompass deeply ingrained tacit skills with a high degree of tacitness, which may be completely unavailable to the holder; imperfectly articulated tacit skills that cannot be articulated through the normal use of words and may be accessed through the use of metaphors and storytelling; readily articulated tacit skills, which are primarily unarticulated but could be expressed readily if individuals were simply asked the right questions; and explicit skills with a lowest degree of tacitness, which can easily be articulated and transferred using any knowledge sharing mechanisms. Hence, Panahi et al. (2013) concluded that tacit knowledge can range from low to high. They hypothesize that knowledge with a low-to-medium degree of tacitness can be transferred if suitable knowledge sharing mechanisms are used. Furthermore, the degree of knowledge tacitness might vary from person to person. It could be tacit for someone, while, at the same time, the same knowledge could be explicit for another.

*Richness of media and issue of social cues:* Social interaction is the main prerequisite for tacit knowledge sharing (Polanyi, 1966; Nonaka and Takeuchi, 1995; Yang and Farn, 2009; Song, 2009). Social interaction is richer when media supports natural language, immediate feedback, social cues, and social presence for both source and receiver of the message (Chua, 2001; Daft and Lengel, 1986). ICT can support this richer interaction by real-time synchronous communications in forms of spontaneous chatting, commenting, video and text based conferencing, etc. (Marwick, 2001). However, ICT support is not as rich as face-to-face meetings so far (Marwick, 2001; Murray and Peyrefitte, 2007). The absence of certain social cues such as body language, emotional feelings, eye contact and so on are argued to be major pitfalls of most computer-aided communications (Hislop, 2001, Hooff and Weenen, 2004). There is no doubt that IT-facilitated communication is not, so far, as rich as face-to-face contact. However, social cues and direct face-to-face communication are more important when the knowledge shared contains a high degree of tacitness (Chennamaneni and Teng, 2011). For knowledge with a low-to-medium degree of tacitness, people prefer using existing technologies to overcome geographical distance, time, and cost barriers (Gordeyeva, 2010). In addition, with the advent of high bandwidth connections and video conferencing technologies which resemble face-to-face interaction, most caveats concerning ICT richness in tacit knowledge sharing are likely to disappear (Lopez-Nicolas and Soto-Acosta, 2010).

*Lack of trust:* Trust is regarded as one of the essential factors for tacit knowledge sharing (Castelfranchi, 2004; Lai, 2005; Yang and Farn, 2009; Song, 2009; Holste and Fields, 2010). Potential lack of past or future associations and eventually lack of trust among users is viewed as an issue for tacit knowledge sharing in computer mediated communications. Building online communities and increasing communication among individuals is suggested as one solution to increase trust among individuals (Räisänen and Oinas-Kukkonen, 2008). On the other hand, anonymous sharing is viewed as a positive aspect of virtual knowledge sharing where tacit knowledge is risky or when people are not confident enough (Räisänen and Oinas-Kukkonen, 2008; Yi, 2006).

The solution to most of these deficiencies as proposed by some researchers is to create a positive online social environment for interpersonal interactions and knowledge sharing (Šarkiūnaitė and Krikščiūnienė, 2005). However, there are also other issues associated with virtual tacit knowledge sharing such as separation, lack of psychological safety, lack of social obligation to give feedback, and the lack of shared language and understanding

(McKenzie and Potter, 2004). The following section will address the subject of tacit knowledge sharing in an online learning medium.

## 2.7 SHARING AND ACQUIRING TACIT KNOWLEDGE IN E-LEARNING

In the last two decades, many academic and corporate universities have incorporated some kind of online distance learning into their education process. In fact, the advent of new web technologies (Web 2.0) is the root of e-Learning feasibility and is becoming a success. Those technologies such as social web initiatives, synchronous conversation and chatting give tremendous opportunities to facilitate experiential knowledge sharing among students and instructors. However, tacit knowledge sharing in e-Learning is also subjected to many enquiries as e-Learning typifies indirect contacts and reliance on ICT tools for learning and teaching. Moreover, Tee and Karney (2010) noted few studies in the literature have examined tacit knowledge issues in e-Learning environments.

The debate on tacit knowledge sharing in online learning can be reduced to ICT-mediated tacit knowledge. The purpose of this section is to identify a list of studies supporting tacit knowledge sharing in online learning, as well as present mechanisms and enabling conditions that mediate tacit knowledge sharing among learners and instructors.

To conduct the content analysis, the methodology applied by Panahi et al. (2013) to review and analyze the literature has been replicated in this research. The purpose was to review the existing literature about the viability of tacit knowledge sharing through the use of ICT tools in online learning environment in order to demonstrate and identify key research gaps in the field. A prospective set of articles was drawn up by searching popular online databases such as e-Learning, Knowledge Management, EJKM, ProQuest, Ebsco-Host, Emerald, Web of Science, Elsevier, ScienceDirect and Google Scholar/Books. A search query was constructed according to the purpose of the analysis, using keywords and synonyms obtained from known primary studies. Search strings were formulated using "AND/OR" Boolean operators and connectors like "IN". The following is an example of a search query used in the search of databases:

*(Tacit OR experiential OR implicit) AND knowledge AND (sharing OR transfer OR exchange OR dissemination) AND (approach(es) OR mechanism(s) OR method(s) OR way(s) OR technique(s)) IN (((online OR virtual) AND learning environment)) OR e-Learning)*

In searching databases, no time and geographical limitations were imposed. However, an English language limitation was applied to the selected papers and books. The search was not restricted to a particular type of publication to increase the scope of search. Also, references cited from collected papers were reviewed to maintain the relevancy case for analysis. To ensure the quality of papers, cases having less academic rigour, having not been published in peer-reviewed scholarly publications, or having inadequate discussion of the topic under review, or just briefly touching the topics that were discarded from the sample.

In the selected literature, Falconer (2006) disagreed with previous studies asserting tacit knowledge sharing cannot be facilitated by ICT. Based on the new development of ICT tools, such as social media types of tools in e-Learning, she positions ICT as an effective medium for exchanging tacit knowledge and praises the growth of e-Learning as evidence of fulfilling that fundamental objective of learning and training which is sharing and gaining new knowledge. Similarly, Hildrum (2009) also challenges the widespread argument that ICT-mediated communication is inadequate for the sharing of tacit knowledge. Drawing upon an original case of e-Learning in Cisco System, the researcher's main conclusion is that advanced e-Learning systems make possible the efficient sharing of tacit knowledge between internationally dispersed technicians. He asserted:

> "If ICTs are really inadequate as a means of diffusing tacit knowledge, it is peculiar that Cisco's extensive network of remote labs continues to exist and grow after eight years of operation. Although the knowledge shared in Cisco's remote labs represent a very small part of Cisco's total knowledge base, the experiences from remote labs still represent an important counterexample to the claim that face-to-face interactions are indispensable for interpersonal sharing of tacit knowledge." (Hildrum, 2009, p. 214).

With the growing interest in e-Learning research and practice, other studies have been conducted to identify factors, approaches, mechanisms, techniques and conditions that could facilitate or ease the success of tacit knowledge sharing in an online learning environment.

### 2.7.1. Facilitators for Sharing and Acquiring Tacit Knowledge in e-Learning

E-Learning growth and wide adoption have been the direct consequence of the advancement of web tools facilitating direct and synchronous chatting, web conference, live discussions and collaboration and so on. The proliferation and integration of social networking tools, multimedia sharing tools (podcasts and vodcasts), wikis, to name a few into e-Learning have been widely popular and increase interaction between online learners and tutors. Panahi et al. (2012a, 2012b, 2013) and Panahi (2014), investigating social web tools and tacit knowledge sharing, hypothesize that five factors are required to facilitate tacit knowledge via those tools: *social interaction*, *experience sharing possibilities*, *observation*, *informal relationship* and *networking*, and *mutual trust*.

Panahi and his colleagues' findings align with the general challenges of online learning success presented in the section 2.2.3. Focusing on tacit knowledge sharing, the authors confirm that any progress of ICT tools will not automatically wipe away the pitfalls inherent to online learning, but highlight the need for a guide and procedures to establish the five conditions seen by them as the guarantors of tacit knowledge success in any social media space. However, Panahi and his colleagues' work is essentially descriptive, presenting only arguments and counterexamples that refute the thesis that tacit knowledge sharing cannot be effective via ICT and revealing the five factors cited above. Panahi (2014) amplifies the previous findings with his team by investigating empirically in the healthcare sector. The author interviewed physicians to confirm the positive role played by social web tools to share their tacit knowledge. Nonetheless, the effectiveness of tacit knowledge sharing from individual perspectives is still blurred simply because the amount of tacit knowledge an individual or a novice can gain from expert instructors in such condition has not been examined.

Hildrum (2009) suggests tacit knowledge sharing success on the web depends crucially on the degree to which students are motivated to acquire new knowledge. He emphasizes motivation can be facilitated through collaboration and participation in Networks of Practice that refers to an overall set of various types of informal, emergent social networks that facilitate information exchange between individuals with practice-related goals. However, in order to access and benefit from those networks, students require a certain threshold level of relevant knowledge as it is in any Community of Practice.

After demonstrating the positive role and contribution played by ICTs in sharing tacit knowledge and revealing favourable factors and conditions, some studies have been conducted to find better approaches and techniques to leverage tacit knowledge management in online learning. In general, these studies advocate and promote knowledge management and e-Learning synergy.

### 2.7.2. Leveraging Tacit Knowledge Cultivation and Retention in e-Learning

As mentioned above, many institutions and companies are now applying online learning for teaching and training. organizations exploit online learning platforms to train employees in order to pass on organizational knowledge and experiential skills to get them ready and productive. Similarly, universities facing tough competition have been improving their curriculum to meet the demand and requirement of learners who are more attracted to apprenticeship or mentoring programs to gain direct hands-on and employable skills. Shifting to an online learning medium is definitely adding another burden to those adopters and providers trying to establish the credibility of their online programs and processes to fulfil student expectations and to forge students' practical performance.

To leverage tacit knowledge diffusion among novices and experts in online learning, many researchers have suggested combining Knowledge Management and e-Learning forces. In fact, both fields s have been the subject of a great deal of literature and have experienced significant development and growth, separately. However, it has been noted that both are concerned with the creation, acquisition, capture, sharing and use of knowledge. Therefore, to promote and enhance tacit knowledge creation and dissemination, there has been a vast adoption of Knowledge Management strategies into e-Learning, labelled as Knowledge Management and e-Learning synergy (Ubon and Kimble, 2002; Liebowitz and Frank, 2010, 2011). Advocates that justify Knowledge Management are concerned about managing both tacit and explicit knowledge effectively and efficiently, while e-Learning is all about garnering new knowledge. In that sense, the authors claim applying Knowledge Management strategies, tools and techniques will potentially enhance online learning experience. However, applying the right mix of Knowledge Management tools and techniques is vital.

- **Knowledge Management**

The concept of Knowledge Management encompasses any processes and practices concerned with the creation, acquisition, capture, sharing and use of knowledge, skills and expertise (Swan et al., 1999; Ubon and Kimble, 2002). With the rise of the new knowledge economy, Knowledge Management has been established and applied as the discipline to facilitate the spreading of knowledge to individuals or groups, across organizations, in ways that directly affect performance. In fact, the rise of Knowledge Management has similar parallels with the rise of English as an academic discipline Jashapara (2004, p. 8).

Rowley (2000) asserted "...organizations that succeed in knowledge management are likely to view knowledge as an asset and to develop organizational norms and values, which support the creation and sharing of knowledge". Established as an independent discipline, theories and practices encompassing techniques, strategies, tools, and mechanisms have been developed as a guide to leverage knowledge in a system.

Among Knowledge Management tools, strategies and techniques; proponents of Knowledge Management applications in online learning suggest possible tools and techniques that can be applied to leverage the flow of tacit knowledge among students and instructors (Ubon and Kimble, 2002; Woelk and Agarwal, 2002; Liebowitz and Frank, 2011).

**Knowledge Management Tools**: technologies are always regarded as effective Knowledge Management tools in managing and transmitting explicit knowledge in the online learning community. Yet, technologies such as videoconferencing and collaborative groupware enable better teacher to student, as well as student to student, interaction within a Virtual Learning Environment. In fact, three types of interactions exist in online learning: teacher to student, student to student, and student to content. Teacher to student and student to student interactions have been found to be the most important towards tacit knowledge sharing (Sher, 2009; Chao et al., 2011).

Applying Knowledge Management tools properly reduces time and space constraints. Advanced technologies, such as videoconferencing and chat rooms, allow learners to discuss over synchronous, interactive media, and increase the level of interactivity in online communication. This should increase the sense of trust, identity and commitment, making students and instructors more comfortable and willing to collaborate, and share their tacit knowledge.

**Knowledge Management techniques**: Ubon and Kimble (2002) warned that "using Knowledge Management tools to solve the problems in online distance education is just one part of the equation. Technology alone is not enough to create trust and personal context necessary to achieve a true network". Therefore, Knowledge Management tools must be supported with techniques to help achieve a greater result in knowledge sharing within the online learning community. The authors suggest Knowledge Management techniques must encompass two managerial perspectives: *process management* and *space management*. Process management is concerned with the configuration of an online environment that would encourage learners and instructors to generate, share, and use knowledge easily. For instance, this may involve introducing a reward system to motivate participants in knowledge creation and sharing (Ubon and Kimble, 2002; Hildrum, 2009). It may also involve monitoring and ensuring each student has equal opportunity access to the sources of knowledge.

From space management perspectives, the online learning environment should be designed in a way that makes it simple and easy for students to become acquainted with other peers. In such conditions, students will start to develop a shared understanding and common language, which is essential to productive knowledge transfer (Ubon and Kimble, 2002). Students subsequently develop identity, trust and commitment; and share their knowledge with others. Finally, the common ground students possess in the online learning community, may help reduce linguistic and other cultural barriers as they can easily understand *"what"* other members want and *"why",* according to the researchers.

**Communities of Practice and Knowledge Networks**: the role of teams in the modern organization and their function in tacit knowledge management is clearly important (Jorgensen, 2004). In a given project, groups of people working together tend to collaborate closely and share their knowledge. The composition of the team is also vital as it will have an impact on the likelihood of knowledge transfer (Busch, 2008). Some argue that disparate teams can negatively influence the dissemination of knowledge, insofar as "people tend to feel part of a social group (functional) to which they assign superior or at least more positive, characteristics, skills and knowledge, with a tendency to assign negative characteristics to other groups" (Camelo-Ordaz et al., 2005). Though such negativity may be true at the inter-team level; at the intra-team level, others claim heterogeneity along the line of intellectual and occupational background may in fact increase knowledge creation and transfer in novel ways (Busch, 2008).

It is not irrational to consider communities as teams on a larger scale. The term Community of Practice coined by Lave and Wenger (1991) refers to "...an activity system about which participants share understanding concerning what they are doing; as well as what that means in their lives and for their community" (p. 98). The authors' Community of Practice model with its foundations in apprenticeships is well cited in the existing knowledge management literature (Venkitachalam and Busch, 2012). For instance, Hustad (2004) noted that the Community of Practice model has a number of variants, including communities of knowing (from Boland and Tenkasi, 1995), communities of practitioners (from Blackler, 1995) and micro-communities of knowledge (from Von Krogh et al., 2000). Along the same line, Rogoff (1994) presented the Communities of Learners. Rogoff's idea of a Communities of Learners is based on the premise that learning occurs as people participate in shared endeavours with others, with all playing active roles.

The inspiration behind Communities of Practice is to provide personalised tacit knowledge sharing (Venkitachalam and Busch, 2012). Venkitachalam and Busch provide an example of John Deere tractor manufacturing firm that confirms applying hundreds of Communities of Practice within the organization for enabling knowledge. Those Communities of Practices are supported through systems such as *MindShare*, in which videoconference, e-mail and discussion groups are fully integrated (Desouza and Evaristo, 2004).

Another widely examined tacit knowledge associated phenomenon in a team environment is that of knowledge networks. Knowledge, but particularly tacit knowledge, is sticky by nature (Bush and Tiwana, 2005; Jensen, 1993; Ramaprasad and Rai, 1996; Polanyi, 1966). In this regard, Sternberg et al. (1995) claim the more valuable the tacit know-how, the less likely the individual, team or organization will want to lose it or transfer it out. Studies indicate that sharing of knowledge and particularly tacit knowledge causes the team or individual to become less important to the organization (Desouza and Evaristo, 2004). Additionally, the more that is invested in building up a knowledge network, the less likely the abandonment of this precious resource will be contemplated (Bush and Tiwana, 2005). Moreover, the composition of the network is also of direct relevance to the "stickiness" of knowledge.

All knowledge management tools, techniques and approaches presented above could potentially and positively address and mitigate online learning issues in order to enhance tacit knowledge sharing among participants. However, none has addressed in great detail the course content that defined the basis and the scope of collaboration and interaction in online learning.  Ubon and Kimble (2002) gave a direction by mentioning space management to consider as the way the environment has to be designed and organised to facilitate acquaintances and collaboration in the subject. Therefore, online learning content has to be prepared, designed and set up in a way that will easily facilitate knowledge sharing initiatives.

- **E-Learning Content Design**

Designing study materials that engage students and potentially get them active to learn and exchange with others is crucial. This aligns with finding and defining consistent instructional design strategies to apply within an online learning community to encourage interaction and commitment. Tee and Karney (2010) revealed that online content in online learning plays an important role as it encourages processes and creates conditions consistent with Nonaka and his colleagues' SECI model of knowledge creation and the concept of *ba*, or shared context. According to the authors, online content is the common ground of students and interaction; and the guide encourage them to share and to construct knowledge through socialization and externalization. The design of the online course is therefore vital. Advocators of knowledge management and e-Learning synergy have promoted the design of online learning content into small chunks known as 'Learning Objects'.

**Learning Objects**: are operationally described as interactive web-based tools that support the learning of specific concepts by enhancing, amplifying, and/or guiding the cognitive processes of learners (Agostinho et al., 2004; Wiley et al., 2004).

***Learning Object background***: as presented in the section 2.2, behaviourist, cognitivist, constructivist, and connectivist theories contribute, and continue to be used, to produce online learning materials. The strengths of each are combined to attain greater value from the resulting online learning content. According to Ally (2004), behaviourist strategies focus on teaching the facts (*what*); cognitivist strategies emphasize the principles and processes (*how*); and constructivist strategies teach the real-life and personal applications and contextual learning. Connectivism strategies look at the development and setting of the online learning community. Those learning theories have certainly influenced online learning instructional design defining the practice of creating instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing. Instructional designers seek to produce a simple, interactive, focused and specific learning content to make it easy to handle for learners. As a result, the concept of the Learning Object has been welcomed and adopted.

Learning Objects are increasingly popular. This popularity is evidenced by the number of them repositories available. MERLOT (Multimedia Educational Resource for Learning and Online Teaching) has one of the largest collections. This popularity has grown, despite a lack of consensus on what exactly constitutes a Learning Object (Francis and Murphy, 2008).

The literature is comprised of various definitions of "learning object". According to Wiley (2001, p .6), a learning object is "any digital resource that can be reused to support learning". Sosteric and Hesemeier (2004, p. 40) present a learning object as "a digital file (image, movie, etc.) intended to be used for pedagogical purposes, which includes, either internally or via association, suggestions on the appropriate context within which to use the object".

From a broad point of view, learning objects are grounded in the object-oriented paradigm of computer science programming (Wiley, 2001). Object-orientation highly values the decomposition of anything; system, program, problem, tasks, etc; big into small bits that could be easily managed and potentially reused whenever needed in future. Thus, the same idea is replicated valuing the creation of components, called "objects", that can be reused (Dahl and Nygaard, 1966 cited in Francis and Murphy, 2008) in multiple contexts. This is the fundamental idea behind learning objects that is building instructional components relative to the size of a course, that can be reused a number of times in different learning contexts.

Learning Objects are generally meant to be digital entities distributed over the internet, so as to allow students to access them simultaneously. They can also collaborate on and benefit instantly from updates. These are significant differences between learning objects and previous educational media. In that sense, learning objects facilitate participants' interaction and increase the focus of attention on learning. Liebowitz and Frank (2011) argued that learning objects also improve both the retention and transfer of knowledge; and could solve a major concern of e-Learning as reported by Geri (2012) insofar as "student retention is one of the major challenges of distance learning".

***Learning Objects structure and composition***: Despite the adoption of learning objects, their structure and composition is still open to interpretation (Balatsoukas et al., 2008). Different theoretical views advocate disparate approaches to structure and aggregate learning objects. In practice, content specifications for online learning such as SCORM and IMS Content Packaging do not provide granularity of learning content. The prevailing suggestions are presented below.

Downes (2003) argues that an important characteristic of a learning object is its size, which provokes disagreement. The giant, Cisco Systems, recognised by the international success of their online training systems based on learning objects, addresses the size issue by emphasising its content combination instead, comprising text, video, images and photos (Barron, 2002). Other researchers tackle the size issue of learning objects from the instructional time-based angle. That group of authors suggests that the size can be defined in terms of 15 minute to two hour learning experiences (Downs, 2003; Mortimer, 2002). In contrast, Currier and Campbell (2005) and Polsani (2006) refutes both learning time and physical size as a valid criterion of the granularity of Learning Objects. They postulate that logical size rather that physical size is more appropriate.

Other views that emerged on the structure of learning objects includes Metro's suggestion (2005, p. 2) that Learning Objects must include a learning objective, a practice activity and an assessment. This view has been backed by Mortimer (2002) who argues that Learning Objects should include metadata, a teaching objective and the actual content, as well as activities and assessments that support the specified objective.

***Learning Objects issues:*** There are a number of issues in employing learning objects to facilitate learning (Wiley et al., 2004). In fact, the debate and disagreement on the conceptualization of a Learning Object is misleading; and compromises the implementation and application of the concept in online learning. Critics suggest that learning objects claimed to be derived from the object-oriented paradigm is more technical than pedagogical. Despite the hype and the advantages of such a paradigm into learning objects, opponents argue that learning objects are free of any pedagogy and do not facilitate learning from the end-user perspective.

Additionally, reusability of learning objects is a feature cited in almost every description and definition of learning objects. Reusability matches with commercial slogan *"create once, sell for reuse many times"* (Wiley et al., 2004) stipulating the ability to reuse, to move and integrate the Learning Object from one learning system to another. Again, this attribute fails to convince and to provide positive effects on the student learning experience. Instead, reusability advocates context-free learning content (Friesen, 2004) covered in great detail on the issues surrounding the learning objects paradigm and confirming those revealed above. Furthermore, the author concluded: "... most importantly for e-Learning content and standardization, it is important to recognise that objects and infrastructures for learning cannot simultaneously be both pedagogically neutral and pedagogically valuable. Developers and designers will have to recognise and choose relevant (and probably differing) pedagogical positions, or risk pedagogical irrelevance."

Wiley et al. (2004) acknowledged the limitations and concerns over the Learning Object's ability to fulfil learning objectives and empower students. Researchers then suggest ways to overcome each of the issues. For instance, to deal with the reusability paradox, the author suggested a guiding question to use with the subject-matter expert. It involves asking an expert "can you ever imagine wanting to teach some portion of this topic without teaching the others?" When the answer is "no", the remaining sets of the topic is scoped as a single learning object.

Despite the initiative to tackle issues in learning objects, a new movement towards Knowledge Objects has also emerged.

***Transforming Learning Objects to Knowledge Objects***: Most of the definitions and principles that govern the concept of Learning Objects are shaped around reusability, learning intent, and context-independence. A typical example can be found in the study of Polsani (2006) who suggested that "an independent and self-standing unit of learning content that is predisposed to reuse in multiple instructional contexts". There are many applications of learning objects. In fact, Longmire (2000) asserted that: "Building an entire course of study around these learning objects can satisfy both immediate learning needs, as in a knowledge-based or skills-based course, and current and future learning needs that are not course based" (Longmire, 2000).

The Web-Based Training Information Center (2009) stated that learning objects will have the biggest impact on online learning in the coming years. The goals of learning objects are: reusability, interoperability, durability and accessibility. However, Lytras et al. (2005) and Merrill (1998) alleged learning objects that possess tacit knowledge characteristics have a positive influence on learner development. Unfortunately, all these concepts have not been the subject of experimental testing and validation. Therefore, they remain purely descriptive and theoretical.

Moreover, Liebowitz and Frank (2011) believed that by replacing Learning Objects with Knowledge Objects within the online learning environment, learning will become more powerful and agile. The authors advocated that if learning objects are transformed into

Knowledge Objects whereby a student has access to interactive pools of knowledge, then the student can augment personal knowledge and deepen specific knowledge through these knowledge bases.

**Knowledge Objects**

Knowledge Objects have been implemented in Tsinghua University in China. The university's Digital Teaching Reference Book System was designed and assembled by using Knowledge Objects (Zhang and Li, 2006). The creation and reorganization of Knowledge Objects serve as the knowledge elements in teaching reference materials.

According to Liebowitz and Frank (2011), a Knowledge Object is a learning object enriched with interactive pools of knowledge that refers to a Network of Practice that stimulates collaboration and participation and, increases the profit of new knowledge provided that the student accessing it has a certain threshold level of relevant knowledge (Hildrum, 2009). This unveils the notion that the Community of Practice that should be linked with the Knowledge Object.

The composition of Knowledge Object described entails three types of interactions along the line with Moore (1989): *student - student*, *student - instructor* and *student - content*. Therefore, it will be necessary and essential to develop knowledge taxonomy and ontology, to allow a stronger shared vocabulary and understanding during collaboration amongst students and instructor (Liebowitz and Frank, 2011). The effectiveness of learning depends upon the provision that the interaction among participants is formatted. This means that interaction between two learners, for example, should be performed following a formal method to prevent any meaningless chatting (Chao et al., 2011).

Also called learning Knowledge Object in other disciplines (artificial intelligence, intelligent tutoring systems), Zouaq et al. (2007) suggest a more dynamic generation and administration of Knowledge Objects to learners according to their need and level of understanding. The authors advise to integrate a comparison layer on the learners' competence before generating learning knowledge. This involves checking the competence requirements before administering the Knowledge Object to ensure its effectiveness to the learner. This aligns with the concept that a threshold of knowledge should be possessed before joining a Community of Practice to reap the benefits of interaction and knowledge exchange. This also aligns with the notion of absorptive capacity defined as the capacity to identify useful knowledge, internalize and apply it (Cohen and Levinthal, 1989, p. 569-596).

**Summary**

Venkitachalam and Busch (2012, p. 365) noted that: "Advocates and critics suggest the influence of information technology in the Knowledge Management field support codified knowledge rather tacit knowledge. Yet, there is evidence in the current literature that presents the use of technologies and applications to support the articulation and flow of tacit knowledge between individuals." The literature on tacit knowledge sharing, assisted and facilitated with ICT tools, as well as tacit knowledge exchange in a complete virtual space such as an online learning environment, is increasingly growing. Despite the lack of common consensus regarding tacit knowledge per se as well as the potential role of ICT in sharing that kind of knowledge, some researchers shared a similar opinion,from a general organizational perspective, on the phenomenon; and investigated more fully, suggesting ways and means to maximize tacit knowledge creation and exchange among individuals in an online learning environment as shown in previous sections.

Although there are practical examples indicating success in the adoption and implementation of the concepts and ideas suggested in order to facilitate tacit knowledge gain and diffuse it among novices and experts; there is a scarcity of studies that examine how much tacit knowledge a novice can gain in that online learning condition. Insch et al. (2008) noted researchers have linked tacit knowledge to organizational performance assets, but research on how to measure tacit knowledge is lacking. In fact, researchers tend to justify the growth of online learner performance and expertise by using measurements that are not meant to test tacit knowledge (know-how) but instead gauge the academic or explicit knowledge (know-what). Therefore, it is crucial to expand this chapter to understand and review how to measure tacit knowledge. This next section is important as it discusses the feasibility of the measurement of tacit knowledge.

## 2.8 TESTING FOR TACIT KNOWLEDGE

The investigation and measurement of tacit knowledge has gained popularity in research but are dissatisfactory because discussions of tacit knowledge show much ambiguity over key tenets of the concept. Divergent opinions of the definition and existence of tacit knowledge make it difficult to reach a common agreement on how to operationalize and measure such knowledge when compared with other explicit knowledge. For example, Busch (2008) listed in his book, in appendix A, thirty three different definitions of tacit knowledge from several authors since its origin from Polanyi (p. 338-371). This is to show the complexity of developing a universal way to measure tacit knowledge since there are so many contradictory views.

Gourlay (2004) examined how tacit knowledge has been applied in empirical research and found eight different uses of the concept, where six are related to individual level and two are related to the collective level of tacit knowledge. Focusing on individual level of tacit knowledge, Gourlay said that some of the uses of tacit knowledge actually refers to "...explicitly known knowledge, or stretch the meaning of the phrase beyond credulity". He then recommends tacit knowledge "... be used where it can clearly be inferred that actors' behaviour depended on knowledge of which they were unaware", furthermore the author stresses that "Such knowledge can arise prior to or in a practice".

Remarkably the vast majority of studies on tacit knowledge do agree that tacit knowledge contributes to successful performance in a variety of fields. It may be unwritten knowledge, hard to articulate, residing in a person's head and also considered as implicit knowledge or even subconsciously embedded in people. However, it is also recognised as action oriented and practical knowledge that enables an individual to achieve their goals. Therefore, existing mechanisms that measure tacit knowledge tend to look at individual practical knowledge close to the assessment of real-world competency.

Studies digging into the testing for tacit knowledge at the individual level tend to be done by psychologists. The outcome of their work has been beneficial in improving the intra-organizational welfare of companies (Ramaprasad and Rai, 1996). For instance, it has now become common for all types of professional organizations to implement practical, largely tacit, knowledge tests to assess potential employees' knowledge in relation to soft knowledge situations (Coates, 2001 cited by Busch, 2008, p. 80). These tests are largely along the lines of enquiring into an employee's experience and ability to fit into the organization rather than an enquiring of the candidate's codified knowledge per se. Tacit knowledge is not considered to be intelligence tests in disguise (Busch, 2008; Insch et al., 2008; Somech and Bogler, 1999). Tacit knowledge should not be evaluated as academic intelligence.

### 2.8.1. Practical Intelligence versus Academic Intelligence

Somech and Bogler (1999) noted that tacit knowledge research is mostly found when discussing job performance and management. This aligns with the definition of tacit knowledge of psychologist as “action-oriented knowledge, acquired without direct help from others that allows individuals to achieve goals they personally value” (Sternberg et al., 1995). It could be confusing on the type and construct to predict job performance, Somech and his colleague, recalled that to predict academic success, one should seek information about students’ SAT scores, psychometric test scores and other measures of intelligence although they can be argued. However, to predict job performance, intelligence test scores would not suffice and other criteria should be sought such as measures of tacit knowledge or practical intelligence acquired throughout life.

Tacit knowledge, seen as a critical ingredient of job success and performance in management, healthcare, leadership and so on, presents one aspect of the concept of practical intelligence. Sternberg and his colleagues define practical intelligence as “a person’s ability to apply the components of intelligence to everyday life” (Sternberg, 1993, p. 518). It is based on procedural information relevant to one’s daily life (Sternberg and Wagner, 1989). However, from the view of Somech and Bogler, practical intelligence and tacit knowledge terms can be used interchangeably and no distinction is made between either term (Somech and Bogler, 1999, p. 606). According to Wagner (1987), the concept of tacit knowledge is used to describe practical know-how. In addition, Schmidt and Hunter (1993) argued that practical intelligence is a general concept that embodies tacit knowledge.

The concepts of practical intelligence and tacit knowledge are similar to the concepts of academic intelligence and formal academic knowledge, respectively (Sternberg et al., 1995). Somech and Bogler (1999) contrasted the two notions. The authors revealed that “an academic intelligent person has come to be so regarded because he or she has acquired formal academic knowledge and has been tested through a wide range of intelligence and aptitude tests. By contrast, the practical intelligent person has acquired tacit knowledge that has been tested through various real-world events but is not predicted through conventional intelligence tests”.

Within different studies, Sternberg and his team revealed that there is no correlation between practical intelligence and academic intelligence (Sternberg, 1985; Sternberg et al., 1993). Scores on tacit knowledge tests were correlated at 0.4 with measures of job performance but did not yield any correlation with measures of psychometric intelligence (Sternberg, 1993). Therefore, the authors concluded that “the majority of variance in real-world performance is not accounted for by intelligence test scores” (Sternberg et al., 1995, p. 913) but by other measures such as practical intelligence or common sense. An academic test that measures the ability to solve academic problems will result in a high probability of predicting academic performance and low probability for job-related performance (Somech and Bogler, 1999, p. 608).

Table 2.5 summarizes some attributes of the type of knowledge required for academic intelligence and practical intelligence.

*Table 2. 5 Knowledge characteristics of academic and practical intelligence*

| Characteristic | **Academic intelligence** | **Practical intelligence** |
|---|---|---|
| Essence | Content and rules | Norms |
| Organization and access | Formal and open | Informal and often tacit |
| Knowledge transmission | Reading and listening | Observing and modelling |
| School’s attitude | Valued | Devalued |
| Measures of evaluation | Conventional ability tests | Stimulation |

Source: Extracted from Somech and Bogler (1999)

Nonetheless, Somech and Bogler (1999) argued that people who have tacit knowledge added to academic knowledge will have better job success than their counterparts who lack tacit knowledge. Students with tacit knowledge will apply practical knowledge throughout their learning experiences and processes, which will result in improvement in their academic achievement. The authors explained that students with practical intelligence will choose to study with tutors who have traditionally granted students high grades; they will also consult with senior students about course requirements and expectations; see the teaching assistant and the course instructor during office hours and at the end of the lecture; and consult with administrative staff to acquire helpful information.

Furthermore, Somech and Bogler (1999) demonstrated that the possession of tacit knowledge increases academic performance, learning and achievement. However, the opposite wouldn't be true, since a student who has good academic grades may not necessarily have the right tacit knowledge. The authors’ work has then confirmed the claim that tacit knowledge is vital to academic success and job performance. However, the non-retroactivity of the relation between tacit knowledge and academic performance, means the methods and technique used to measure or assess academic performance are not suitable and relevant for tacit knowledge testing. Tacit knowledge testing deserves its own assessment metrics (Insch et al., 2008).

### 2.8.2. Approaches of Testing for Tacit Knowledge

Difficulties in measuring tacit knowledge are directly related to the lack of clarity in visualizing the concept. In a review of the literature, Gourlay (2006) identified six ambiguities associated with the conceptualization of tacit knowledge: it is both individual and collective; it is acquired through experience but also innate; it is acquired with or without the presence of others; it is a form of practical intelligence whilst also being defensive, naïve or belying incorrect theory; it facilitates routine behaviours whilst also being a source of innovation; and it may or may not be converted to explicit knowledge.

Many studies treat tacit knowledge as an individual level phenomenon where the concept of tacit knowledge is closely related to skill learning (Polanyi, 1966) and to expertise where "tacit knowledge distinguishes more successful individuals from less practically successful" (Sternberg et al., 2000, p.105). Busch (2008) cited Sternberg and his team saying "One of the major hurdles to tacit knowledge related research stems from its soft nature which, by definition, does not lend itself easily to articulation and therefore measurement. Sternberg… and his research team shows us that tacit knowledge is able to be tested for, where a majority of researchers seems typically to be content with discussing its existence." (p. 7).

One other ambiguity from Sternberg et al. (2002) about tacit knowledge is that tacit knowledge "is acquired [in the face of] low environment support" (p. 207). This is actually important to address in the context of this study. Sternberg and his team's statement adds confusion similar to the "unconscious awareness" factor to the tacit knowledge holder in many studies. In this specific case, Gourlay (2006a) criticises and suggests we should be talking and attempting to measure tacit knowledge where it can clearly be inferred that candidate's behaviour depended on knowledge of which he/she was unaware. Regarding Sternberg and his team's statement, Busch's (2008, p. 6) specifies that we do not receive much help as an individual in acquiring such knowledge. Busch also emphasized that tacit knowledge is gained either through personal experience over time and place or by serving in an “apprenticeship” with someone who is senior and able to pass on the tacit knowledge to the trainee (Goldman, 1990). This study subscribes to Busch’s clarification and argues that Sternberg and his team’s statement is not problematic for the interest of the research. This is also justified by the fact Sternberg and his team’s subsequent works and other followers infer tacit knowledge by looking at an indicator associated with it and its professional practical expertise. The study involves measuring students’ tacit knowledge at the individual level gained from exposure and intervention of subject matter experts without face-to-face contacts as this latter aspect (absence of co-presence) is at the centre of contention about tacit knowledge sharing capability online. Methods adopted to test for tacit knowledge in this research are discussed and justified in the research methodology chapter after the review provided in this section.

With tacit knowledge, as a mental capacity or psychological characteristic, a difference is bound to exist. In fact, even people who have the same skills, possess differences in tacit knowledge. Of course, tacit knowledge has a subtle characteristic and, therefore, its measurement cannot be as easy as the measurement of any physical attribute of an object. We cannot measure it directly but we can only speculate on the level and characteristics of individuals’ tacit knowledge through some special methods (Zeng et al., 2016).

Approaches that have been adapted as a means of empirically testing for tacit knowledge started with Larkin (1980) in the late 1970s. In general, the tactics tend to codify the tacit knowledge problem solving process, or determine how subjects undertake the completion of tasks for which not all instructions are necessarily obvious to the uninitiated.

**Approach of Larkin (1980)**

Larkin’s (1980) approach considers a single participant at the time and seeks to study the tacit knowledge based approach the candidate uses to solve problems, the details of which are captured by a non-automated program. The processing model achieved does not necessarily include the temporal data that indicates at which point in time a certain step in solving the problem is achieved, nevertheless the main steps are “captured”. Running the program performs a “trace” which duplicates as closely as possible how the candidate attempted the problem-solving exercise. A comparison is then made with the candidate’s original protocols. The testing then takes place once again with a different set of data variables. In conclusion Larkin (1980) identifies four main stages in the explanation of the tacit knowledge: assembly of information from the problem; planning of the problem solution; solving the problem; and checking of the solution. Larkin's approach is very time consuming.

**Approach of Scott (1992, 1990)**

Scott (1992, 1990) used a triangulated combination of: interviewer – administered survey – questionnaire, participant observation method and day – to – day observation of the work conducted by nurses. The work conducted was ethno-methodological in its approach in which the researcher immerses herself in the hospital environment which could lead to extensive biases.

**Approach of Reed, Hack and Lockhead (1993)**

Reed, Hock and Lockhead (1993) conducted research on the effect of tacit knowledge on visual scanning. Researchers conducted two experiments with an aim to test participant ability to determine the length of images they were shown. In the first experiment, participants were split into two groups. "Subjects in both the perception and image groups participated in two tasks. For the perception condition, six of the subjects did the scanning task first and the other six did the length estimation task. … The task was designed to study how well people can estimate the lengths of lines … For the image condition, the other 12 subjects followed the same procedure as the perception group, except that the patterns were presented for only 0.5 sec and the subjects were instructed to base their judgements on a visual image of the pattern" (Reed, Hock and Lockhead 1993, p. 139).

The second experiment followed along the same lines of the first except that participants themselves estimated the time required for scanning the patterns without actually being required to scan the patterns. The results of the experiments seemed to indicate, "scanning a maze should take longer than scanning a spiral and scanning a spiral should take longer than scanning a line … it appears from the data … that tacit knowledge is inadequate to account for all mental scanning data" (Reed, Hock and Lockhead 1993, p. 142-143).

**Approach of Reber (1993), Reber (1989), Reber and Lewis (1977)**

Reber bases his work on tacit knowledge in relation to implicit learning. Reber and Lewis conducted experiments in which participants were asked to solve anagram puzzles based on the syntax of an artificial grammar. Over time, participants would slowly become more competent in articulating the rule system in use. The experimentation was individualistic in nature insofar as testing was conducted at the individual level. The sample population was composed of undergraduates. The testing was psychological in nature. The empirical tacit knowledge research was aimed at the explanation of tacit knowledge, in other words articulating grammatical rules for how anagram puzzles were solved. Similar research had also been conducted on attempting to get expert chess players to explain their moves (DeGroot 1965 in Reber 1993). Two major approaches were adopted. Firstly, grammar learning; and secondly, probability learning. The former approach involves "an acquisition phase, during which subjects acquire knowledge of the rules of the grammar, and a testing phase, during which some assessment is made of what they have learned" (1993, p. 220). The latter approach incorporates the subject observing a sequence of rapidly presented events and then a testing phase at which stage the subjects make predictions based on the probability of a certain event taking place. The conclusions from the research seemed to be that "the operations of implicit learning are shown to take place independently of consciousness; their [the subject's] mental products have been demonstrated to be held tacitly; their functional controlling properties have been shown to operate largely outside of awareness" (1993, p. 233).

**Herbig et al. (2001)**

Herbig, Büssing and Ewert (2001) explore the tacit knowledge dimension within the nursing field. Somewhat more similarly to the Sternberg approach, which will be explored next, Herbig, Büssing and Ewert (2001) adopt a workplace-oriented approach to examining usage made of tacit knowledge, in this case, by nursing practitioners. A study involving 16 experienced nurses was conducted with the research questions comprising: "do nurses who successfully deal with a critical nursing situation differ in their tacit knowledge from nurses who less successfully deal with the same situation; what kind of difference between these two groups can be found and how do they relate to experience – guided working?" In essence, the work is based on the Delphi method, however, to some extent, the approach follows the simulation technique proposed by Frederiksen (1966).

As with a Sternberg-based approach to tacit knowledge testing, critical workplace situations are articulated by experts on the subject, whereupon significant incidents are prioritised into actor 'scripts'. The explanation process was along the line first promulgated by Kelly's repertory grid technique (1969 in Herbig, Büssing and Ewert 2001; Kelly 1955) whereby the individual is considered to subjectively construe his or her own world and has the ability to provide feedback with more details than would ordinarily be the case with interviews and questionnaires. Novices are then ‘trained’ on the basis of these scripts to act as patients with certain ailments. The nurses are then presented with a brief patient record, whereupon the actors, both nurses and patients, ‘act out’ the patient nurse scenario relating to the illness the patient apparently has. The actions taking place in the scenario are video recorded in combination with a half-structured interview. Results are then able to be determined in relation to the extent to which nurses are drawing upon their tacit knowledge to deal with medical situations. The results seemed to indicate that “the unsuccessful nurses in contrast to the successful nurses seem to have a sequential organization of their tacit knowledge and seem to use a sequential – analytical procedure in dealing with the situation. This sequential organization is compared to the concept of experience-guided work which includes a holistic perception of the situation.” (p. 694).

**Sternberg et al.**

Sternberg et al. (2000, p. 223) stated, “tacit knowledge appears to reflect a single underlying ability, which we label practical intelligence”. Arguably the greatest amount of empirical tacit knowledge-based research has arisen out of the Yale based psychology group under the directorship of Professor Robert Sternberg. And whilst Sternberg may have his critics, he is very well known and accepted for his tacit knowledge related research within the psychology community.

In order to understand the Sternberg approach to tacit knowledge research, it is necessary to bear in mind the open acknowledgement made by the group at Yale in relation to what they consider to be tacit knowledge, “practical know-how that rarely is expressed openly or taught directly” (Oxford English Dictionary 1933 in Wagner and Sternberg 1991a). The Sternberg group concedes that what they are testing is “management knowledge”; whether this is of management of oneself, others, or one’s career; whether the tacit knowledge relates to a local context, or a global context; whether such knowledge is of an idealistic orientation (‘ideally how good is a solution’), or of a more practical persuasion (‘just how workable is a solution’, or what would you actually do in this situation).

The Sternberg’s approach to test tacit knowledge is broadly based upon two major techniques used to measuring real-world competencies known as the critical-incident technique (Flanagan, 1954; McClelland, 1976) and simulation (Fredericksen, 1966; Thornton and Byham, 1982). The critical-incident technique involves interviewing personnel within the field and eliciting information in relation to workplace tasks that were performed specifically well and those performed poorly. Using statistics, researchers classify issues that have been identified as being important. On the other hand, the simulation approach involves observing individuals performing tasks. It is considered to have face validity. The “in-and-out-baskets tests” (Fredericksen, 1966; Fredericksen et al., 1957), fall into this sort of category where employees are given a range of tasks to perform that appear in their “in-baskets”. The delegation of onward responsibility for certain tasks based on what is in their in-basket, is an example of employees making use of their workplace tacit knowledge.

The Sternberg aggregated technique consists of set of work-related situations, each with between five to twenty response items that represent various options for handling the situation. The situations pose a problem for the test-taker to solve, and the participants indicated how he or she would solve the problem by rating the various items. The process always commences by interviewing what they consider experts in the field on how individuals would handle critical situations at their jobs. From these interviews, the researchers extract what they believe is implicit tacit knowledge and then construct scenarios or possible solutions (also called tacit knowledge inventory). They then ask test-takers to rank the possible solutions, comparing those solutions to the responses with those of experts. The closer the candidate’s responses are to those of the experts, the higher is the candidate’s tacit knowledge.

The set of ratings that a subject generates for all the work-related scenarios during the test is the measure of the subject’s tacit knowledge in that field. Sternberg and his group suggested three ways to decide on the tacit knowledge score: by correlating participants’ responses with an index of expert, intermediate and novice group membership; by judging the degree to which participant’s responses conform to professional “rule of thumb”; or by calculating the differences between participants’ responses and an expert prototype.

In a nutshell, the approach is based on the principle that novices and experts differ in the amount and organization of field specific knowledge and that tacit knowledge can be articulated. Therefore, the more expert-like knowledge a person possesses, the more tacit knowledge that individual has. The process of developing a tacit knowledge inventory in this way begins by eliciting experienced-based tacit knowledge from successful practitioners in a particular field and finishing with a validated and revised instrument similar to Situational Judgement Tests. The potential items are selected to yield a measure of the underlying field relevant tacit knowledge (Sternberg et al., 2000).

The Yale group has measured tacit knowledge in sales teams (Sternberg and Wagner, 1988), academic psychology (Wagner and Sternberg, 1985), managers (Wagner and Sternberg, 1991) and military leaders (Hedlund et al., 2003). For example, in the study by Hedlund et al. (2003) the Tacit Knowledge for Military Leaders (TKML) inventory, consisting of a series of leadership scenarios, was developed to assess the amount of knowledge leaders possess. Three versions of the TKML were administered to a total of 562 leaders at the platoon, company, and battalion levels. At all three levels, TKML scores correlated with ratings of leadership effectiveness from either peers or superiors, and the scores explained variance in leadership effectiveness beyond a test of general verbal ability and a test of tacit knowledge for managers. These results indicate that subject-specific tacit knowledge can explain individual differences in leadership effectiveness and suggest leadership development initiatives should include efforts to facilitate the acquisition of tacit knowledge. Table 2.6 summarizes of examples of instruments for tacit knowledge testing based on the Sternberg approach.

*Table 2. 6 Examples of the Sternberg-based instrument for tacit knowledge testing*

| Researchers | Domains | Object of measurement | Measuring tools |
|---|---|---|---|
| Taylor et al. (2013) | Police training | Police officers' professional knowledge | Police Officer 's Tacit Knowledge Inventory (POTKI) |
| Wagner and Sternberg (1991) | Psychology and management | General manager | Tacit Knowledge Inventory for Managers (TKIM) |
| Hedlund et al. (1998) | Psychology | Military Leader | Tacit Knowledge Scale for Military Leadership |
| Leonard and Insch (2005) | Management and education | Academic staff in universities | Tacit Knowledge Scale Academia |
| Busch (2008) | Management and Information Science | Information System Staff | Information Systems Staff's Tacit Knowledge Scale |
| Kexin (2004) | Psychology | Knowledge worker | Tacit Knowledge For Managers (TKIM-R) |
| Zuoxue (2008) | Management | Enterprise staff university graduate | Individual Tacit Knowledge Ability Questionnaire |
| Liu (2013) | Management | General staff | Scale of Individual Tacit Knowledge |

### Critics of the Sternberg approach

Sternberg and his colleagues' technique for testing tacit knowledge is not exempt from criticism~~s~~. In their approach, tacit knowledge typically is measured via Situational Judgement Inventories. Individuals are presented with written descriptions of situations that represent actual situations or approximations of actual situations in the subject of interest. Over the years, various constructs have been linked to Situational Judgement Tests. According to Wagner and Sternberg (1985), the purpose of a Situational Judgement Test is to measure something other than academic intelligence (cognitive ability). They proposed that Situational Judgement Tests measure "tacit knowledge" or "practical intelligence"; for example, practical know-how that is usually not openly expressed or stated and which must be acquired in the absence of direct instruction. There is considerable controversy over what these tests actually measure (Schmitt and Chan, 2006). Hence, other research does not support this position and reveals that Situational Judgement Tests are related to cognitive ability. Gottfredson (2003) contends Sternberg and the Yale group's tests of tacit knowledge and argues they do not reveal the strong empirical support they assert.  The author's review stated there is no evidence that there exists a general factor of practical intelligence. Northrop's (1089) review of Situational Judgement Tests also argued against the likelihood of a general factor from such tests; arguing with McDaniel and Whetzel (2005) that items in Situational Judgement Tests tend to have construct heterogeneity.

In the meta-analysis of McDaniel et al. (2001), it was found that Situational Judgement Tests show a correlation of 0.46 with cognitive ability, even though there was substantial variability throughout this estimate. For instance, video-based Situational Judgement Tests had lower correlations with cognitive ability than written Situational Judgement Tests (Weekley and Jones, 1997). Another example is that Situational Judgement Tests based on a job analysis were usually more highly related to cognitive ability than those not based on a job analysis (0.50 versus 0.38). Still other researchers suggest that Situational Judgement Tests are alternative measures of job knowledge, job experience or interpersonal variables (McDaniel and Nguyen, 2001; Weekley and Jones, 1999). Taken together, the extent to which Situational Judgement Tests tap different constructs seems to vary greatly. This is no surprise as Situational Judgement Test items may refer to a wide range of situations and include different types of content to which applicants must attend when making a decision.

In addition, responses to Situational Judgement Test items with multiple options are the result of a combination of ability, experience, and personality.

Recently, some efforts have been undertaken to open the “black box” of what Situational Judgement Tests measure. Again, the type of response instructions mattered. Specifically, the meta-analysis of McDaniel et al. (2007) reported that Situational Judgement Tests with knowledge instructions correlated more highly with cognitive ability tests (0.35) than Situational Judgement Tests with behavioural tendency instructions (0.19). Conversely, Situational Judgement Tests with behavioural tendency instructions correlated more highly with Agreeableness (0.37), Conscientiousness (0.34), and Emotional Stability (0.35) than Situational Judgement Tests with knowledge instructions (0.19, 0.24, and 0.12, respectively). These results confirm that Situational Judgement Tests with knowledge instructions should be considered maximal performance measures, whereas Situational Judgement Tests with behavioural tendency instructions are typical performance measures.

**Recommendation for Situational Judgement Test format in the Sternberg-based approach**

McDaniel et al. (2003) re-analyzed the McDaniel et al. (2001) data examining a response instruction moderator. They identified two groups of response to Situational Judgement Tests: behavioural tendency and knowledge. Behavioural-tendency instructions ask candidates what they would do in a given situation; what they are most or least likely to do; or, to rate what they would most likely do. On the other hand, knowledge-tendency instructions ask candidates to select the best response; select the best or worst response; or to rate the effectiveness of various responses. Researchers found that Situational Judgement Tests with knowledge-based instructions assesses cognitive ability primarily, with some assessment of personality; and that Situational Judgement Tests with behavioural-based instructions assess personality primarily, with some assessment of cognitive ability. This finding is emphasized by McDaniel et al. (2007) confirming that Situational Judgement Tests with knowledge tendency instructions had a higher correlation to cognitive ability tests (0.35) than Situational Judgement Tests with behavioural tendency instructions (0.19). On the other hand, Situational Judgement Tests with behavioural-tendency instructions had a higher correlation to Agreeableness (0.37), Conscientiousness (0.34), and Emotional Stability (0.35) than Situational Judgement Tests with knowledge instructions (0.19, 0.24, and 0.12, respectively). These results confirm that Situational

Judgement Tests with knowledge-based instructions should be considered maximal performance measures, whereas Situational Judgement Tests with behavioural-tendency instructions are typical performance measures.

By using knowledge-based ‘what should you do?’ type of instructions, as opposed to behavioural-based ‘what would you do?’ type of instructions (i.e., “What should you do?” rather than “What would you do?”) in Situational Judgement Tests McDaniel and Whetzel (2009) suggest that faking can be reduced. Knowledge-based instructions allow for the assessment of whether the candidate knows the best response to the situation.

McDaniel and Whetzel (2005) concluded “The validity of situational judgment tests varies with their construct loadings with the more g-loaded knowledge-instruction Situational Judgement Test tests having higher validity than the less g-loaded behavioural-tendency-instruction tests. However, both have validity. Thus, we do not dispute Sternberg’s claims that practical intelligence tests can predict job performance. In fact, we have summarized substantial evidence that situational judgment tests do predict job performance and can provide incremental prediction over g in the prediction of job performance.” (p. 523).

McDaniel and Whetzel (2009) also acknowledge that Situational Judgement Tests are valid predictors of job performance and recommend having applicant's rate the effectiveness of several options as opposed to choosing a single course of actions. They also suggest the use of a clearly understood Likert rating scale and avoid fine distinctions such as 1=extremely ineffective while 2=very ineffective. They also strongly recommend the use of knowledge instruction, such as asking the applicant “how effective is this response?”, that correlate less with agreeableness, conscientiousness, and emotional stability.

**Summary**

Individual tacit knowledge has been measured at the articulated level of abstraction using a form of self-report situational judgment tests (Sternberg et al., 2000), experiments in Artificial Grammar learning (Reber, 1995) and mental scanning (Reed et al., 1983). Qualitative case studies have also been applied in tacit knowledge sharing (e.g., Desouza, 2003). Team-level tacit knowledge has been assessed by proxy (Edmondson et al., 2003) and using SNA (Busch et al., 2003). In general expert knowledge forms the basis for tacit knowledge measures.

Insch et al. (2008) notes that, despite the extensive literature on tacit knowledge, there are very few studies concerning the measurement of tacit knowledge other than Sternberg et al. (Sternberg et al., 1993, 1995; Sternberg, 2000; Wagner and Sternberg, 1986). A further strength in using the Sternberg approach is that there is a general acceptance in the research community of situational job inventories (McDaniel et.al. 2000). The Yale group body of work is debated, but, given his popularity within the field, it cannot be disregarded in this study.

Accounting for the criticism levelled against the Yale group, recommendations to Situational Judgement Tests are to be applied to mitigate the inherent issues discussed above. The Sternberg approach of testing tacit knowledge, parallel to the other psychological approaches discussed here, tends to rely on both descriptive and analytical statistics and seems more powerful with large sample size. Therefore, the benefits of using a purely statistical approach can be lost for smaller sample sizes, which may negate data analysis (Richards and Busch, 2000; Busch, 2008). This observation is also accepted while designing the methodology of the research and an additional approach was sought to complement Sternberg's approach and strengthened research findings.

## 2.9 GAPS IN THE LITERATURE

The terms knowledge and tacit knowledge are defined and interpreted differently in various fields throughout the literature. These concepts have more consensuses in organizational learning research that is more concerned with capturing, transferring and maximizing knowledge; with an emphasis on tacit knowledge; in order to harvest the benefits it brings at both the individual and organizational level. However, researchers following that viewpoint and interest are also divided as to the usefulness and effectiveness of ICT tools to cultivate or pass on tacit knowledge. For some authors, ICT tools can facilitate the successful sharing and retention of tacit knowledge while others clearly disagree.

Despite vast amounts of literature on tacit knowledge sharing, there is a scarcity of studies investigating whether or not people are able to gain and transfer tacit knowledge effectively using ICT tools. This could be considered as the major gap in tacit knowledge research (Panahi et al., 2013). It also aligns with Venkitachalam and Busch (2012) conclusions stating "...the most interesting unexplored research issues regard to tacit knowledge creation and particularly transferral is the impact ICT has in the organization"

(Goh, 2005 cited in Venkitachalam and Busch 2012, p. 365). The same finding is noted in virtual organizations as well as online education literature, in which people interact or communicate indirectly relying on ICTs; and therefore the effective acquisition and transfer of tacit knowledge lacks evidence. In short, at this stage, no study has addressed the question related to whether or not people are able to gain tacit knowledge effectively online (Özdemir, 2008).

Traditional ICT tools were quite limited and used to restrict opportunities for people to see each other and communicate synchronously. This limitation was at the core of critics regarding ICT tools. However, information technology is constantly advancing. Modern ICTs are now better and provide new opportunities for people to visually interact reducing the distance issue significantly.

Social web technology is a recent technology that has captured the attention of practitioners and researchers. Panahi et al. (2013) stated "with the advent of social web technologies a group of researchers now assert that social web technologies may facilitate knowledge sharing" (p. 13). Panahi and his colleagues further dug into the impact of social media tools in tacit knowledge sharing. They revealed five factors and conditions including social interaction, experience sharing possibilities, informal relationship and networking, observation and listening, and mutual swift trust; as catalysts to enable the successful sharing of tacit knowledge through social media. Although the researchers' finding has been confirmed among physicians in the healthcare field, it is vital to carry out similar studies in e-Learning environment to confirm or refine these factors.

Venkitachalam and Busch noted that existing studies on tacit knowledge are predominantly descriptive in many aspects (Venkitachalam and Busch, 2012, p. 364). They highlighted that fewer studies exist exploring the diffusion of tacit knowledge among people. In fact, the lack of empirical studies on tacit knowledge is perhaps the main reason for debates in the field. Tacit knowledge sharing in the e-Learning environment suffers from the same scarcity of empirical evidence. For instance, Falconer (2006) claimed that tacit knowledge can be shared effectively in e-Learning via a purely descriptive and synthesis of theoretical and conceptual ideas, based on ideal usage of ICT. Falconer's work is a series of examples and counterexamples to demonstrate how convenient ICT tools are with conditions that support the exchange of tacit knowledge in e-Learning environments. But she does not address in-depth the ability of participants to learn and develop their tacit knowledge in such conditions.

Similar to Falconer's study, Yi (2006) argues the online environment is the most effective way for people to share their tacit knowledge but admits the limitation of her measurement and generalizability. In fact, she interviewed a small sample (*n*=6) of people at a conference on the ways of online learning and their comfort in externalizing tacit knowledge online. The qualitative study revealed a positive opinion of tacit knowledge holders towards the use of ICTs to externalise and share their tacit knowledge. However, the study ignored the receiver side, which makes it hard to believe that the process will enable others to capture that knowledge. Yi's opinion is essentially based on the comfort and opportunities ICTs can provide the knowledge sender. The nature of her work remains similar to previous studies that neither investigate whether or not people can actually improve their tacit knowledge via an online channel, nor explore factors and/or any conditions that may influence this development.

Hildrum's (2009) study is parallel to that of Yi (2006). Hildrum interviewed eleven participants on the use of ICT to interact with remote colleagues, the impact of such interactions in their personal improvement and the ability to perform their daily tasks at work. The nature of enquiry used by the researcher is again arguable to conclude that there is effective tacit knowledge acquisition and transmission in e-Learning; although Hildrum's case study was based on Cisco System; the most successful e-Learning platform in the world. In fact, Hildrum emphasized the contribution of ICT in assisting and bringing closer students and masters in e-Learning. Hildrum claimed that there is an improvement in tacit knowledge of his study's participants; which could be argued not be a direct consequence or result of the e-Learning system, as the participants may have been developed their expertise elsewhere to become proficient in their daily duties. In a nutshell, many examples in the literature propose qualitative studies on the usefulness and contribution of ICTs in e-Learning with regard to tacit knowledge, but ignore existing methods to evaluate and explore tacit knowledge of participants. This also explains why there is also no insights regarding factors or personal characteristics that play a major role in the development of tacit knowledge in e-Learning which ultimately involves learning in which learning theories highlight many variables that affect people's ability to learn, acquire and recall new knowledge.

Despite existing and proven methods for testing tacit knowledge, it is noted that those who strongly argue that such knowledge can be transferred virtually, or face-to-face, rarely endeavour to conduct tests to support their claim. The psychologists' approaches are well-known in this respect though. There are existing tools developed by Sternberg and his team for tacit knowledge testing in management, leadership in military, sales, teaching, etc. Such tools could have been used to back arguments about tacit knowledge sharing in virtual environments. Additionally, Busch and his colleague provided some added features in testing that sort of knowledge which is almost overlooked in tacit knowledge research. The Busch triangulated methodology gives an opportunity to test tacit knowledge from individual perspectives and to assess the flow of that kind of knowledge among a group of people using Social Network Analysis. Typical research such as that of Busch (2008), is missing in online learning that could prove how efficient and effective ICTs, pillars of online learning environment, can assist experts in externalising their tacit knowledge as well as facilitating novices to internalize that knowledge. Remarkably, there is a plethora of studies that emphasize ways, concepts and techniques to leverage tacit knowledge in e-Learning although ignoring the fundamental concern of individual tacit knowledge gain using that learning channel.

Many studies have promoted the synergy between Knowledge Management and e-Learning to mitigate the challenges inherent to online learning and leverage tacit knowledge sharing. This movement has inspired various theoretical and conceptual ideas that remain untested in regard of their real ability to facilitate tacit knowledge transfer and to increase tacit knowledge acquisition. Ubon and Kimble (2002) stated "we need to study the problems of online distance education based on actual case studies, explore the Knowledge Management tools and techniques in more detail, and evaluate the results from the studies". Knowledge Management literature advocates for technology as a fundamental component to manage knowledge. Indeed, Knowledge Management encompasses three dimensions: people, processes and technology. Approaches, techniques and mechanisms postulated in Knowledge Management research including Community of Practice as well as e-Learning's instructional design techniques such as Knowledge Objects are of interest in this study and which again have never been subjected to empirical investigation and assessment concerning tacit knowledge acquisition from an individual's perspective.

Yi (2006) suggested further investigation about how to design, develop and manage more effective online learning environment; addressing issues such as lack of motivation; to facilitate online externalization of tacit knowledge and other types of knowledge conversion. In the pursuit of increasing the transferral of such kinds of knowledge, Tee and Karney (2010) found that online courses encouraged processes and created conditions consistent with Nonaka and his colleagues' SECI model with the *ba* concept, or shared context, to encourage students to share and to construct knowledge through the four phases of the SECI model. Tee and Karney stated "a ba-like environment may be a useful approach to facilitating online learning, creating a strong potential to support learning processes necessary for students to cultivate tacit knowledge". On the other hand, some studies like Liebowitz and Frank (2011) promotes and emphasizes designing online courses with Knowledge Objects and encouraged learners and tutors to interact through which leads to a rich flow and growth of personal tacit knowledge. Unfortunately, these ideas and claims have not been tested empirically in order to reveal the concrete improvement of students' tacit knowledge in such conditions and features.

This study has adopted a holistic approach to consolidate previous findings and to bridge the gaps. The strategy was to identify first contemporary mechanisms claimed to improve tacit knowledge transmission and retention in e-Learning in line with learning theories and adult learning theories. Then, the strategy would establish and apply relevant concepts to design a conducive adult learning online environment as a testbed. Secondly, it was designed to investigate and explore factors or characteristics that influence the development of participants' tacit knowledge in such conditions. Naturally, this involves assessing individual tacit knowledge in the field via methods and validated instruments discussed in the fourth chapter. The proposed e-Learning system integrates concepts at the core of research interest is the focus of the conceptual framework developed in the third chapter.

## 2.10 CHAPTER SUMMARY

The importance and value associated to tacit knowledge in the global knowledge economy has deeply impacted businesses and educational institutions. E-Learning becoming one of the preferred ways to impart knowledge is adding another burden to practitioners left without substantial evidence on the capacity of acquiring and disseminating tacit knowledge online, in which communication and collaboration are devoid of face-to-face contact. Some researchers argue that current and incessant development of ICT provides potent tools to mitigate the lack of face-to-face contact concern, while enriching interaction among people as never done before.

Other studies have the merit of exploring conditions favourable to tacit knowledge sharing within e-Learning environments and propose ideas inherent to Knowledge Management field. Despite the sporadic theoretical discussions in the literature that argue the effective creation and development of tacit knowledge in conditions reported, it was noticed that there is still a lack of empirical evidence that confirm these claims. This observation is also noted by Stark and colleagues, who called for empirical evidence examining learner performance, learner level and learner experience in online learning environments; (Stark et al., 2013, p. 276) as well as clarifying whether or not learners can gain tacit knowledge via e-Learning (Özdemir, 2008).

The purpose of this chapter was to build a theoretical foundation for the empirical research through a review of existing literature. The chapter was divided into five major parts. The first part dealt with learning theories and adult learning theories often ignored in Knowledge Management and tacit knowledge sharing discussions. The second part presented the context of the research that is online learning and its general challenges. The third part offered the definition of tacit knowledge, explained how tacit knowledge is acquired and presented issues on tacit knowledge sharing with opinions on the use of ICT to externalise and pass on that sort of knowledge. The fourth part addressed tacit knowledge in e-Learning environments in great detail. The fifth part was dedicated to approaches and methods to test tacit knowledge at the individual level. In doing so, gaps in the literature were identified. It was revealed that there is a lack of holistic and empirical studies confirming claims related to tacit knowledge sharing in e-Learning. Consequently, there is not substantive evidence of the ability of students to acquire and recall tacit knowledge often hidden among their peers and instruction through online education. Also, if it is even possible, there is no practical guidance and information about factors or conditions that matter the most. Instead, practitioners are left with myriad of concepts and ideas.

On the basis of the extant review of the literature, the next chapter proposes a conceptual framework of this study. It assembles some specific concepts and factors reported to positively influence tacit knowledge transmission and retention in an e-Learning environment. It sets the basis of the design of the experiment and formulation of hypothesis to test and explore any improvement of students' tacit knowledge as well as students' influencing factors.

# Chapter 3: Conceptual Framework

## 3.1 CHAPTER INTRODUCTION

The previous chapter critically reviewed the literature relevant to the phenomenon under study. This chapter intends to make a theoretical link between the concepts and factors branded into the literature as enablers or facilitators for tacit knowledge sharing success in e-Learning environments. The main purpose of this chapter is to suggest a conceptual framework that, according to Miles and Huberman (1994), lays out the key constructs related to the phenomenon being studied and the presumed relationships between them. Saunders et al. (2009) argue that a conceptual framework enables the researcher to make a connection to the existing body of knowledge in the subject area under study. It functions as a sensitizing device helping the researcher "theorise or make logical sense of the research problem" (Sekaran, 2003, p. 87). Hence, this chapter is to develop a conceptual framework for the research that integrates components or concepts of interest into the study; which then helps set the basis and formulate hypotheses to verify throughout the experiment adopted by this study, in order to answer all research questions.

This chapter consists of four main sections. First, an investigation is performed to identify theories related to the exchange of tacit knowledge using ICT tools and particularly tacit knowledge sharing and acquisition in e-Learning. Second, a consolidation of core concepts claimed to enable or improve tacit knowledge acquisition in e-Learning environments is presented; which includes both opinions supporting tacit knowledge forming and retention in e-Learning as well as practical implementation. Third, the conceptual framework for the research is developed; integrating concepts and strategies that this study proposes to facilitate the acquisition of tacit knowledge of a subject at individual level in an e-Learning environment. Fourth, the variables and measurements of the propositions are discussed. Finally, the chapter closes with a summary of assumptions and formulation of hypotheses before starting the experiment.

## 3.2 THEORETICAL FOUNDATION

Tacit knowledge is considered to be an important type of knowledge; however it is also a difficult one to deal with in practice and in research, due to its soft nature. Many theoretical lenses have been employed to examine the question of capturing, transferring and sharing tacit knowledge. There is a plethora of studies that have addressed tacit knowledge in various aspects that have enhanced understandings of the phenomenon despite the contention on its definition and conceptualization. Other studies looked at tacit knowledge in the e-Learning context, arguing that e-Learning environments provide conditions that enable students to acquire tacit knowledge. However evidence provided is not satisfactory. The literature lacks empirical studies conducted within real e-Learning environments, in which participants' tacit knowledge is clearly assessed. This study is set to fill the gap. The approach is to identify ideas and conditions claimed to facilitate tacit knowledge cultivation and retention in e-Learning, implement them into a testbed and explore outcomes at individual level. This section is dedicated to theories, mechanisms and potent ICT tools that are associated to the success of tacit knowledge sharing in e-Learning.

The section is organized as follows. The first part presents mechanisms and approaches from the Knowledge Management field used to leverage tacit knowledge creation and its flow, with an emphasis on learning and teaching based on Community of Practice spirit. Second, Knowledge Objects advocated in knowledge management and e-Learning synergy are reviewed regarding their role in the design of e-Learning content. The next part identifies factors enabling people to successfully share and acquire tacit knowledge over ICT tools. The final part consolidates the conditions required for the success of tacit knowledge sharing and acquisition in e-Learning environments.

### 3.2.1 Knowledge Management with regard to Tacit Knowledge

Delving into tacit knowledge research requires at least a cursory understanding of Knowledge Management, its parent discipline. Knowledge Management is widely described as the discipline that promotes an integrated approach to identifying and sharing all of an organization's knowledge assets; including unarticulated expertise and experience in individual workers. Research and developments in Knowledge Management are increasingly committed to finding efficient and effective mechanisms to leverage knowledge within an organization, and among individuals in a community. For instance, knowledge-sharing activities improve organizational performance (Lesser and Storck, 2001), promote competitive advantage (Argote and Ingram, 2000), organizational learning (Argote, 2012), innovation (Powell et al., 1996) and even survival (Baum and Ingram, 1998).

According to Busch (2008), Knowledge Management research tends to treat tacit knowledge as the target of Knowledge Management practice, after noticing that some researchers argue tacit knowledge sits at the very heart of knowledge management (Busch, 2008, p. 25). However, capturing and disseminating tacit knowledge is the challenge organizations face, given its soft nature and the fact that it is not typically written down or codified in any form. Busch described tacit knowledge as being akin to a reserve deposited deep within the ground that needs to be detected and then pumped out; as opposed to explicit knowledge treated as a kind of surface pool that is easier to detect and capture but which represents only a fraction of the organizational knowledge. Theorists differ on the nature of tacit knowledge as presented in the previous chapter. However, Nonaka and Takeuchi (1995) viewed tacit knowledge as subjective and mental; as opposed to being objective and external. Henceforth, organizations should treat the deep buried reserve as having different chemical properties, or being in a different physical state. Merely *"pumping tacit knowledge out"* will not suffice to make it useful; it needs to be processed and converted into a new form (Mooradian, 2005).

It is known that organizations have made relatively long standing use of the codified knowledge assets powerfully and successfully supported by Database Management Systems. Databases will still have their use and are not likely to disappear; but they are not appropriate with respect to tacit knowledge management. In practice, managers have come to realize that the departure of an employee from the organization means losing the soft or tacit knowledge. Nonaka and Takeuchi's (1995) SECI model suggests processes to convert tacit knowledge to explicit knowledge and vice versa that can potentially maintain the target tacit knowledge "indoors". However, the model does not specifically explain which mechanisms are actually effective to capture and preserve tacit knowledge. It is vital to find out which mechanisms and techniques are best used to conserve and pass it on.

**Knowledge Bases**

Busch and Tiwana (2005) mentioned that knowledge repository or similar technology is one way of capturing an organization's tacit knowledge, which is set to encourage employees to enter their workplace tricks of the trade. Should an experienced employee have a knack for solving a particular problem, he or she is able to enter this information into the knowledge base; and, "even knowledge that cannot be codified or stored in a knowledge repository can be shared through hyperlinks, pointers, multimedia..." (Busch and Tiwana, 2005, p. 70). In order to establish a functional approach to extracting, compiling and preserving tacit knowledge; personnel are strongly encouraged to enter their 'know-how' into the database.

One example of successful implementation is that of Buckman Laboratories, reported by Robins and his team, cited by Busch:

> "Buckman Labs has organised its employees and their work around its knowledge network – K'Netix... Not long after K'Netix went online, Buckman made his expectation clear: Those who have something intelligent to say now have a forum in which to say it. Those of you who will not or cannot contribute also become obvious. If you are not willing to contribute or participate, then you should understand that the many opportunities offered to you in the past will no longer be available." (Busch, 2008, p. 26).

As reported by Harrington (2005), the biggest challenge with knowledge repositories is changing from a knowledge hoarding, to knowledge sharing culture. Furthermore, it can still be argued that knowledge repositories facilitate codified knowledge rather than tacit knowledge. A direct mean of externalising tacit knowledge is that of storytelling and its variants.

**Storytelling and Narration**

Storytelling is an ancient, traditional way of passing on complex, multidimensional information and ideas through narrative (Ruggles, 2004). Stories provide context and simulation (Snowden, 2002) that is often missing in the knowledge repositories described above. Additionally, stories explain and create a connection between past, present and future. In other words, they help to isolate and explain every component surrounding a subject. Wiig (2003) stated that:

> "Much of what we know is in the form of isolated knowledge elements. We often link these isolated elements with other knowledge elements. We integrate and synthesise to create a weave -- a mental model, a story-like construct for a particular context... That is why it is so hard for a mechanical engineering graduate who knows all the theoretical principles to design a working machine before she has formed a 'story' in her mind of how all the details fit together." (Wiig, 2003, p. 15-16)

In Knowledge Management, storytelling is used as a technique to explain complex issues, describe events, understand difficult changes, present other perspectives, make connections and communicate experience. People learn easily from stories and thus it is useful in Knowledge Management to facilitate storytellers to externalize their tacit knowledge (LeBlanc and Hogg, 2006). In practice, storytelling, or narrative knowing and telling

(Küpers, 2005; Snowden, 2005, 2002), is an approach that is gaining popularity as a means of managing the knowledge available within an organization (Roth, 2003). Schultze and Boland (1997) explored the use of stories in Knowledge Management and suggested a discussion on database as an effective way to communicating organizational memory. Mitroff et al. (1974) argued that data only becomes information when "tied to an appropriate story that has personal meaning to the individual who needs the information, the organization in which he is located, and the type of problem that he faces". Busch (2008, p. 27) then asserted "storytelling permits individuals to elucidate thoughts, make use of metaphors and transfer body language all at the same time. The combination of such 'techniques' is of course much richer than a message sent through e-mail." In nutshell, Küpers (2005) claimed that stories permit *"embodied emotional knowledge"* and *"meta knowledge"* to be transferred.

While one could argue that storytelling as reported in the examples presented above required face-to-face contacts to be effective, ICT supporters towards tacit knowledge sharing also evoke storytelling as a means to pass on tacit knowledge online. For instance, Yi (2006) stated that:

> "... in online environments sharing one's own experience is the most effective way people use when sharing their tacit knowledge with others. Sharing one's original experience is the fundamental source of tacit knowledge. Tacit-to-explicit knowledge conversion often happens in the forms of storytelling and metaphors. As the tacit knowledge of one individual is shared in the form of metaphors and stories, the others listen and combine this input with what they already know and understand. Thus, the listener attains new knowledge, of an explicit nature." (Yi, 2006, p. 670-671).

Furthermore, Yi (2006) argued that it is more consistent and comfortable to externalize tacit knowledge in an online environment rather than face-to-face. She justified that tacit knowledge sharing online involves careful selection of materials, cues, illustrations (videos, audios, pictures) and provides a control over all kinds of information to convey to others. On the other hand, it may be hard to find effective illustrations when engaging in a face-to-face discussion or conversion according to the author. Similarly, Watson and Gemin (2008) argued that web-based environments eradicate, or significantly mitigate issues that may create social friction such as appearance, physical disabilities, age, gender, ethnicity, academic history or socio-economic status which are likely to impede face-to-face sessions regarding the transferred knowledge. Certainly, stories tend to be effective mechanisms in tacit knowledge transmission, but involve selecting the right words. They are often combined with metaphors and analogies to increase the capacity of understanding.

**Metaphor and Analogy**

Nonaka et al. (1996) suggest that metaphor and analogy enables the externalization of tacit knowledge to a large degree. Busch (2008, p. 48) defined metaphor as “a figure of speech in which a term or phrase is applied to something to which it is not literally applicable, in order to suggest resemblance”. On the other hand, an analogy is defined as “a partial similarity in particular circumstances on which a comparison may be based... A form of reasoning in which similarities are inferred from a similarity of two or more things in certain particulars” (Busch, 2008, p. 48).

The role of metaphor and analogy is justified and reinforced by the fact that words in language are often not powerful enough to present knowledge we may wish to transmit (Guzman and Wilson, 2005). However, Busch (2008) warned that an emphasis needs to be placed on the fact that metaphor and analogy should be used in regards to knowledge, not data or information. In other words, there should be a human meaning attached. Knowledge is said to incorporate a “tacit” component, whereas information is purely articulate in nature and words.

Much product innovation takes place in the ICT field and metaphors abound within. For instance the term “web” is used to describe the internet’s software interface, which links computers worldwide. Other metaphorical examples include firing up a document, rebooting a machine, spreadsheeting, debugging, etc. Despite the usefulness and power of metaphors, Lei et al. (1996) noted that it is difficult for outsiders to decode metaphors. For example, unless one has had experience with computers and programming, a novice is unlikely to understand the concept of debugging. In fact, the receiver’s existing knowledge base is vital to their participation in any process involving tacit knowledge sharing. Without a prior understanding of the subject, it would be difficult for a novice to decode or capture the knowledge.

**Teams and Communities of Practice**

Generally, groups of people working on a given project tend to collaborate closely together and share their knowledge. In modern organizations, teams and their functions are vital in tacit knowledge management (Jorgensen, 2004). However, the makeup of the team will also have an impact on the likelihood of knowledge transfer. Some studies argued that a team's diverse composition can negatively influence the transfer of knowledge, insofar as "people tend to feel part of a social group (functional) to which they assign superior or at least more positive, characteristics, skills and knowledge, with a tendency to assign negative characteristics to other groups" (Camelo-Ordaz et al, 2005, p. 698). This negativity may be true at either the inter-team level (Busch and Tiwana, 2005), or intra-team level. On the other hand, opinions such as the one of Malik (2004), which claims the diversity in intellectual and occupational background can actually increase knowledge creation and transfer in novel ways; which makes for a positive argument in favour of the transfer of knowledge during in-person discussion settings.

Reasonably, communities could be considered as teams on a larger scale. In practice, Busch (2008) brings attention to tractor manufacturer John Deere as an example where hundreds of Communities of Practice manifest within the organization, enabling a very effective exchange of knowledge. The company uses MindShare; a Community of Practice system supporting videoconference, email and discussion groups.

Typical virtual team environments, or virtual communities of practice, are widely implemented in practice and based on the same the idea of enhancing ties among people. In a study, Hildrum (2009) exhibits and justifies the positive role of Community of Practice in sharing tacit knowledge online, whereby participants join together to share common interests successfully, despite the distance barrier. However, Ledford and Berge (2008) proposed that in order "to attain optimal tacit knowledge transfer within virtual team environments, organizations structure and culture concerning tacit transfer and virtual protocol will have to be purposefully re-designed".

**Sticky Knowledge Networks or Network of Practice**

One other means of undertaking tacit knowledge management is through the establishment of knowledge networks. Knowledge is sticky by nature, and tacit knowledge particularly so. According to Busch and Tiwana (2005), "the more valuable the knowledge becomes, the less likely we are to want to lose it or otherwise to transfer it". Several studies indicate that people recognize that sharing knowledge makes either the team or the individual less valuable to the organization. (Desouza and Evaristo, 2004)

Furthermore, "the more that is invested in building up a team, workgroup or knowledge network, the less likely we are to want to abandon this precious resource" (Busch and Tiwana, 2005). However, as Snowden (2005) remarks, the nature of the team or the networks also lend relevance to the "stickiness" of knowledge. He argues that informal, self-formed networks carry more inherent trust than formal network established by a firm's senior hierarchy, or an instructor. Employees who form their own networks are more likely to be successful at sharing their experiences. More significantly, employees who are on the receiving end of important knowledge are at an increased likelihood of gaining from the experiences of their more enlightened peers. Snowden (2005) aligns with the suggestion made by Hildrum (2009) regarding Network of Practice to boost up tacit knowledge transferral in e-Learning.

**Summary**

To manage tacit knowledge and enhance organizational learning in order to harness knowledge for innovation, the Knowledge Management field advocates practices and mechanisms such as knowledge repositories, storytelling, metaphors, analogies, communities of practice, etc. The idea behind each concept can be entirely applicable or adjusted to promote the most efficient method of knowledge sharing in online learning. Hildrum (2009) is an example studying and presenting the positive role of communities and networks of practice for tacit knowledge sharing in online learning; and thus, this approach was promoted in this research to maximise the exchange of tacit knowledge among participants, before evaluating the receiver's level of knowledge acquisition.

The majority of the knowledge management concepts described above have been applied successfully in some online environment studies. The section that follows identifies and places an emphasis on key approaches and factors for tacit knowledge sharing and acquisition success in e-Learning.

### 3.2.2 Knowledge Management and E-Learning Synergy

In e-Learning, all forms of communication and collaboration take place in a Virtual Learning Environment. A Virtual Learning Environment is the space where online materials and activities are configured to promote learning. Tee and Karney (2010) emphasized that content in online learning plays an important role in knowledge sharing. They argue that online content encourages processes and creates conditions consistent with the Nonaka et al. (2000) SECI model of knowledge creation, and the concept of *ba* (or shared context). Tee and Karney recalled that online content is the participant's common ground the basis of interaction; and the guide to encouraging them to share and to construct knowledge through socialization and externalization; as recommended in the SECI model. Therefore the design of online courses is important.

Advocates of knowledge management and e-Learning synergy have promoted the design of e-Learning content being broken down into small chunks known as "learning objects", which we reviewed in Chapter Two. A new movement in support of Knowledge Objects has emerged, suggesting that the merging of Knowledge Objects with knowledge bases creates a better understanding within' the learner; and in turn, they produce a stronger final product enriched with dynamic content as described in section 3.2.1. Liebowitz and Frank (2011) believed that by packaging learning objects within the online learning environment, absorption of information becomes more powerful and agile. Moreover, the authors suggested that by transforming these learning objects into Knowledge Objects with an interactive knowledge base, retention becomes more specific and profound. Learners accessing these Knowledge Objects can further augment their personal knowledge (Liebowitz and Frank, 2008, p. 8).

**Knowledge Objects**

The concept of Knowledge Objects has been implemented in Tsinghua University in China. The university's Digital Teaching Reference Book System was designed and assembled using Knowledge Objects (Zhang and Li, 2006). The creation and reorganization of Knowledge Objects serve as the knowledge elements in teaching reference materials.

Liebowitz and Frank (2011) defined a Knowledge Object as a learning object enriched with interactive pools of knowledge, which refers to a knowledge base or Network of Practice; both reviewed in section 3.2.1. Liebowitz and Frank argued that such features enrich collaboration, participation and profit of new knowledge.  The conceptualization of the Knowledge Object suggests that the outcome in the learning community interaction and discussion should be archived and dynamically attached to the Knowledge Objects so that any learner can obtain access anytime, whenever needed. Nonetheless, Hildrum (2009) warned that the students accessing such resources should have a certain threshold of relevant knowledge to maximize the full potential benefit embedded within.

The concept of Knowledge Objects can be found in several other disciplines concerned with knowledge transfer, such as artificial intelligence. Intelligent tutoring system designers and researchers advocate that the learning Knowledge Objects should be more dynamic and adaptive to the student in order to match with their level and expectation (Liebowitz and Frank, 2011, p. 9).

### 3.2.3 Tacit Knowledge Sharing and Acquisition Success over ICT

The capacity to access and assimilate knowledge from different corners of the world is becoming increasingly important for innovation-based competitiveness, for both organizations and individuals (Hildrum, 2009). Many organizations are now making substantial investments in new ICTs to strengthen this capacity (McAfee, 2006). The general expectation is that the internet and novel internet-based applications will transform people’s fundamental ability to share and co-create new knowledge within an organization or community. (Benkler, 2006; Friedman, 2007; Dahlander et al., 2011; West and Lakhani, 2008).

Among the existing ICT tools, researchers typically use social web technologies as examples to demonstrate the ability to mitigate some of the issues that exist in the tacit knowledge sharing process. Such challenges are present among both experts and novices in the online environment.  Khan and Jones (2011) proposed that as new and emerging social web technologies, such as online social networks, Wikis and blogs are being put into use, these new communications tools and community forms must be examined in the discussions on tacit knowledge sharing. Furthermore Hsia et al. (2006), Panahi et al. (2012b, 2013) proposed that social web technologies are effective tools to transfer tacit knowledge among professionals.

Interested in how ICT and social web technologies in particular could facilitate tacit knowledge sharing among people who are geographically dispersed; Panahi et al. (2012a) proposed to map social media concepts and capacities to tacit knowledge sharing requirements. Panahi and his colleagues then revealed that five requirements must be present for tacit knowledge sharing: social interaction, experience sharing, observation, informal relationship/networking, and mutual trust. They exemplified their claim with the fact that social media permit synchronous communication such as sharing, discussion, storytelling, etc; which in turn facilitates tacit knowledge and expertise sharing. What's more, social media tools provide opportunities for observation and imitation of best practices, expert locating, informal networking and a friendly space to discuss ideas and ideals. The role of social media in each of Panahi et al.'s five components is presented in following sections.

Online social interaction is enriched by the emergence of web 2.0 that integrates "human approach to interactivity on the web", "better support of group interaction", and "fostering a greater sense of community" (Kamel Boulos and Wheeler, 2007). Marwick (2001) and Lai (1997) maintain that online discussion forums, chat rooms and other real-time online interactions can facilitate tacit knowledge sharing among team members very effectively. Wahlroos (2010) observed that social media presents a significant potential in improving tacit knowledge sharing by providing a platform for live conversations, relationship networking and collaboration among individuals.

As far as experience sharing is concerned, Yi (2006) argued that online environments are more comfortable and convenient for sharing personal tacit knowledge. Malita and Martin (2010) consider that social networking sites such as digital storytelling tools ease experience sharing online. Similarly Strahovnik and Mecava (2009) pointed out that the tools offered in web 2.0; such as social networking, videos, etc; are efficient means for the exchange of ideas and experiences.

Regarding informal relationships and networking, many studies refer social networking sites as popular and well-known platforms that connect people across the globe in an informal fashion. Relationship building is the foundation of social networking sites. They allow people with common interest to gather together in a virtual space and interact synchronously or asynchronously with each other and share knowledge. According to Bowley (2009), connectivity is the main characteristic of social media. DiMicco et al (2009) found that the building of relationships is the most popular action among users, and thus it is an asset for social networking companies.

In a digital world, the observation of skills can be greatly achieved by watching videos or images; and through more enriched media such as video class and videoconferencing. Both social media and e-Learning platforms were improved by the integration of these tools. In fact Wang (2006) acknowledged that experience sharing is one of the most common reasons for the use of video applications. Mavromoustakos and Papanikolaou (2010) confirmed that people can share their experiences through images, pictures and videos. Nilmanat (2011), Räisänen; Oinas-Kukkonen (2008) and Eraut (2000) determine video, voice and pictures as media that is important to the transfer of tacit knowledge. Multimedia sharing is identified as the main feature of social web technology. This enables people to store and share their own produced video, audio and other multimedia files in the online community. Similarly, podcast and vodcast are also other social web initiatives that enable individuals to keep up-to-date with their favourite audio or video contents.

A study done by Wu et al. (2006) helps us understand that trust is positively associated with knowledge sharing in virtual teams. Wu and his team indicate that mutual communication and understanding establish interpersonal trust among virtual team members. Chen and Hung (2010) also found a positive relationship between mutual trust and knowledge exchanging behaviour in professional virtual communities. Some studies also introduced the concept of "swift trust", a kind of trust that is formed in a temporary team in an online environment. This immediate trust allows people to continue sharing both explicit and tacit knowledge in online communities over time.

Figure 3.1 presents the conceptual model of tacit knowledge sharing in social media proposed by Panahi et al. (2012b). The model indicates that when social web technologies are present, online environments have the ability to support several major requirements of tacit knowledge sharing. This is because they provide a better place for social interaction by establishing opportunities for experience sharing; building a network of informal relationships; providing facilities to observe, listen, and imitate best practices; and finally, by establishing a mutual swift trust among participants. Therefore the authors asserted "the combination of these features creates opportunities for effective flow of tacit knowledge in social media space" (Panahi et al., 2012b, p. 1100).

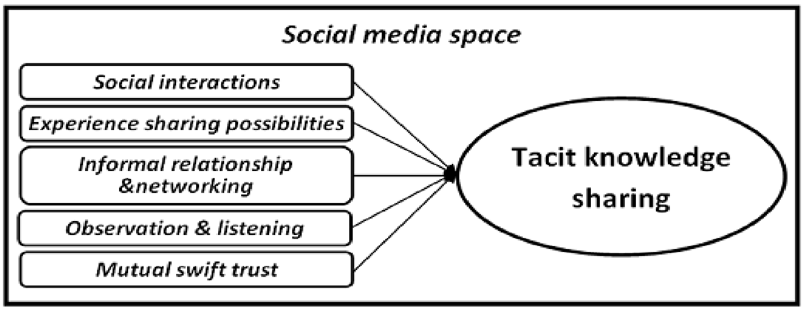



*Figure 3. 1 Conceptual model of tacit knowledge sharing in social media space*
Source: (Panahi et al., 2012b)

Being essentially theoretical, Panahi et al. (2012b) recommended the testing and validation of this conceptual model empirically in a variety of social media contexts. An empirical study in the healthcare field was conducted; from which they confirmed the validity of each factor of the model. Social media was confirmed to play a positive and useful role enabling physicians to share tacit knowledge in their day-to-day activities (Panahi et al., 2012a).

Interestingly, the requirements highlighted in the model proposed by Panahi and his team are similar to the challenges that impede tacit knowledge sharing in e-Learning, as described in Chapter Two; such as time and space, lack of face to face contest, low collaboration, trust, etc. The social media tools pinpointed by Panahi and team; such as online social networks, Wikis, blogs, etcetera; are the very features that are present in e-Learning environment. Therefore, it can be argued that this model can be suitable in e-Learning. Social web technologies have the ability to mitigate issues and challenges in e-Learning in order to facilitate the sharing of tacit knowledge; and thus the assumption adopted in this research to examine the real impact on the development of students' tacit knowledge.

### 3.2.4 E-Learning and Tacit Knowledge Sharing Success

"In the course of the last 10 years e-Learning has emerged as an imperative internet-based tool to acquire, impart and share knowledge in organizations" (Hildrum, 2009, p. 203). Historically, early generations of e-Learning were characterized by one-way communication of information, mediated through static electronic documents. The current e-Learning system involves far more contact between students and instructor; and incorporates interactive communication formats such as blogs, live chats, webcams, Wikis, live online courses, simulation systems and interactive 3D computer game environments. Another innovative tool that empowers e-Learning; is that of remote laboratories. These are fully equipped physical laboratories accessed and controlled at a distance through telecommunications, control and robotics systems (Colwell et al., 2002). Remote labs make it possible for both master and apprentice students located in different parts of the world to jointly access advanced lab equipment and contact material in various fields; including chemical engineering, microelectronics and telecom signal processing (Denizet et al., 2003; Ray, 2006).

Studies have also been conducted to examine the potentials of e-Learning as a favourable environment to help students and tutors share their tacit knowledge. Hildrum (2009) was a study committed to uncovering whether or not e-Learning can facilitate the sharing of tacit knowledge among individuals who are geographically separated.  Hildrum put forward the propositional framework shown in Figure 3.2; which delineates the process and influencing factors for tacit knowledge sharing in e-Learning context.

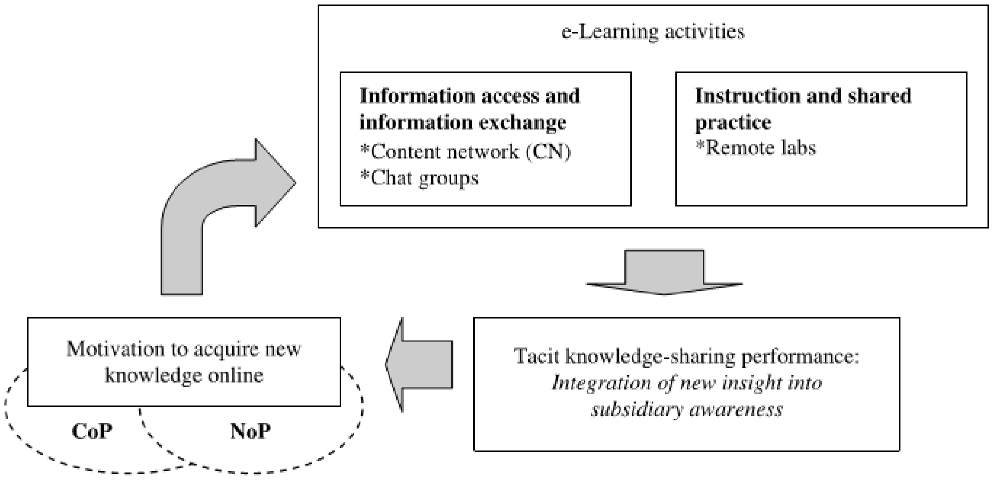



*Figure 3. 2 Framework of e-Learning, tacit knowledge sharing and motivation*
Source: (Hildrum, 2009)

The propositional framework portrays e-Learning activities, motivation and tacit knowledge-sharing performance. Hildrum argues that there is a dynamic and mutually reinforcing relationship between these categories. In fact, e-Learning activities include all type of resources and activities set within the e-Learning system.

Many studies of e-Learning state very high dropout rates caused by a lack of motivation or the inability to uphold motivation over time (Bonk, 2002; Moshinskie, 2001). This result aligns with Polanyi’s emphasis on the importance of personal enthusiasm and drive for the acquisition of new knowledge. While Polanyi was content to point out the importance of intrinsic motivation, research on e-Learning has gone a step further examining the underlying cause of the lack of motivation such as task relevance, authenticity and the availability of meaningful feedback (Bonk, 2002).

In Hodges (2004) opinion, the most important motivational factor is past learning performance and the feeling of mastering a task or a discipline. Students who have been successful in e-Learning in the past are typically more motivated to engage in e-Learning in the future. According to Hardré (2001), it is possible to encourage such virtuous circles of motivation and performance through the formation of online learning communities centered on the e-Learning tasks in question. Online communities are useful in the sense that they bring people with similar skills and interests together; and allow them to engage in informal interaction, support one another, and give meaningful advice and feedback regarding tasks and topics of shared interest. This latter argument involves some interesting overlaps with the above-cited literature about Communities of Practice and Networks of Practice.

Understanding the three components highlighted in Figure 3.2; Hildrum (2009) proposed four propositions associated with arrows in the diagram. First (vertical arrow): e-Learning activities can facilitate the interpersonal sharing of knowledge. Second (curve arrow): successful e-Learning performance depends primarily on the degree to which the users are motivated to acquire new knowledge online. Third, motivation can be facilitated through the formations of online Networks of Practice centered on the e-Learning activities. Within the four propositions (horizontal arrow): there is a mutually reinforced relationship between knowledge-sharing performance and motivation, meaning that past successful performance is likely to inspire more e-Learning in the future.

Hildrum's (2009) model is criticized for neglecting many other dimensions that might influence the tacit knowledge sharing such as psychological group dynamics, financial incentive systems and organizational structure. However, the framework is relevant and a starting point for analyzing and devising practical strategies to improve the organizational knowledge-sharing processes. This framework can used to inspire the development of e-Learning environment to facilitate and enhance tacit knowledge sharing in addition to others techniques presented above. An immediate hypothesis is that by integrating components in the Hildrum model and means suggested in the selected studies presented above, people will be able to effectively share and acquire tacit knowledge online.

## 3.3 THEORETICAL FRAMEWORK

The literature on tacit knowledge in the e-Learning context is as vast as tacit knowledge concept research. There are many related themes found in the literature to manage and leverage tacit knowledge in e-Learning. These theories have been developed from many different perspectives; and it may be daunting and confusing to understand how they all play a part in the success of tacit knowledge sharing and acquisition in e-Learning, supported by ICT.

It was found useful to provide the reader with a guide – shown in Figure 3.3. This guide has been followed in this study in order to identify key theories, concepts and mechanisms claiming to facilitate learners' ability to share, capture and retain tacit knowledge in e-Learning environments.

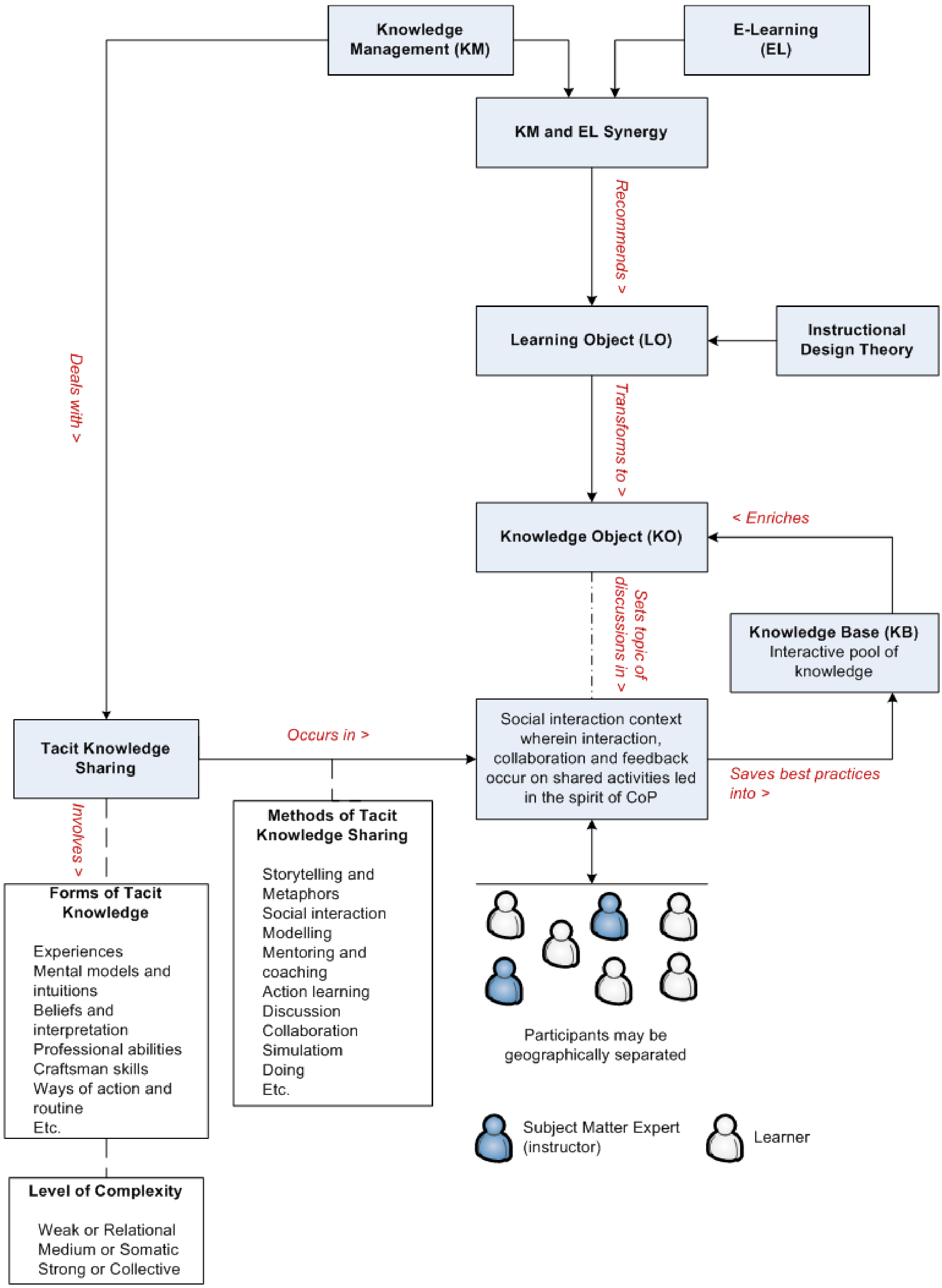



*Figure 3. 3 Theoretical framework*

## 3.4 CONCEPTUAL FRAMEWORK DEVELOPMENT

The conceptual framework is the basis of the research problem. It originates from the theoretical framework and focuses on selective components of the theoretical framework, which become the foundation of the study. The conceptual framework for this research is presented in Figure 3.4 integrating concepts found relevant and viable to facilitate the acquisition of tacit knowledge of the subject being taught in the e-Learning environment.

The model in Figure 3.4 presents concepts under study and the strategy to facilitate a learner's ability to acquire tacit knowledge within an e-Learning environment from learning, collaborating and interacting on a topic with peers, tutors and experts. The model implies that conducting learning and teaching activities in the spirit of the Community of Practice will enable students to engage and share information, ideas, insight and experience about the topic of interest with the tutor's guidance. The model advocates the use of Knowledge Objects obtained from transforming traditional Learning Objects to more dynamic e-Learning content. Knowledge Objects set the context of discussions and exchanges in the learning community. One role of the Knowledge Object is to prepare a student to develop some insights and understandings of a topic set within the community. In doing so, a student immersed in such an environment will go through a series of cognitive processes that can happen consciously or subconsciously; leading to the transfer and acquisition of knowledge that they may not be able to articulate easily.

The effectiveness of the dissemination and cultivation of tacit knowledge portrayed in the conceptual framework presented in Figure 3.4 holds onto a set of factors. Abdullah et al. (2011) present a framework to evaluate the effective transfer of knowledge in e-Learning (Figure 3.5). The authors clarify a set of factors that influence any form of knowledge to be transferred and received in an e-Learning environment. Following the same approach, the next sections will discuss factors that are likely to impact the transfer of tacit knowledge in e-Learning environment as presented in the conceptual framework of this study.

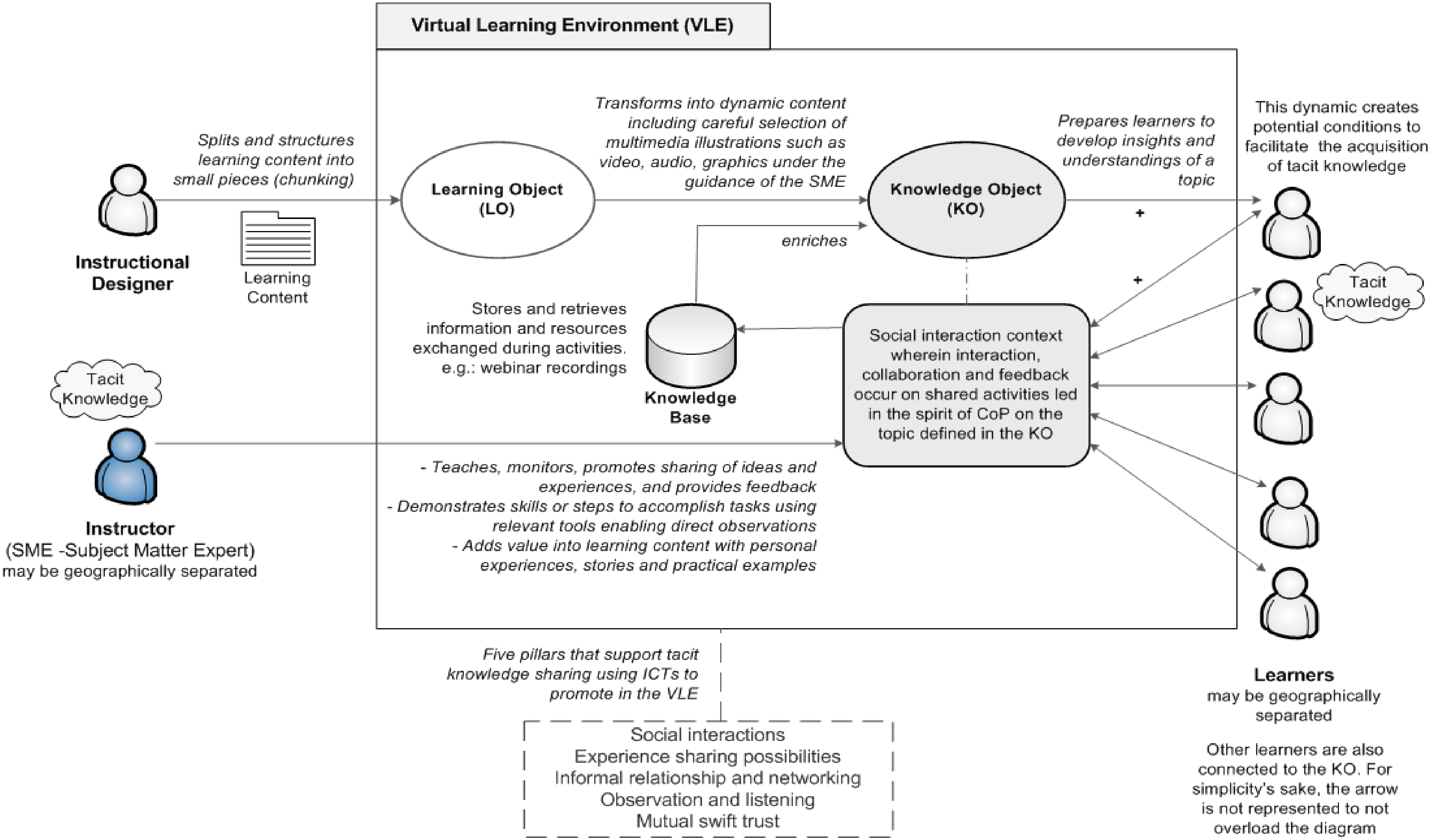



*Figure 3. 4 Conceptual framework*

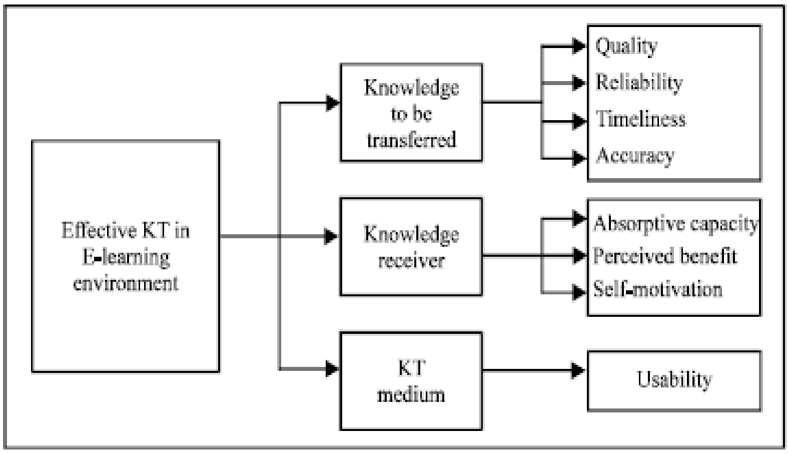



*Figure 3. 5 A framework for measuring knowledge transfer in e-Learning*
Source: (Abdullah et al., 2011)

### 3.4.1 Tacit Knowledge Holder or Instructor Factor

Ancori et al. (2000, p. 273) asserted "knowledge remains tacit because the emitter and/or receiver have no knowledge about how to exchange knowledge."

Generally speaking, the transfer of knowledge from an emitter (instructor/subject matter expert) to a recipient (student/novice) depends highly on the emitter's wealth of knowledge and experience (Gupta and Govindarajan, 2000). As suggested by Szulanski et al. (2004), a source with relevant experience in knowledge transfer can easily initiate knowledge transfer from himself to the recipient. Turning to tacit knowledge, the knowledge holder should master mechanisms and techniques to externalize his/her information to novices. On the other hand, as the medium and context is ultimately online, this requires the tacit knowledge holder to be proficient and familiar with technology. On contrary, incompetency in using ICTs could have the opposite effect.

The credibility of the tacit knowledge holder is another factor that may influence knowledge transfer. Credibility is the extent to which the recipient perceives the knowledge to be trustworthy, reputable and expert (Joshi et al, 2007). According to Szulanski et al. (2004) and Ko et al. (2005), credibility is very important to ensure the success of knowledge transfer. This suggests that the tacit knowledge holder should be credible so that his/her personal experience or stories teach and inform students positively.

### 3.4.2 Tacit Knowledge Seeker or Learner Factor

Aligning with the Ancori et al. (2000) quote mentioned in the previous section, tacit knowledge is captured and recalled if the receiver is in a position to understand what has been referred from the emitter. In fact "...There will always be significant knowledge that cannot be communicated due to lacking receiver competence... It is 'tacit' to those who don't understand" (Eliasson in Lamberton, 1997, p. 75). Busch (2008) amplifies that "in a master-apprentice situation, the apprentice is never likely to attain tacit knowledge if the frame of the mind is not willing to accept the subtle skills passed on by the master". Busch added that one could also argue that novices who do not wish to understand or novices who do not wish to see, are unlikely to acquire tacit knowledge. In relation to contingency-based knowledge perspective, the receiver can only acquire the tacit component of knowledge if they themselves have experienced similar to contingency-based experiences. For instance, a metaphor or context used to illustrate certain points could make more sense if the novice is familiar with the context.

From the discussion above and other studies, three key factors could impede the successful acquisition of the tacit knowledge from novices' side: learning intent, absorptive capacity, motivation and rewards.

The learning intent is defined by Tsang (2002) as the level of desire, will and actual commitment of the recipient with respect to learning and acquiring knowledge from the source. Easterby-Smith et al. (2008) and Pérez-Nordtvedt et al. (2008) then argued that if a knowledge seeker has the intent to learn and acquire knowledge possessed by the source, it will be better prepared psychologically to understand and assimilate the required knowledge. Park (2001) advised that constant efforts have to be made to internalize new knowledge; otherwise knowledge transfer is likely to be more difficult. The absorptive capacity is the ability of the knowledge seeker to recognize the value of new knowledge supplied by an expert source, assimilate, recall and apply that knowledge successfully (Srivardhana and Pawlowski, 2007; Ko et al., 2005). It can be argued that the absorptive capacity is defined by an individual's experiences and baseline knowledge in the field. Furthermore, motivation is also an important factor for acquiring new knowledge. Gold et al. (2001) asserted that motivation and incentive systems should be present in a learning environment so that individuals feel encouraged and rewarded for spending time acquiring, applying and sharing knowledge.

Hildrum's (2009) propositional model presented in Figure 3.2 acknowledged and highlighted motivation as an important factor to acquire tacit knowledge in e-Learning. What's more, Hildrum recognizes the importance of the absorptive capacity, experiences or baseline knowledge by warning that "to contribute to and benefit from an international network, people require a threshold level of knowledge about the practice question" (Coenen et al., 2004 cited in Hildrum 2009, p. 203). Stark et al. (2013) shared the same opinion. They confirmed that motivation, self-discipline and technology literacy predict the learning performance; and that students are also impacted by their access to the internet, comfort with electronic communication and their level of experience with computers and other ICT devices. Their findings also reveal that for lower-level students, access to the internet matters most, while motivation and self-discipline are more significant for upper-level students. The literature also seems to agree that age and years of experience affect the possession and application of tacit knowledge (Busch, 2008, p. 172).

In summary, the following students' characteristic or attributes can potentially influence their ability to acquire tacit knowledge in an e-Learning environment based on studies presented above: age, English as a first language, years of work experience, years of experience in the field, perceived usefulness of the e-Learning program, self-competence, self-directed learning, motivation, perception of the proposed e-Learning model. Gender, ethnicity, major field of study, working status working (part-time or full-time), familiarity with e-Learning environment, years of using e-Learning in academic studies constitute other factors of analysis suggested in e-Learning and adult learning literature discussed in the previous chapter.

### 3.4.3 E-Learning Environment and ICT Factor

E-Learning environment, commonly referred to as a 'Virtual Learning Environment' or a 'Learning Management System', defines the context where learning and teaching generally take place in online education. Moodle and Blackboard are two of the most popular Virtual Learning Environments in the market. As the support and the backbone of communication in e-Learning, the quality of the Virtual Learning Environment is ultimately crucial to accommodate knowledge sharing activities among participants (Ko et al., 2000).

According to Gold et al. (2001), collaborative and distributed technologies allow people to communicate effectively, transfer and acquire knowledge from partners or other peers by eliminating the structural and geographical impediments. This suggests that the Virtual

Learning Environment should be fitted with technologies that enable students and instructors to collaborate effectively. Looking at ICT in particular, the study of Panahi et al. (2012b) recommend that social web technologies are able to satisfy the collaboration dimension. However, it implies that participants should be familiar and proficient in using them in way that will help them understand and exchange their experience and tacit knowledge more effectively.

### 3.4.4 Knowledge Object Factor

The content in online learning gives directions to access appropriate information or knowledge. The learning resource has to be of quality, and easy to boost and drive the learning and teaching processes. Horton (2001) sees a Knowledge Object as an electronic content that can be accessed and must have a goal to accomplish. This suggests that each Knowledge Object designed and dispatched to students should clearly express the skills they should be able to demonstrate from it (Sabitha et al., 2014). The components of a Knowledge Object according to Merill (1998) are: *Information Component* (name, subject, date, and status), *Parts Component* (objective, keywords, abstract, content), *Properties Component* (other attributes that describe an object), *Activity Component* (view, search, print) and *Processes Component* (sets of actions performed to satisfy a goal or set of objectives).

In practice, Liebowitz and Frank (2011) recommends that Knowledge Objects be made available anywhere and anytime. It then advises providing content that is most likely to be functional across the various devices being used by students in the present day; which may not always be compatible to network and access within the Virtual Learning Environment. Furthermore, Knowledge Objects should be linked to the *Knowledge Base* comprising of resources and materials exchanged in the learning community, whereby students can deepen their understanding of a specific knowledge and peers' contribution. This can be regarded as additional and dynamic sources to supply students with information and/or ideas relevant to the subject.

### 3.4.5 Community of Practice Strategy Factor

For people with a shared common interest, the purpose behind gathering in a Community of Practice is to collaborate and share experience and best practices. The online Community of Practice is a virtual version of the more traditional, face-to-face type of Community of Practice Like social networks, online Communities of Practice are characterized by informal learning (Gray 2004) and shared interests. In such space, participants are able to actively exchange information and ideas; and both learn and work together. There is no requirement for a formal award or accreditation. Many of these communities are social spaces or networks as opposed to formal learning spaces. Online Communities of Practice can potentially provide the opportunity for formal, non-formal and informal learning.

On the internet, there are many platforms that mimic the online Community of Practice concept available for various fields. A popular example of such a platform is StackExchange; a virtual space where people sharing the same interest or concern pertaining to Programming, Chemistry, Politics, Engineering, etcetera; and join together to share their experiences and ideas on questions raised in the community. It can be overwhelming to review all of the answers, as they are not always relevant. To tackle this issue, the platform has implemented a rating or voting system that enables members to rate every response. Obviously, an answer with the highest rate turns out to be the best idea that is endorsed by the entire community. Furthermore, each member's credentials are public; as are their levels of interactivity and the percentage of positive contribution. This information can account for the credibility of the answerer, and allow others to better determine whether or not to consider his/her idea.

E-Learning environment in the education or corporate context tends to be formal; where knowledge sharing takes place during organized training or courses and participants behave in a very formal way. With the findings of Panahi et al. (2012b), the communication in such context should allow people to network socially and informally, and therefore develop common language, understanding and interest.

### 3.4.6 Summary

There is an abundance of theoretical concepts or ideas to facilitate and leverage tacit knowledge sharing and acquisition in a virtual space, that have seldom been tested. Among directions found in the related literature, the conceptual framework proposed here links concepts and presents a strategy that this study claims to be viable and practical, in order to facilitate students' ability to acquire tacit knowledge of a subject in an e-Learning environment.

## 3.5 VARIABLES AND MEASUREMENTS

This study is set primarily to answer whether or not students are able to acquire tacit knowledge in e-Learning environments. It aims to examine the development of students' tacit knowledge of a given subject in a purposefully designed e-Learning environment, under the condition described in the conceptual framework presented in this chapter. Afterward, an investigation is conducted to ascertain the influencing factors that positively impact students' ability to gain tacit knowledge in an e-Learning environment. Given the focus of the research, hypotheses for the experiment are defined based on the control group design adopted to meet the research objectives. There are formulated and organized in three groups:

**Tacit Knowledge Acquisition**: to evaluate tacit knowledge acquisition, the differences in tacit knowledge (TKIBP) scores between experimental group and control group of students are examined before and after the e-Learning experiment. The following hypotheses are defined:

- $H_0$: $\mu_{exp} = \mu_{control}$, null hypothesis states there is no difference in pre-scores between the two groups
- $H_1$: $\mu_{exp} \neq \mu_{control}$, alternative hypothesis states there is a difference in pre-scores between the two groups

- $H_0$: $\mu_{pre} = \mu_{post}$, null hypothesis states there are no changes in TKIBP scores pre- vs post- intervention
- $H_1$: $\mu_{pre} \neq \mu_{post}$, alternative hypothesis states there are changes in TKIBP scores pre- vs post- intervention

- $H_0$: $\mu_{exp} = \mu_{control}$, null hypothesis states there is no difference in improvement between the two groups
- $H_1$: $\mu_{exp} \neq \mu_{control}$, alternative hypothesis states there is a difference in improvement between the two groups

The scores of students assessed by observations of a panel of experts within the close monitoring initiative – discussed in the research methodology – was initiated to confirm the results of the above hypotheses.

**Facilitating Tacit Knowledge Acquisition in e-Learning Environment**: to evaluate the effectiveness and viability of the proposed model to facilitate tacit knowledge in e-Learning environments using Knowledge Object concept to design e-Learning content; coupled with interactive and collaborative learning and teaching activities; lead in the spirit of Community of Practice. An examination is conducted on each individual Knowledge Object and associated activities against related tacit knowledge (TKIBP) scores in a scenario covered by that Knowledge Object, and learning and teaching dynamic. For simplicity's sake, the module is used to refer to Knowledge Object and associated learning and teaching activities conducted in the spirit of a Community of Practice. In other words, an analysis is conducted on the association between the improvement in tacit knowledge (TKIBP) of a subject defined in a scenario and the module covering the scenario. Hence, the following hypotheses are formulated:

- $H_0$: null hypothesis states that there is no association between improvement in TKIBP scenario and corresponding module
- $H_1$: alternative hypothesis states that there is an association between improvement in TKIBP scenario and corresponding module

**Students' Characteristics and Factors**: the following are the determining characteristics and factors that may significantly influence students' ability to acquire tacit knowledge in e-Learning environments: age, gender, ethnicity, major field of study, present employment status, years of work experience, years of experience in the field, English as a first language, familiarity with e-Learning environment, years of using e-Learning in academic studies, self-competence, perceived usefulness, self-directed learning, motivation, and perception of the proposed e-Learning model. Based on these things, the following hypotheses are proposed:

- $H_0$: null hypothesis states there is no association between TKIBP score improvement and a factor (age, gender, etc.)
- $H_1$: alternative hypothesis states there is an association between TKIBP score improvement and a factor (age, gender, etc.)

## 3.6 CHAPTER SUMMARY

This chapter has developed a conceptual framework for the research, integrating components and factors of interest. This conceptual framework offers the main frame of reference and potential lines of investigation, for the analysis and survey that will be carried out in this thesis to explore students' level of tacit knowledge acquisition in an e-Learning environment; and the influencing factors that positively impact students' a ability to acquire tacit knowledge in e-Learning. The proposed conceptual framework is novel because it combines the concept of Knowledge Object and Community of Practice learning strategy associated with the sharing and acquisition of tacit knowledge in e-Learning environments, identified in previous studies. Its significance lies in practical guidelines for implementation to move from mere theoretical studies about tacit knowledge in e-Learning. It also stresses the demographic and background variables of learners as influencing factors. To the researcher's knowledge, none of previous studies has attempted to combine similar concepts and examine learners' influencing factors to acquire tacit knowledge in an e-Learning environment. The proposed conceptual framework could be used as a frame of reference by educational institutions, which seek to implement and conduct E-Learning courses. It could also serve as a decision-making tool to support educational institutions in their effort to develop E-Learning platforms that will facilitate students to acquire knowledge hidden among their peers and tutors. Scholars can use this conceptual framework to deepen and expand their understanding of the acquisition of tacit knowledge in e-Learning environments.

# Chapter 4: Research Methodology

## 4.1 CHAPTER INTRODUCTION

The main purpose of this research is to empirically investigate learners' ability to acquire tacit knowledge in a typical e-Learning environment, where they learn and interact with subject experts using ICT tools without face-to-face contact. The goal is to evaluate whether or not learners' tacit knowledge of a subject varies in importance through a subject-specific e-Learning program over a period of time. This also motivates the exploration of important influencing factors or characteristics that impact learners' capacity to acquire tacit knowledge, if any, in an e-Learning environment. The previous chapter proposed a conceptual framework that consolidated and integrated concepts that claimed to facilitate tacit knowledge sharing and acquisition in e-Learning environments, by providing theoretical and practical guidelines to develop the testbed environment for this research. This chapter presents the overall methodology of the research and its detailed phases; while discussing and justifying instruments, methods and techniques used to collect information, conduct the e-Learning experiment and analyze data to answer the research enquiries.

The ethereal nature and complexity of tacit knowledge constraints research on the subject. This offers possible reason as to why many studies on tacit knowledge tend to be more descriptive and non-empiric. This study endeavours to address the issue of tacit knowledge acquisition in e-Learning environments in a different way in order to give an insight of the level of tacit knowledge potentially gained by knowledge seekers. The stages to achieve that target are as follows: first the scene for the "empirical" conduct of tacit knowledge research is presented. Second, a general overview of the methodology is presented, inspired by Busch's (2008) approach to carry out empirical tacit knowledge research and adjusted following the study interest. Third, a step-by-step guide is developed according to the objectives to achieve in this research. Each step or component of the research is addressed and, if relevant, every concern inherent in social science research such as the research paradigm, research approach (quantitative and/or qualitative), research strategy and research design. It also includes methods and techniques to collect and analyze data and, ethics considerations. Fourth, the methodology rigour is justified supporting the reliability, validity, credibility and generalizability of the findings.

## 4.2 EMPIRICAL CONDUCT OF TACIT KNOWLEDGE RESEARCH

Eldabi et al. (2002, p. 64) stated, “conducting any type of research should be governed by a well-defined research methodology based on scientific principles”. Regarding tacit knowledge research, Busch (2008, p. 167) highlighted that “the research must take into account that whereas tacit knowledge may be a much talked about phenomenon, when it comes to actually experimenting or observing how tacit knowledge could be collected, measured or transferred, the options are limited”. The atypical nature of tacit knowledge adds much burden to controlled experiments whilst the knowledge itself is very much grounded within an organization or community and the interaction among people. According to Stenmark (2000), there is more than reasonable support for the idea that the conduct of tacit knowledge related research is best commenced from qualitative perspective.

With the existing and proven techniques, such as that of psychologist Sternberg and his team, firmly grounded into a positivist epistemology whereby authors used questionnaires and statistics to interpret the results, Busch (2008) suggested the integration of the interpretivist approach to combine the strength of both epistemological approaches.

## 4.3 GENERAL METHODOLOGICAL OVERVIEW

Due to the soft nature and complexity of tacit knowledge, the research process must commence with a very extensive review of literature to define and establish what could be said to comprise tacit knowledge. This exercise in formulating a definition essentially allows the researcher to determine two things. First, the knowledge area of the study should be defined to determine whether the research may be conducted purely theoretically or should take place within a “real world” field. Second, the selection of research instruments that will enable data collection and data analysis. As discussed in the literature review chapter, in this research tacit knowledge refers to articulable tacit knowledge (pages 74-77) to meet the research objectives and make comparisons with previous studies. The ‘tacit knowledge in business presentation’ subject chosen for the experiment refers to articulable, implicit professional business presentation expertise. Properties and examples of such knowledge are given in Table 4.1 (Dampney et al., 2002).

*Table 4. 1 Articulable tacit knowledge properties in a knowledge area*

| |
|---|
| {Abstract high level plans, Abstraction, Access constraints, All purpose algorithms, Analogies, Aphorisms, Artistic vision, Assumptions, Behaviour, Beliefs, Business knowledge, Common sense, Competitive advantage, Complex multi-conditional rules, Concepts, Constructs, Content, Contradiction, Convincing people, Crafts, Culture, Customer's attitudes, Customs, Data, Decision making, Descriptors, Discussion, Everyday situations, Examples can be articulated, Expectations, Externalization, Face to face transfer, Goal attainment, Grammatical rules, Gut feel, Habits, Heuristics, Hunches, Ideals, Imitation, Impressions, Information, Information placed in meaningful context - eg. Message, Innovation, Interaction, Job knowledge, Judgement, Justified true belief, Know how, Knowledge base that enables us to face the everyday world, Knowledge of designs, Logical rules, Maxims, Meaning, Methods, Negotiation, Observation, Perceptions, Performance, Perspectives, Political correctness, Practical know how, Practice, Prescriptive knowledge, Principles, Private knowledge, Procedural in nature, Procedures, Process, Proverbs, Reproduction, Riding a bicycle, Ritual, Routine, Rules of thumb, Schema, Script/Scripted, Semantics, Shop lore, Stories, Subjectivity, Swimming, Task management, Tasks, Team coordination, Technique, Technology, Theories, Tradition, Trial and error, Tricks, Understanding, Understanding of categories, Values, Way things are done, Wisdom} |

Source: Dampney et al. (2002, p. 6)

Despite the extensive literature on tacit knowledge, there are very few studies concerned with the measure of tacit knowledge other than Sternberg and his colleagues (Sternberg et al., 1993, 1995, 2000; Wagner and Sternberg, 1986). The majority of empirical tacit knowledge research takes place in psychology where the emphasis is on testing at the individual level, along the lines of who possesses more tacit knowledge than others. As a means of increasing rigour Busch and Richards (2000) felt it was beneficial to adopt a triangulated approach which would incorporate both the positivist and interpretivist approaches; a Sternberg based psychological testing instrument presented above, Social network analysis as a tool to track and monitor the soft knowledge dissipation cycle, and formal concept analysis as a means of balancing results with those achieved by the way of the Sternberg's method and the dissipation through people.

Following Busch and Richards opinion, we also adopted a triangulated approach combining both the positivist and interpretivist viewpoint to collect and analyze tacit knowledge data from the experiment conducted in the research to answer research questions. From this perspective, the conduct of the study was broadly composed of three phases. The first phase involved choosing and justifying the field of interest, which in this case is 'business presentation', and getting the approval of the ethics committee. The second involved defining methods and instruments used to measure tacit knowledge in the chosen field. The third involved building Knowledge Objects, preparing learning and teaching activities to perform in the spirit of a Community of Practice; setting up the Learning environment as defined in the conceptual framework; and preparing various questionnaires to collect data throughout the experiment. The fourth phase was dedicated to the conduct of experiment where the experimental group of learners joined instructors to learn, collaborate and share ideas, experiences and best practices related to business presentation field, over a span of 14 weeks. This also included a set of activities to collect data at the beginning, middle and end of the program. The fifth phase consisted of gathering the students perspectives and opinions of the e-Learning program on a set of variables; and consolidating the data collected during the experiment for data analysis. Each phase will be examined in more detail in the following sections commencing with the background of the research.

## 4.4 PHASE 1: CHOICE OF THE FIELD AND ETHICAL CLEARANCE

### 4.4.1. Field of Interest

Tacit knowledge is contextual and field specific; therefore, it is important to possess the testing instrument for the related field, prior to embarking into the testing phase. Existing testing instruments are available for managers, military leaders, salespersons, teachers, information technology, information system managers, etc. Since the purpose of this research was to ascertain the effectiveness of sharing tacit knowledge through ICT tools in online learning as well as the possible gain or increase of tacit knowledge from a novice perspective, any field would have been appropriate to meet research objectives; however, 'business presentation' was determined to be the best opportunity for a number of reasons.

As there were no tacit knowledge testing instruments available for business presentation, it seemed daunting to carry on with this chosen field; as the researcher had to construct such an instrument, essential to gauge participants' level of expertise and improvement in further steps of the study. Nonetheless, reasons to proceed with business presentation field were.

- Mere memorization of rules and facts do not make an effective business presentation. The possession of tacit knowledge may be a contributing factor in the success of the presentation, because the tacit knowledge they possess could be contributing to their confidence in the delivery. For example fear and anxiety grip some people when it comes to public speaking, regardless of whether the audience is large or small.

Techniques to tackle fear or anxiety factors are abundant in books but to put these techniques into practice is entirely different in itself. This is, among other things, an aspect that experts master that make themselves often successful in delivering business presentation. Therefore it will be of interest to investigate whether or not learners or novices can acquire such skills online.

- Fallows and Steven (2000, p. 75) declared that “Today’s challenging economic situation means that it is no longer sufficient for a new graduate to have knowledge of an academic subject; increasingly it is necessary for students to gain those skills which will enhance their prospects of employment.” According to Stowe et al. (2010), effective communication and presentation skills can give a new business school graduate a competitive advantage over his or her peers with the ability to speak effectively in front of an audience;

- Knowing how to deliver an oral presentation is also perceived and exemplified as possession of tacit knowledge about managing tasks by Wagner and Sternberg (1991, p. 2) (key researchers in tacit knowledge testing): “... An example of managing tacit knowledge tasks is about knowing how to make an effective oral presentation”. Additionally, Campbell et al. (2001) highlighted that business people often mentioned oral presentation situations when describing their most challenging communication episodes at work. This suggests that successful presentations involved some tacit skills. Hence, the researcher felt that such an area would be a good case to witness skills transference via e-Learning. The researcher then expected undergraduate students to significantly improve their business presentation skills after the e-Learning experiment.

- There was an opportunity sample and e-Learning environment in an UK institution meeting the requirements for this study. The institution offers a wide range of courses from undergraduate to doctorate level. Second-year undergraduate students have to deliver a presentation to a professional standard in front of audience comprised of professionals from different companies and lecturers as part of the assessment for a core module. The presentation mark is essential to pass the module and it is also an opportunity for students to obtain job placements and prizes.

  Every academic year, the institution offers extra rehearsal classes to help students improve their business presentation skills but the outcomes were not fully satisfactory.

Therefore, it was felt that conducting the research in such context, participants were more likely to get involved and hone their practical skills in that realm. This also suggests that participants were more likely to be motivated in taking part. Furthermore, conducting the experiment on the subject of business presentation gave some guarantees such as the availability of the participants, instructor, the Virtual Learning Environment platform and ICT tools needed for the e-Learning experiment as the institution showed high interest in the research.

- According to Kenkel (2011): “Academics and practitioners have long agreed that communication skills and linked to professional effectiveness”. Kenkel added that online business degrees often eliminate oral presentations from their curricula because of logistics involves. This created a serious void in a student’s educational experience from that type of learning environment.

By exploring research enquiries over the business presentation field, the study will reveal the student's ability to acquire tacit knowledge related to business presentation; which will reflect on and impact their professional expertise in making business presentations. What’s more, methods and techniques applied and implemented in the e-Learning experiment will clarify some concerns about e-Learning; and also provide practical guidelines for the future initiatives of online institutions.

The business presentation field was an opportunity for the researcher that also met the criteria of the research. It was employed to conduct the experiment needed in the study to answer all research questions. Moreover, it was thought that proceeding with business presentation will provide not only more indication and clarification on tacit knowledge gain in online learning but also, it will give an overview and outcome of learning and teaching online practical skills associated to business presentation.

### 4.4.2. Ethics Committee Approval

Gaining ethical clearance prior to any actual data collection was one of the main concerns. Certain safeguards were taken to comply with the University of Wales Trinity Saint David’s code of practice and also ethics considerations that matter in any social science research. As a general principle, the intention of the research is to ensure that participants are treated equally and not exposed to any harm. The main research subjects were adults learning and/or participating over the Internet. The research also involved some face-to-face and virtual contacts between the researcher and field experts for semi-structured interviews.

While the Internet makes people's interactions uniquely accessible for researchers and erases boundaries of time and distance, such research raises new issues in research ethics, particularly concerning informed consent and privacy of research subjects, as the borders between public and private spaces are sometimes blurred. To tackle those issues, Eysenbach and Till (2001) proposed to researchers a framework as a reminder including *intrusiveness, perceived privacy, vulnerability, potential harm, informed consent*, and *confidentiality*. Combining the human participation aspect, the level and details of the participants' involvement in the study led to the following ethical considerations (Creswell, 2013; Babbie, 2013):

- Voluntary participation was respected at all levels;
- Participants were informed beforehand on the purpose of the study as well as the quality and the kind of the results that will be published. Each participant then provided his or her approval before participating in the research. Participants were entitled to withdraw from the research at any time until publication of the thesis.
- Participants were assured that all information, comments and responses they shared with the researcher would be treated confidentially, that is, no names, or any other identifying information would be reported in the study. Practically, codes such as "Student 1", "Expert 2", "BPP-C3", etc., were used in order to de-identify participants at every stage.
- Only the researcher had access to the participants' data, the audio files of the interviews and web-based questionnaires data.
- At the beginning of the research, no potential risk was identified. However, a risk assessment was conducted at every stage of the research journey to tackle any issue that might occur.
- Findings of the study would only be used for the purposes of the research.

The Ethics Committee of the University of Wales Trinity Saint David reviewed the study approach for the data collection and data analysis. Their final approval was received in late July of 2013 and the research was considered as "Low Risk". One final requirement from the Committee was that research results be kept secure for at least 5 years and that the means of identification of subjects must be available only to the principal researcher.

## 4.5 PHASE 2: METHODS OF TACIT KNOWLEDGE TESTING

The Sternberg approach remains the popular and practical method for tacit knowledge testing which cannot be disregarded in this study. Another reason for using the Sternberg approach is that there is a general acceptance in the research community of situational job inventories (McDaniel et al., 2001). Accounting for the criticism against the Sternberg approach, we sought to apply recommendations to mitigate issues related to the Sternberg situational judgement test construct found in McDaniel and Whetzel (2005, 2009) as well as Lievens et al. (2008) to produce and use a valid and reliable test instrument. The Sternberg method being firmly grounded into a positivist epistemology, we subscribed to Busch's (2008) recommendation to integrate the interpretivist approach to complement the positivistic approach and combine the strength of both epistemological approaches throughout the collection and analysis of data to answer the main research enquiry. Churchman (1971) regards epistemology as "systems of inquiry". He notes that epistemologies differ not only in how they investigate the world, but also what is considered information. Different epistemologies produce different understandings of the situation.

Quantitative inquiry employs data collection techniques that generate or use quantitative data or numerical and measurable data with accompanying statistical analysis to answer the research questions of "what" and "how many" about the phenomenon under study (Babbie, 2011). Conversely, qualitative inquiry emphasizes acquiring and analyzing qualitative data or meanings in order to answer the "how" and "why" research questions related to the phenomenon under study. It is concerned with understanding the experiences and actions of people as they engage with their environment. Qualitative inquiry employs data collection techniques that generate or use non-numerical data, such as questionnaires, participant observation, interviews and focus groups (FitzGerald et al., 2008). Quantitative and qualitative approaches are sometimes employed together to answer a specific research question, which is then called mixed-method research. The general differences between quantitative, qualitative and mixed methods are shown in Table 4.2.

*Table 4. 2 Quantitative, qualitative, and mixed methods*

| Quantitative | Qualitative | Mixed Methods |
|---|---|---|
| Bases on meaning derived from numbers. | Based on meanings expressed through words. | Based on meaning derived both from numbers and those expressed through words. |
| Data is numerical and standardized, collected using a predetermined instrument. | Data is non-standardized, such as interview, document, observation data. | Multiple forms of numerical and qualitative data is collected. |
| Data is analyzed using statistical methods. | Data is analyzed through the use of conceptualization and interpretation. | Both statistical and qualitative approaches are used for data analysis. |

Adapted from: Saunders et al. (2009) and Creswell (2009)

As explained at the beginning of this section, the current study is to test for the change or improvement of tacit knowledge of learners before and after an experiment including influencing factors causing any improvement of tacit knowledge, which is well accommodated by quantitative techniques namely the Sternberg approach to answer some research questions. The study also looks for the learners' viewpoints, perceptions, and experiences of using ICT and the proposed e-Learning environment for tacit knowledge acquisition. Furthermore, due to the underexplored nature of the topic, a qualitative approach was also deemed appropriate and complementary for achieving the goals of the study (Taylor and Bogdan, 1998).

With this ground, we developed our mixed-methods with data collection technique to meet the research objectives and to enable comparison with existing studies like Busch et al. (2003) who employed a mixed method approach to investigate tacit knowledge acquisition and sharing including its diffusion in brick and mortar organizations.

Our first method was based on the Sternberg technique. The second and third method belong to the qualitative stance using qualitative data collection; including observing, interviewing, and analyzing documents or audio-video materials (Creswell, 2009). The second method required monitoring the learners closer while they are engaged in the learning process in the e-Learning environment, which used predominantly observations. Observation is the most fundamental of all research methods that provides depth and rich insight due to its focus on a situation for a specified duration of time. Observation was considered appropriate for this study as it provides the opportunity to observe learners' behaviour and actions while performing tasks related to the subject of interest throughout the experiment and to gain insight into how tacit knowledge is acquired in the e-Learning environment.

The third method used interviews. Interviews are more powerful in eliciting narrative data that allows researchers to investigate people's views in greater depth (Kvale, 2003). The value of interviewing is not only because it builds a holistic snapshot, analyzes words, reports detailed views of informants but also because it enables interviewees to “speak in their own voice and express their own thoughts and feelings” (Berg, 2007, p. 96). With different types of interviews, semi-structured interview was deemed appropriate for this study to gain in-depth information about the interviewee’s thoughts, knowledge, reasoning, motivations and feelings. Semi-structured interviewing provides to the researcher opportunities to ask participants for a detailed account and explanation of their opinions and experiences (Saunders, et al., 2009). Moreover, researching tacit knowledge acquisition, which is a highly complex concept, requires an in-depth understanding of the phenomenon to yield a variety of perspectives and experiences. Semi-structured interviews provide a better capacity to achieve such an understanding rather than administering other type of survey such as open-ended questionnaires. Open-ended questionnaires may raise issues such as misunderstandings about the concept being studied and result in incomplete responses (Saunders, et al., 2009). Therefore, semi-structured interviews were deemed to be a more efficient and effective way of gaining answers to the research questions than open-ended questionnaires.

The next sections will present each of the three mixed-methods in details including the process, sampling strategy, sample size, role in the study, etc.

### 4.5.1. Method One - The Sternberg-based TKIBP Construct and Validation

**Approach:** this method uses situational job inventories as a means of determining the differences in “street smarts” between experts and novices through a tacit knowledge inventory questionnaire. The development of the tacit knowledge inventory instrument begins with interviewing field experts in business presentation.

**Process:** interviewing experts consists of asking what it takes to succeed in the field, to provide typical performance-related situations and possible options to handle these situations. This exercise involves identifying examples of informal knowledge about delivering quality and professional business presentations. These examples are about delivering presentations that are not written in books or taught in classes, but nevertheless used by expert business presenters as they meet the demands of their jobs. It is the knowledge and lessons learned as they relate to incidents, problems and challenges faced or witnessed by experts in the field.

**Sampling strategy and recruitment procedure**: experts were recruited around the world using the snowball sampling approach where one participant would provide referral/recommendation for their colleagues or friends who are also experts. The candidates received a formal email with the details about the research and an invitation to participate (see appendix A), including a short screening questionnaire. They have to fill out the questionnaire providing information about their years of experience, place of employment and/or accreditations as well as familiarity in the subject of tacit knowledge. In order to qualify, a person must have at least ten years of experience in dealing with business presentations; which is commonly perceived as being senior in the field. The literature also seems to agree that age and years of experience affect the possession and application of tacit knowledge (Busch, 2008, p. 172).

More importantly, experts were asked to provide samples of presentations delivered; including video recordings and webinars; as well as information related to the context of presentation; such as when and where it took place, as well as the type of audience. Three independent experts watched these samples of presentations, assessed each and provided and overall assessment score. Assessment score was based on the following 9 rubrics suggested by Kenkel (2011): introduction, vocal qualities, eye contact, gesture/posture, transitions, organization and length, audience attentiveness, conclusion, appearance of speaker and visuals (see appendix I). If the assessment score was 24-27 then the practical intelligence of the expert was confirmed.

**Interviews**: interviews comprising of both open and closed questions ranging from 45 to 90 minutes in duration were conducted with seven business presentation practitioners. The purpose of this exercise was to elicit their tacit knowledge along the lines of Sternberg's technique. The interview guide used can be found in Appendix B. The interview guide was carefully followed and deepened via prompts used by the interviewer until it was noticed that nothing new emerged in the last interviews and relative data saturation had been achieved.

Inspired by Busch (2008), it was felt desirable to include a mix of both practitioners and/or theoreticians such as lecturers, business conference presenters and researchers who teach or attend business presentations; in order to provide balance and strength to the tacit knowledge inventory. The five practitioners and/or theoreticians were also interviewed to capture their experience in delivering business presentations and what seemed to be the best and worst qualities exhibited by presenters they have observed. The same interview guide followed with experts was applied. The interview lasted between 35 and 80 minutes.

Some secondary data such as videos and podcasts from consultants and influential business speakers were also used to increase the robustness of the instrument. The approach consisted of capturing stories, examples and situations whereby authors were providing tips and tricks to succeed in the issues related. The guide followed the same lines and structure as the others mentioned above so as to make it more intuitive and simple to match topics and incidents reported by each group of participants. A total of five secondary sets of data were selected and reviewed. The target of all data collected at this stage was to build the tacit knowledge inventory for business presenters labelled TKIBP.

**Creation of Tacit Knowledge Inventory (TKI):** interviews were transcribed and codified using NVivo – qualitative data analysis software. The summarization and analysis were conducted along the lines of Sternberg's approach (see Appendix C – Interview Coding Sheet). The outcomes enabled the creation of 17 business presentations workplace scenarios with answer options for dealing with each scenario. The answer options varied from 5 to 11 ways of dealing with each specific scenario making a total of 100 questions. Each answer option was specific to that particular scenario, although broadly similar themes began to emerge from interviewing practitioners and theoreticians along the lines of "management" related information, which was retrospectively discovered in Wagner and Sternberg's (1991) views on tacit knowledge being management-related information concerning management of self, others, and tasks. In short, tacit knowledge may be considered "management" knowledge. What Sternberg's group means by this is that the management of one's life, the management of tasks necessary to achieve day-to-day success, and the management of people we interact with:

> "Tacit knowledge about managing self refers to practical know-how about self-motivation and self-organizational aspects of performance. An example of tacit knowledge about managing oneself is about knowing how to overcome the problem of procrastination. Tacit knowledge about managing tasks refers to practical know-how about how to do specific work-related tasks well. An example of tacit knowledge about managing tasks is knowing how to make an effective oral

presentation. Tacit knowledge about managing others refers to practical know-how about managing relations among subordinates, peers, and superiors. An example of tacit knowledge about managing others is knowing how to reward individuals so as to maximize both their job satisfaction and their productivity" (Wagner and Sternberg, 1991, p. 2).

The approach adopted is one of workplace scenarios with options for dealing with a situation, which are then "tested" by respondents.

**Pre-pilot study:** Once the tacit knowledge inventory was finalized with different workplace scenarios, it was duplicated and handed out randomly to five fellow research students and professionals both on and off campus of the University of Wales Trinity Saint David - London campus as a form of pre-pilot study. The purpose of this exercise was to establish the face validity and consistency of the inventory. Subramaniam and Venkatraman (2001) adopted a similar approach.

The full list of the 17 scenarios with their answer options was issued to each of the pilot study participant for "reality check" and critics. The purpose was to receive feedback from the formulation of scenarios and answers and to see to what extent each reflects the reality in the field. Typical feedback and comments received from participants at this stage include:

*Questions and answers seem okay but some answer options seem similar*
*I think there are some crossovers between some of the scenarios*
*Realistic scenarios! Some actually happen to me*
*I mistakenly applied this option and it cost me my presentation*
*Interesting but too long! I was not really concentrating after the ninth scenario*

Feedback in terms of language and terminology used were also recorded for revision of the final inventory to enhance readability and understanding. Having collected critics and comments from the pre-pilot study, a refinement process took place whereby all inputs received were utilized to update the tacit knowledge inventory before it could be integrated into the complete questionnaire. The refinement process led to a reduction in the initial number of questions in the TKI survey from 100 to 74 items.

**Incorporation of the Tacit Knowledge Inventory within a Questionnaire:** this step consists of converting the questionnaire into a web-based survey for the respondents using

LimeSurvey software. In line with the research enquiries, one section to collect respondents' demographic information was included. To this end the questionnaire comprised two major components: biographical section and the tacit knowledge inventory itself:

**Programming of the Tacit Knowledge Inventory questionnaire**: it was felt indispensable to present scenarios with answer options in the questionnaire in a random order to respondents. This helps reduce the possibility that respondents could assist each other or memorise answers; and also required some cognitive effort each time he/she is taking the test. Moreover, a respondent who completed the test cannot easily inform others of its content. For these reasons, web-based questionnaires were the best tools to accommodate these requirements to collect the TKIBP data.

**Actions to mitigate weaknesses of Situational Judgement Tests in the TKIBP survey**: following McDaniel et Whetzel (2005, 2009), Lievens et al (2008) findings and recommendations about Situational Judgement Tests, the TKIBP test used knowledge based instruction as opposed to the behavioural-based instructions discussed in Chapter Two. By using knowledge-based instructions, in contrast to behavioural-based instructions (i.e., "What should you do?" rather than "What would you do?") in Situational Judgement Tests, McDaniel and Whetzel (2009) suggest that faking can be reduced. Knowledge-based instructions also allow for the assessment of whether or not the respondent knows the best response to the situation. Knowledge tendency instructions consist of asking respondents to select the best response, select the best/worst response, or to rate the effectiveness of various responses.

With these recommendations in mind, following actions were taken: first, questions in the TKIBP were reworded accordingly; then, respondents were asked to rate the level of effectiveness of answer options in the questionnaire using 7-point Likert scales (1=very ineffective, 2=moderately ineffective, 3=slightly ineffective, 4=neutral, 5=slightly effective, 6=moderate effective, 7=very effective).

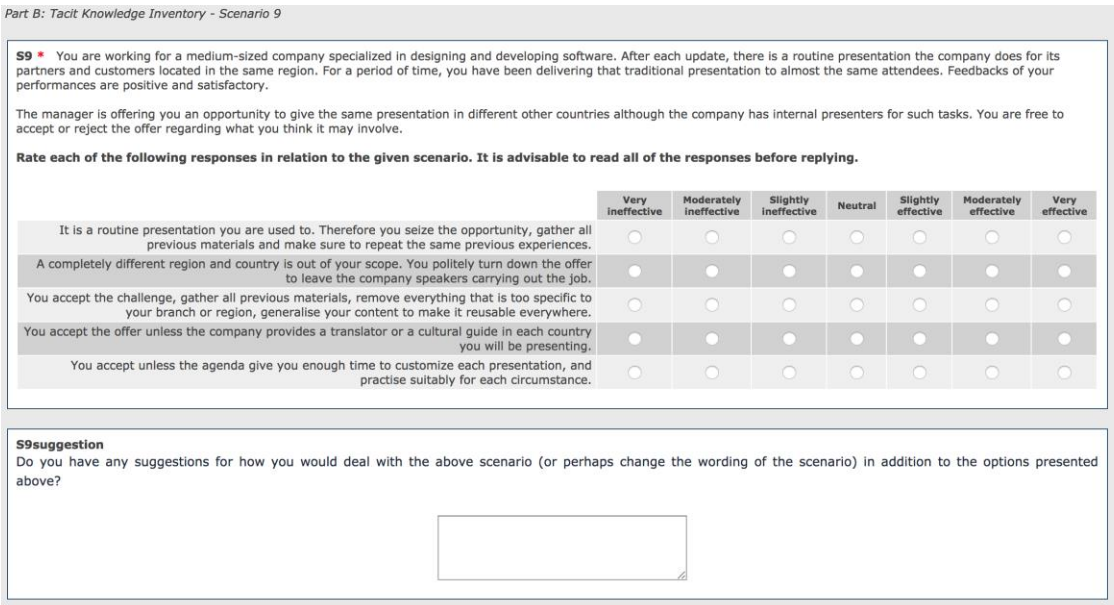
**Content validity of the TKIBP tool:** after producing all items of the questionnaire, it is recommended to have it evaluated by experts or judges panel (Cronbach, 1971). The draft instrument was then sent out to seven experts for assessment. The anonymity of the experts is achieved via the online distribution of questionnaires to avoid direct contacts among experts. According to Fowles (1978), this allows for an independence of judgments, thus limiting the psychological effects involved in direct social interactions as a pressure group or inhibition. Our content validity technique is focused on the method of Lawshe (1975) who proposed the content validity ratio to measure the degree of agreement among experts on the relevance of the items.

Lawshe's method is to ask experts to specify individually for each item if it is either not relevant; significant but not essential or; essential. The content validity ratio of each item obtained from the formula of Lawshe is between -1 and +1, the positive value indicates that more than half of the experts noted that the item is essential. The experts will also be able to add items deemed essential but which were not included in the initial version of the questionnaire. They could also suggest moving an item from one scenario to another. All suggestions are then analyzed to refine the questionnaire.

The results of this content validity showed that only 58 of the 74 items proposed to the experts received the strong consensus of being essential (content validity ratio then is greater than 0.90). This shows that all scenarios resulting from this process have a level of acceptable validity of content. For each scenario, it also means the items were representative of the scenario.

The initial list of 17 scenarios was then reduced to 11 scenarios with 4 to 7 answer options apiece, making a total of 58 questions. The Sternberg's group from Yale University tends to use inventories in the order of 12 scenarios with 4 to 12 answer options per scenario.

Figure 4.1 shows scenario 9 in the final TKIBP (the rest in in Appendix H).



*Part B: Tacit Knowledge Inventory - Scenario 9*

**S9** * You are working for a medium-sized company specialized in designing and developing software. After each update, there is a routine presentation the company does for its partners and customers located in the same region. For a period of time, you have been delivering that traditional presentation to almost the same attendees. Feedbacks of your performances are positive and satisfactory.

The manager is offering you an opportunity to give the same presentation in different other countries although the company has internal presenters for such tasks. You are free to accept or reject the offer regarding what you think it may involve.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| It is a routine presentation you are used to. Therefore you seize the opportunity, gather all previous materials and make sure to repeat the same previous experiences. | | | | | | | |
| A completely different region and country is out of your scope. You politely turn down the offer to leave the company speakers carrying out the job. | | | | | | | |
| You accept the challenge, gather all previous materials, remove everything that is too specific to your branch or region, generalise your content to make it reusable everywhere. | | | | | | | |
| You accept the offer unless the company provides a translator or a cultural guide in each country you will be presenting. | | | | | | | |
| You accept unless the agenda give you enough time to customize each presentation, and practise suitably for each circumstance. | | | | | | | |

**S9suggestion**
Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Figure 4. 1 Example of scenario 9 resulting from the interview data*

**Internal validity of TKIBP tool**: Initially, three experts in the pilot group were asked as series of 58 questions related to 11 scenarios with 4-7 questions for each scenario; and their response was collected using the 7-point Likert scale described in the previous sections. The level of agreement between experts was assessed using Intraclass Correlation Coefficient, a value between 0 and 1 measuring response similarity with a series of questions. For the pilot group of three experts we obtained Intraclass Correlation Coefficient = 0.75. Using this information, we conducted a power analysis to determine the number of experts needed in order to statistically prove instrument reliability (Intraclass Correlation Coefficient > 0.60) with statistical power of 80%, one-tailed level of significance 0.05. A power analysis was conducted using Intraclass Correlation Coefficient sample size packages in R software. The sample size of 28 experts was determined to be sufficient. An additional 25 experts were recruited to solicit their opinion.

Experts ($n$ = 28) found to be very consistent in their responses, yielding Intraclass Correlation Coefficient = 0.965 (95% CI 0.951 – 0.977, $p < 0.001$).

The consensus of opinions from these 28 experts were used to establish a reference. For each of their answers, of the 58 items in the TKIBP questionnaire, we calculated mean and standard deviation; Mi and SDi, where i = item number 1…58. Exploring standard deviations, we can see they range between 0.19 and 1.91, with median SD = 0.89 suggesting similarity of their opinions.

Later, we recruited and administered the instrument to 53 mature and experienced students who had business experience and then went back to school; who also have 6-14 years of experience in delivering or attending business presentations; and 443 undergraduate students with 0-5 years of experience.

Overall score for each expert, and later for students; was calculated using the following equation: $Score = \sum_{i=1}^{58} \left| \frac{X_i - M_i}{SD_i} \right|$, where Xi is the individual response to question/item i. Lower score would correspond to individual responses closer to experts' consensus opinion. We expect experts to have lower scores than both experienced and new students.

We also collected experience information, including number of years of relevant business experience, from each participant. Naturally, we expect higher experience to be associated with better presentation skills, thus lower score.

**Reliability**: Internal consistency (reliability) of the instrument was further validated by examining the Intraclass Correlation Coefficient for experienced students (Intraclass Correlation Coefficient = 0.984, 95% CI 0.978 – 0.990, $p < 0.001$) and novice students (Intraclass Correlation Coefficient = 0.989, 95% CI 0.985 – 0.993, $p < 0.001$).

Distribution of scores was explored using histograms, we found overall normally distributed data (Appendix L). Therefore, we will be using parametric statistical tools (one-way ANOVA, t-tests, Pearson correlation) for inferential analysis.

*Table 4. 3 Comparing TKIBP scores between groups*

| **Group of participants** | **Score, M ± SD (95% CI)** |
|---|---|
| Experts, n = 28 | 45.59 ± 5.74 (95% CI 43.37 – 47.82) |
| Experienced students, n = 53 | 69.55 ± 10.95 (95% CI 66.53 – 72.56) |
| Students, n = 443 | 95.55 ± 18.52 (95% CI 93.81 – 97.29) |

- H0: $\mu_{experts} = \mu_{experienced\ students} = \mu_{students}$, null hypothesis states there is no difference in scores between three groups of participants
- H1: alternative hypothesis states that at least one group has different scores

One-way ANOVA test (Welch ANOVA to account for unequal variances) showed statistically significant difference in mean scores between three groups, $F(2,521) = 405.55$, $p < 0.001$. Games-Howell post-hoc tests showed significant difference between all three groups (all $p < 0.001$). This showed that experts have the best presentation skills as compared to both experienced and new students. Table 4.3 contains the descriptive statistics for each group, with corresponding confidence intervals. Confidence intervals show the range where population mean falls with 95% certainty. For example, all experienced students are expected to have population mean score between 66.53 and 72.56.

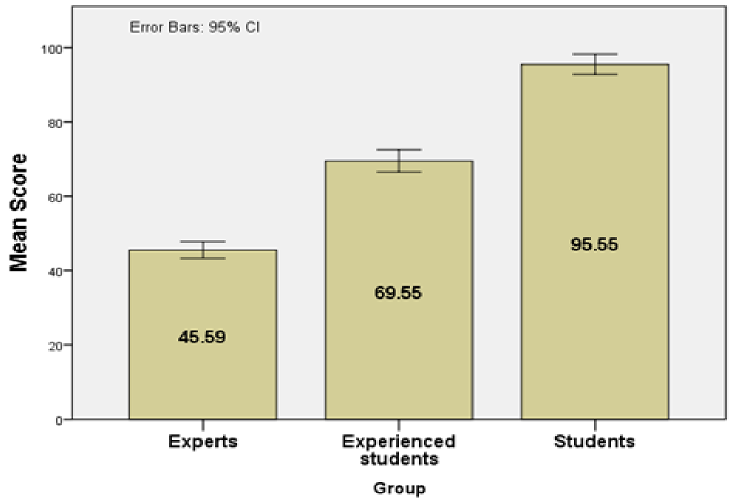



*Figure 4. 2 Histogram of TKIBP score per group*

Table 4.4 shows association between years of experience and score within each group of participants. As we can observe, all correlations are strong, negative and statistically significant. Negative correlation sign implies that higher level of business presentation experience is associated with a lower score, closer to experts' consensus. Scatterplots for associations can be found in Appendix M.

*Table 4. 4 Correlation between TKIBP scores and years of experience*

| **Group of participants** | **Years of experience, M ± SD (range)** | **Pearson correlation coefficient between years of experience and score** |
|---|---|---|
| Experts, n = 28 | 19.25 ± 3.44 (15-26) | r = -0.612, p = 0.001 |
| Experienced students, n = 53 | 9.08 ± 2.38 (6-14) | r = -0.756, p < 0.001 |
| Students, n = 443 | 2.16 ± 1.55 (0-5) | r = -0.676, p < 0.001 |

**External validity**: external validity was assessed by exploring correlation between TKIBP score and overall assessment score (using the Kenkel's 9-rubric assessment tool from in Appendix I) obtained from independent experts watching pre-recorded presentations from students.

**Sample size calculation**

In order to prove external validity of TKIBP instrument, we need to show a correlation coefficient between TKIBP score and another assessment to be at least 0.8. We expect correlation to be as high as 0.9, therefore to prove significant association we need a sample size of 47 (according to G*Power calculation with level of statistical significance 0.05 and power of 0.80). See Appendix N.

**Results**

We video recorded 50 student presentations; asked three independent experts to watch them and provide overall assessment score for the quality of the presentation. Assessment score is based on the following 9 rubrics: introduction, vocal qualities, eye contact, gesture or posture, transitions, organization and length, audience attentiveness, conclusion, appearance of speaker and visuals. For each rubric an expert provides a rating from 0 to 3, with 0=Unacceptable, 1=Novice, 2=Apprentice, 3=Distinguished. Then the composite assessment score is calculated by summing the ratings in 9 rubrics, which results in a score 0-27.

Correlation analysis was conducted (see Appendix O) to explore the association between TKIBP instrument score and composite assessment score and found strong negative statistically significant correlation, $r(n=50) = -0.97$, $p < 0.001$. Corresponding 95% confidence interval for the correlation coefficient is between -0.98 and -0.95. Since the value of correlation coefficient is significantly greater than 0.80, which is considered a benchmark for strong relationship, and thus we can confirm sufficient external validity for TKIBP instrument.

In conclusion, the results suggest the TKIBP instrument has high validity and reliability. Hence, the instrument could be used to test for tacit knowledge in the business presentation field. A second method was sought to enforce the outcome of this Sternberg's approach to provide some qualitative supplements from monitoring and observing actual performance of students. This led to a Close Monitoring Initiative as the second method discussed in the next section.

As this first method facilitates quantitative analysis, students' feedbacks were sought at the end of experiment to explore factors influencing the development of students' tacit knowledge in line with research questions (see Appendix J). The feedback survey had five sections (A, B, C, D, E) and included researcher-created items inspired and adapted from Alem et al. (2016). Students have to rate each item using 5-point Likert scale system (1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree). Section B (Q12) contains 14 items assessing students' e-Learning readiness that has Cronbach's alpha of 0.81. Section D (Q14) contains 25 items evaluating their perception of the proposed e-Learning model and has internal consistency (Cronbach's alpha) of 0.83.

### 4.5.2. Method Two - Close Monitoring Initiative

**Approach:** this method was inspired from Herbig et al. (2001) presented in literature chapter (page 115). Researchers determined individual possession of tacit knowledge from their actions, behaviours and attitudes in accomplishing tasks at work. This aligns to Matosková et al.'s (2013) findings about tacit knowledge as "...practical know-how, which is formed in the minds of people in the course of time on the basis of experience and interactions with their surroundings. The individual is not often aware of it because they gain it without conscious attention and use it spontaneously. There is an obvious connection with routines actions..." (p. 4). They went further, citing Pacovský (2006); "…because tacit knowledge is stored in our sub-consciousness and it has a tendency to be activated when an incentive appears." (p. 4).

**Process:** we sent out 30 invitations to randomly chosen experimental group of students (n=231) asking them to be part of Close Monitoring Initiative. 23 students agreed to participate in this initiative. The sample size obtained (*n*=23) was significant compared to previous relevant studies such as Panahi et al. (2014) using *n*=24, Tee and Karney (2010) using *n*=11, Yi (2006) using *n*=6 and Hildrum (2009) using *n*=11. Students were video-recorded making a business presentation on the topic of their choice at three different time points: at the beginning of the study, half-way through the study and at the end of the study; at which point the facilitators made some notes of students' actions and behaviours. At the end of their performance, students were asked to explain or justify decisions and actions taken when performing and their opinions of what they thought they had achieved.

Facilitators helped in taking notes of students' confidence, behaviours and body language. Using the 9-rubrics tool, each presentation, including notes taken, was assessed by the panel of experts. Experts provide qualitative feedback for the areas/rubrics where student got the lowest (0) score. Using a pseudo Delphi method, experts were also asked to give their opinions as to whether students who dealt successfully with critical situations throughout the Close Monitoring Initiative differ in their tacit knowledge from students who dealt less successfully with the same situations; thus determining the extent to which students are drawing upon their tacit knowledge to deal with critical workplace situations.

We examined the change in overall score over time. We also explored the average number of rubrics where student got a zero score. And qualitatively, we looked at experts' feedback and comments.

### 4.5.3. Method Three - Student Experiences and Perspectives Examination

**Process:** at the end of the experiment, we conducted in-depth interviews with 24 random students in the experimental group. Unlike other research methods, in-depth interviews were used as a qualitative technique to delve into each student's "deeper self" and produce more authentic data (Marvasti, 2004). When an in-depth interview is conducted, they are best planned with structure questions that have been prepared ahead of time. (see Appendix K).

In-depth interviews allow students to offer detailed, spontaneous accounts of their experiences, views and attitudes; as well as explanations and evidence supporting their observations. The conversational style of this technique allows the researcher to probe participants' comments more deeply for clarification or to better understand their basis. Students can raise new issues or emphasize points that are important to them.

Through in-depth interviews, we sought to gain deep understandings of students' experiences and perceptions in order to specify the potential contributions to the proposed e-Learning system in the development of their tacit knowledge via the change or improvement of their ways of performing the critical tasks of the field of interest. We sought to identify conditions, ways or factors that could help students to acquire new ideas and insights laden with tacit knowledge in the field.

The mixed methods, method one, two and three presented above, were meant to achieve triangulation in order to validate the data through cross verification from more than two sources and, to deepen and widen our understanding of the research enquiries.

### 4.5.4. Combining Methods and Paradigms: Triangulation

Combining qualitative and quantitative methods has been referred to as triangulation (Denzin, 1970) or as mixed methods (Creswell, 2003). Denzin (1970) defined triangulation as "the combination of methodologies in the study of the same phenomenon" (p. 297). The mixed method approach opts for pluralism or pragmatism rather than philosophical purity. It assumes that the research problem rather than a particular philosophical position should dictate choice of methods and procedures (Creswell, 2003). Denzin (1978) and Patton

(1999) differentiate between four different types of triangulation: method triangulation, investigator triangulation, theory triangulation, and data source triangulation. The triangulation type of interest for the present study is method triangulation which is concerned with the use of multiple rather than single methods.

According to Creswell (2003) the mixed methods approach involves three elements: implementation, priority and integration. Implementation of quantitative and qualitative methods involves data collection that may be sequential or concurrent, with priority given to one approach over the other or both having equal status. The two types of data are integrated at several stages in the process of research: the data collection, the data analysis, interpretation or some combination of places (Creswell, 2003). Creswell (2003) outlines six mixed method strategies, three sequential and three concurrent as follows: sequential explanatory strategy, sequential exploratory strategy, sequential transformative strategy, concurrent triangulation strategy, concurrent nested strategy, concurrent transformative strategy. The sequential exploratory strategy, which is especially advantageous for building a new instrument, was applied at the onset to build the tacit knowledge testing (TKIBP) instrument along the lines of the Sternberg technique. In this approach, priority is given to qualitative data. This means that qualitative data are collected and analyzed first and then quantitative data are collected. Integration occurs during the interpretation phase. Quantitative data are used to examine the possible generality of qualitative findings or to determine the distribution of a phenomenon within a chosen population. The following phases of the research, dedicated on the actual investigation of tacit knowledge acquisition of learners, was conducted following sequential explanatory strategy. In this approach, quantitative data are collected and analyzed first (Method One) and the results used to inform the subsequent qualitative phase (Method Two and Three). Both method triangulation and the sequential explanatory strategy were employed in this study to answer all research enquiries.

## 4.6 PHASE 3: E-LEARNING SETTINGS

**Process**: we built Knowledge Objects and deployed them in the e-Learning environment. Each Knowledge Object and associated learning and teaching activities comprise a module of the e-Learning program addressing a specific topic and orienting discussions within. We also recruited two subject matter experts as instructors to conduct the experiment as Hattie (2012) teach us that expert teachers exert positive influence on student outcomes that are not confined to improving test scores. They encourage learners to complete a program, help them to develop a deep and conceptual understanding, and teach them to develop multiple learning strategies. What's more, expert teachers also help learners to take risks in learning, help them to respect themselves and help to develop into active citizens who contribute in our world. As we sought to form a Community of Practice spirit as the learning strategy in e-Learning venue, the instructors help to bolster a culture of learning, in which learners share their prior experience and learn from the experience of others. They also help create authentic situations, activities, and contexts for generating and sharing tacit knowledge on each specific Knowledge Object.

Two facilitators were also needed to assist particularly in the Close Monitoring Initiative part of the study. The purpose of using also two instructors was to provide different views to students rather than single instructor that may limit understandings. Facilitators were volunteers recruited among academic staff in the institution hosting the research. It was desirable to get an instructor from the institution to facilitate administration procedure.

The instructors were recruited following the same criteria applied to experts in section 4.5.1. Additional criteria include experience in teaching in e-Learning environments, familiarity with learning theories and adult learning theories, mastery of tacit knowledge concept and tacit knowledge sharing mechanisms, experience in managing and monitoring an online Community of Practices. Thus, awards, achievements or titles won as instructor, number of peer-reviewed journals and paper conferences published as well as colleagues recommendations were considered and compared among candidates. The candidates with the highest level of requirement items were selected.

**Knowledge Object composition with related learning and teaching activities:** many authors from various fields advocated for Knowledge Objects to empower and enrich online learning. In line with the conceptual framework, instructional design team hosting the research, subject matter experts and the researcher; all collaborated to create, validate and integrate Knowledge Objects in the Virtual Learning Environment to ensure quality and standard of those learning resources.

From the outcomes of interviews conducted with field experts at phase two, a set of themes emerged as the key factors to a successful presentation in business. These themes described what a presenter should master in order to succeed and understand the audience. The complete list of themes is presented in the following chapter. Each theme corresponded to a Knowledge Object addressing a specific topic; with objectives, resources and activities related to the topic to engage students' interest. Knowledge objects made up from these themes were made available in the Virtual Learning Environment before the experiment starts. These were supposed to provide to students with clear learning objectives and ideas to be deepened with the instructors.

A Knowledge Object was attached to a knowledge base, in which multimedia resources and exchanges in the learning community were stored and available to revisit by any participant. Different types of resources were sought to accommodate different learning styles or preferences. Accounting for the discussion and conclusion drawn about learning theories and adult learning theories in Chapter Two, main participants were adults and we assume they had different learning habits and preferences as suggested in the literature of higher education institution. Each Knowledge Object was then supplied with videos, images, podcasts, written documents and relevant website links. Quizzes for students' self-assessment and practice were also added.

Multimedia resources developed important skills in the respective field. Videos were provided free of charge by business consultants and experts in the field. They were contacted over the Internet and their materials were validated among the researchers, the instructor and the institution business module staff to ensure they meet academic standard. The selection of materials focused on practical examples, skills demonstration, ideas, stories or experiences sharing. Materials that seem to explain mere theories or ideals were discarded. In doing so, 5 to 7 multimedia resources were added to each Knowledge Object to provide more practical insights and real-life examples to students. The complete list of Knowledge Objects compiled is in Appendix E.

**e-Learning Environment Settings:** according to Gold et al. (2001), collaborative and distributed technologies allow people to communicate effectively, transfer and acquire knowledge from partners or other peers by eliminating the structural and geographical impediments. This suggests that an e-Learning environment also known as Virtual Learning Environment, should be fitted with technologies that enable students and instructors to collaborate effectively. Panahi et al. (2012b) recommended the use of social web technologies as they are able to satisfy the collaboration requirement but it implies that participants know how to use to them in an effective way.

Blackboard was the Virtual Learning Environment utilized in this study. It is a modern Virtual Learning Environment providing in-built and sophisticated tools to conduct webinars in which the instructor and students could exchange information using social tools, such as chat forums, to enable students to initiate informal and formal meetings. It also allows for the recording and tracking of activities. Recordings of asynchronous or synchronous activities were made available daily so that students can come back to them to watch, listen or repeat at their convenience. The option to record webinar sessions was also essential as it gave the chance to students to come back to what they missed, and also ensure that the control group of student will benefit from the program.

The researcher did not restrict the communication within the Virtual Learning Environment but considered that participants could contact each other as well as the Instructor via other ICT means like Skype, emails, etc. to discuss the subject matter. In fact, students were encouraged to do so as long as it's done without face-to-face contact.

**Validation**: Once Knowledge Objects were deployed in the Virtual Learning Environment, they were reviewed with academic staff to ensure that all content and activities meet academic rigour and standard. One contribution of instructors in Knowledge Objects implementation process was to confirm that all settings in the e-Learning environment meet their expectation in order to easily conduct the experiment and assist students. The experiment started once all approvals were received.

### Preparation of an Incentive System for Participants

Because business presentation skills are important for every business student's career, it was thought that students will be captivated and motivated to gain such skills. Acknowledging the challenge inherent to e-Learning studies, an additional incentive was also provided to encourage students. The incentive was the reference provided for having participated in the research.

## 4.7 PHASE 4: EXPERIMENT PROCESSES AND SURVEYS

**Process:** the experiment was conducted in a higher education institution in the United Kingdom that fulfilled the requirements for this study. The institution offers a wide range of courses from undergraduate to doctorate level. In this school of business, second-year undergraduate students have to deliver a professional standard presentation at various stage of the program in diverse modules. The second-year undergraduate population then represented an opportunity sample with 595 students.

The second-year undergraduate students attended classes on campus but received additional e-Learning activities and resources via ‘Blackboard’, the Virtual Learning Environment that the institution provided them with as of their first year.

The recruitment of students was random. The participant recruitment flyer (see Appendix C) was made available to all second-year undergraduate students in the Virtual Learning Environment announcement board and repeated during a few classes. The e-Learning business presentation program took place within Blackboard and was labelled “Business Presentation Master Class”.

**Research Design:** to ascertain the growth in tacit knowledge of participants, a control group design (see Figure 4.3) sufficed to reveal the change in students’ tacit knowledge using the proposed e-Learning environment. Students were randomly split into two groups that is experimental/treatment group with 231 students and a control group with 212 students. The analysis consists of examining the tacit knowledge score of students in both groups before and after the e-Learning program.

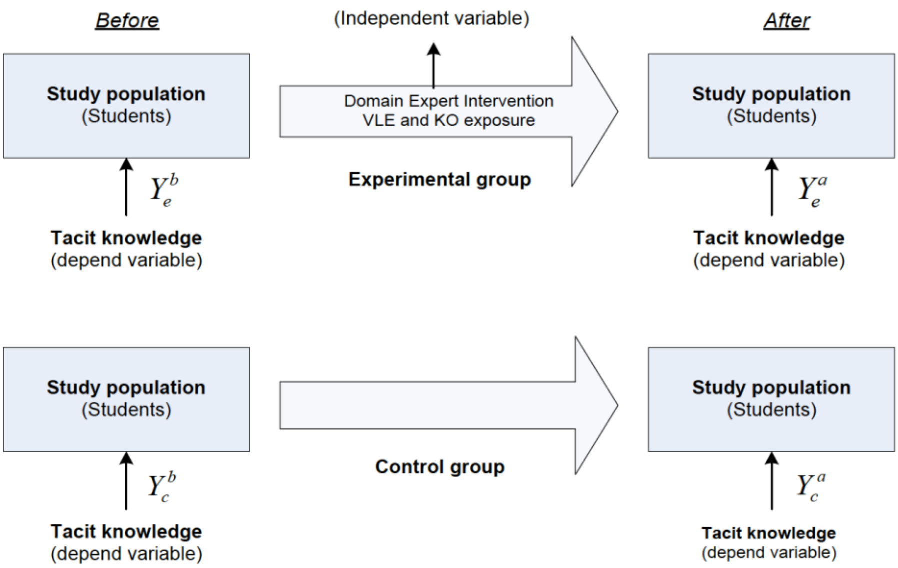



*Figure 4. 3 Research design: control group experimentation*
Source: (Kumar and Ranjit, 2012)

- $Y_e^a$, $Y_e^b$ represent the tacit knowledge score in business presentation field of the experimental group *before* and *after* respectively

- $Y_c^a$ , $Y_c^b$ represent the tacit knowledge score in business presentation field control group *before* and *after* respectively.

The experimental group received the intervention or treatment within the e-Learning environment including subject matter expert instructors and the impact of Knowledge Objects associated with learning and teaching activities while the control group did not. It was assumed then that the intervention and exposure within the e-Learning environment were the causes responsible for any change in students' tacit knowledge in business presentation found.

Data was collected as described in the overall methodology; and occurred in stage one, before the experiment; in stage two, halfway through the experiment; and again in stage three, after the experiment was completed. These are as follow:

**Beginning of the e-Learning program (stage one; pre-test)**

At the beginning of the program the TKIBP questionnaire was issued to all students in both experiment and control groups. Students in the experimental group were required to answer and submit the questionnaire before gaining access to the 'Business Presentation Master Class' module in the Virtual Learning Environment.

Once the TKIBP questionnaire was completed, students were encouraged to capitalize on each Knowledge Object deployed into the Virtual Learning Environment and to participate in associated learning, interactive and collaborative activities, in which the topic addressed by the Knowledge Object was the focus of discussions facilitated and monitored by instructors. The instructor organized webinars or web-conferences to demonstrate presentations skills and share his/her ideas and experiences with students; and also enable them to observe and contribute live. Students were free to contact and interact with whomever they wished in order to discuss the topic at hand.

As presented in the methodology, twenty-three randomly selected students were invited to take part in the Close Monitoring Initiative. Students were then recorded presenting a topic of their choice and answering a series of questions related to their experience, techniques and lessons learned from the activities within the e-Learning program. Video recordings and notes taken by facilitators were then submitted to the researcher for coding and submitted to experts for observation and assessment.

**Halfway of the e-Learning program (stage two)**

The twenty three students of the Close Monitoring Initiative were again invited to present a topic of their choice and answer a series of questions related to their experience, techniques and lessons learned from the activities within the e-Learning program; during which each student was recorded. Video recordings and notes by facilitators were then submitted to the researcher for coding and preparation for submission to experts for observation and assessment.

**End of the e-Learning program (stage three; post-test)**

At the end of the program the TKIBP questionnaire was issued to all students in both experiment and control groups. The experimental group of students received an additional survey comprising of questions intended to capture their feedback from the e-Learning program described in section 4.5.1 (see appendix J)

At the end of this step, the module was made available to the control group of students and others comprising of all resources and recordings of activities that took place. The instructor remained available to assist all students who didn't participate in the experiment to ensure all students could benefit from the study.

The twenty three Close Monitoring Initiative students were invited one final time to present a topic of their choice and answer a series of questions related to their experience, techniques and lessons learned from activities of the e-Learning program, during which each student was recorded. Video recording and notes by facilitators were then submitted to the researcher for coding and preparation for submission to experts for observation and assessment.

## 4.8 PHASE 5: ANALYSIS OF DATA

After all the data was collected, it was consolidated and structured for quantitative analysis and qualitative analysis. SPSS and R software were used for statistical testing, and Nvivo (version 10) was used for qualitative analysis. These exercises contributed to answer all research questions from more than one angle.

## 4.9 METHODOLOGICAL RIGOUR

The section provides justification towards the methodological rigour of the current work concerning its reliability, validity, credibility and generalizability.

### 4.9.1. Reliability

The reliability refers to consistency (Oates, 2006). According to Collis and Hussey (2009) reliability is achieved if the same outcomes will be produced whenever the same technique is replicated within the same study. The study done by Gray (2009) mirrors this, in that a study is reliable if it's possible to repeat it and achieve the same results. If this study was to be repeated with the same participants under the same conditions; using the same or similar methods; then the results of the study would be the same (Burns, 2000). Baily (2007, p. 184) stated that "reliable questions are those that, regardless of when they are asked, elicit the same responses from interviewees. Reliable respondents are those who provide consistent answers. The conclusion is reliable if different researchers draw similar ones from the same data."

The researcher considered this work reliable from several strategies that were adopted in order to reduce possible biases. There are as follows:

- Generating a case study protocol for collecting data inspired from the Busch (2008) similar case. This ensured that standard procedures could be followed in all cases.
- Recorded data was transcribed in full, directly following each interview in an effort to ensure as much accuracy as possible in terms of interpretation. The transcripts were carefully checked to make sure ensure mistakes were not made during transcription.
- The Tacit Knowledge Inventory resulting from the aggregation and consolidation of stories, examples, situations, etcetera shared by participants were then sent back to them for feedback to ensure that the scenarios and answers options presented conformed to what they reported. Additionally the TKIBP instrument has been validated using reliability/consistency across three groups of participants including experts, graduate or experienced students and undergraduate students. The results suggest that the instrument has high reliability.
- Creating a structured case study database to store empirical data from the entire interviews, documents reviews and observations process. This ensured that the fieldwork data was collected and impressions of the participants were noted and stored in a systematic way and that it was placed in logical order.

### 4.9.2. Validity

Validity is concerned with the correspondence between what is reported and the social phenomenon under study (Mayan, 2009). According to Oates (2006), validity is attained at two different levels: that the researcher investigates what he intended to investigate or that the researcher collected the right data from the right sources. Researchers achieve validity when they are able to produce an accurate representation of the setting (Bailey, 2007). It has been argued that qualitative studies have high validity because of their in-depth and contextualized nature (Gray, 2009). In this work, the researcher considered that the validity is high due to the following:

- Clear and detailed explanation of the study aim, objectives and significance was provided to the participants through emails in setting up appointments as well as at the beginning of the interviews.
- Interview questions to elicit tacit knowledge from participants followed the procedures set by Sternberg and his colleagues precisely. Prior to the fieldwork, all questions were reviewed and checked by the research team and other experts recruited in the study. Knowledge based instructions were applied to items in the resulting TKIBP questionnaire to make sure it measure cognitive ability rather than personal traits.
- The researcher spent months attending and engaging in business conferences, watching guru speakers and reviewing business presentation books and papers. The researcher also delivered some presentations in order to become more familiar with the field and to be able to witness and experience situations, routines and any unusual events faced by actors. Extensive efforts were made to take notes and record events and behaviours. This prolonged engagement enabled the researcher to avoid making grandiose interpretations. In addition, attending some online public speaking training, allowed the researcher to develop an in-depth and comprehensive understanding of the online knowledge transfer process.
- Multiple methods (semi-structured interviews, videos observations of guru speakers, podcasts and documents) were used for collecting the data in the field of interest involved in this research, which permitted the researcher to achieve triangulation in designing the TKIBP instrument.

The TKIBP instrument has been validated using content validity, internal validity and external validity. The results suggest that the instrument has high validity.

- The experiment was conducted according to conceptual framework established for the research interest. The processes and activities were completed online via the sole use of ICTs within a real e-Learning environment. Learning resources were available to participants at anytime, from anywhere. Web-based surveys were used to to collect data on the tacit knowledge inventory, as well as participants' experience and perspectives from the e-Learning experiment; and to avoid any bias. They allowed respondents to put their tacit knowledge in action conveniently and freely on each scenario presented in the inventory as supported by Fricker and Schonlau (2002) and Solomon (2001). In addition, a random generation of questions was done each time the test was taken in order to reduce the possibility for students to copy or share answers. Therefore, the findings and conclusions drawn upon this study are essentially based on participants' effort and likely to be more accurate.

#### 4.9.3. Credibility

Credibility refers to the ability of the researcher to present the findings of the study in a way that gives a sense that they are sound and robust (Maylor and Blackmon, 2005). It is vital that a researcher provide adequate evidence in order to support any argument or contention made within the research findings (Myers, 2009). Lee and Lings (2008) argue that some striking raw data collected from the fieldwork need to be included in the research write-ups in order to "allow the reader to get a better picture of the respondents' own concepts and categories, without relying solely on the interpretation of the researcher" (Lings, 2008, p. 237). To establish and enhance the credibility of this work, the researcher adopted the following techniques:

- Using key verbatim quotations expressed by some research participants and also experience, feedback or comments and ideas shared during the process.
- Verifying facts through multiple data sources including semi-structured interviews, questionnaires, video-recordings, observations and assessments.

#### 4.9.4. Generalizability

Since the experiment conducted in this research was based on a Business Presentation case to investigate the effectiveness of tacit knowledge sharing in online learning, generalizability is a major concern. Generalizability addresses the issue of whether the findings of the study can be generalized beyond the study itself (Boeije, 2010; Yin, 2009).

According to Robson (2002, p. 93), generalizability is "the extent to which the findings of the inquiry are more generally applicable outside the specifics of the situation studies".

Qualitative case study research is usually focused on the contextual uniqueness of the social world or the research situation and seeks to understand the phenomenon of interest in-depth. Statistical generalization is not usually sought in multiple case studies (Robson, 2002). As Punch (2005) emphasizes, the objective of case study research is "not to generalize, but rather to understand the case in its complexity and its entirety, as well as in its context". Klein and Myers (1999, p. 75) further highlights that the intention of conducting interpretive case study research is to understand the phenomenon, abstract the essence and relate those to ideas and concepts that apply to multiple situations of similar nature.

This study was motivated and inspired by Busch's (2008) case to explore the tacit knowledge transferability and development phenomenon in the different fields of interest that is business presentation, in a virtual context. Busch did a similar study in physical organizations for Information Technology and Information System. The study replicates some of Busch's steps for empirical research and carried out further investigation in an area not originally covered (Yin, 2013). This process is often referred to as analytical or theoretical generalization (Yin, 2013). According to Lee and Baskerville (2003, p. 236), theoretical generalization is the process of "generalizing from empirical statements to theoretical statements".

## 4.10 CHAPTER SUMMARY

In summary the methodology was comprised of a sequence of stages along the following lines:

- Adopted the organizationally based nature of tacit knowledge from the qualitative analysis findings of Dampney et al. (2002) and Busch (2008).
- To undertake empirical tacit knowledge testing research, the choice of practical research instrument is limited. A widespread and more practical approach is that of Sternberg and his team. It was coupled with observations of students performing and interview similar to the critical incident techniques.

- Expert checking when using the Sternberg approach is considered to greatly increase the face validity of the research instrument. What's more, reliability, content validity, internal validity and external validity of the instrument are confirmed.
- Given the types and sequence of data to collect during the study process as well as the control, comfort and flexibility to provide to respondents, it was found that web-based questionnaires was the best strategy to fulfill all these requirements. They were implemented and administered to participants through LimeSurvey that permitted respondents to complete the survey at ease and helped to reduce risk of sharing or memorizing answers.
- A pilot testing process is considered advisable, which in the case of this research, happened at various stages to check the consistency and robustness of the instrument before issuing to end-users.
- For all forms of data collected during the process, permission from the Ethics Committee of the University of Wales Trinity Saint David was required and granted before any the fieldwork started.
- It was expected that the methodological outline provided in this chapter is replicable to the extent that other scholars may engage in similar studies should they wish to.

Given the instruments to investigate the research enquiries, different data collection points took place as planned. The next chapter will present the first consolidation and summary of the data that comprises main participants and the e-Learning venue in which tacit knowledge sharing and acquisition were meant to take place.

# Chapter 5: E-Learning Set Up and Participants

## 5.1 CHAPTER INTRODUCTION

The previous chapter outlined the methodology adopted in the study including the participants, processes, instruments, testbed as well as the methods for data collection and data analysis to achieve the research objectives and answer the research enquiries. One major component of the research was to test participants' tacit knowledge to determine if any change occurred throughout the proposed e-Learning program. To achieve that, three methods were adopted. The first method involved constructing and validating the TKIBP (*Tacit Knowledge Inventory for Business Presenters*) instrument. The second method involved observing and assessing learners' performances and actions to critical workplace incidents by a panel of experts. The final method involved analyzing in-depth learners' experiences and perceptions.

The first method based on TKIBP led to a compilation of real workplace scenarios obtained using thematic analysis and a protocol proposed by Sternberg and his team to analyze participants' interview data, as described in chapter four (section 4.5.1, pages 145-154). Through analysis, resulting themes informed us about the key areas or topics to master in order to become successful at delivering business presentations. Each theme became a topic for teaching. A Knowledge Object was built to cover each topic (e.g. understanding an audience) coupled with tools and interactive and collaborative activities related to the topic, being the main subject of discussions in a dedicated space.

This chapter presents the TKIBP development process, and key themes of the business presentation field that emerged from interview data. It continues with the building of each Knowledge Object and associated tools, learning and teaching activities to engage learners following the spirit of a Community of Practice in the e-Learning environment as defined in the conceptual framework. The chapter concludes with a summary of demographic and background information of the learners taking part in the experiment.

## 5.2 TKIBP DEVELOPMENT AND KEY THEMES OF THE FIELD

As mentioned, the data used to construct the instrument for testing tacit knowledge was collected using semi-structured interviews. Interviews were conducted face-to-face, via telephone and over Skype according to the availability and convenience of the participants recruited across the globe. Interview data was audio-recorded and detailed notes were taken when participants did not want to be recorded.

The data was prepared for analysis by transcribing the audio-recorded interviews and notes into text documents and entering them into qualitative data analysis software (NVivo). Data was analyzed along the lines of Sternberg's procedure (see Appendix C) as an *<IF>* *<THEN>* and *<BECAUSE>* statement where the details of the story came after the *<IF>*, the details of the chosen response came after the *<THEN>* and reasons came after *<BECAUSE>*. This was followed by the thematic data analysis approach that involves scanning every story, experience and example expressed by the participants as well as coding them and reviewing them multiple times to crystallise the emerging themes and categories.

As described in the methodology chapter, before interviewing participants it was beneficial to reinforce the understanding of the field through videos from business consultants and keynote business speakers. This helped to identify areas to seek clarification from practitioners through prompts during the interviews. This involved searching and watching YouTube videos with keywords like: *"business presentations, business speakers, public speaking, etc."* and TED[2] Talks. As YouTube always recommends other videos in relation to the current one that is playing, this allowed for continuous intake. In doing so, seventeen videos from four business consultants and coaches were retained, and later integrated in the corresponding Knowledge Object bundle according to the topic addressed in the videos. First, authors were contacted for their approval to exploit their material followed by validation from the research team. Each video was three to fifteen minutes in duration.

### 5.2.1. Coding Information

Coding began immediately after the data from the interviews was transcribed. Familiarization with the data was achieved by listening to the interviews and reading interview transcripts multiple times. Following Sternberg's procedure given in Appendix C, each interview was summarized as follows:

1. Participant information (i.e. branch, time in job, ethnicity, gender) and a participant identifying code for anonymity purposes (i.e. BPP-E1);
2. Summary of each story discussed during the interview;

[2] TED (Technology, Entertainment, Design) is a global set of conferences with talks on many scientific, cultural, and academic topics.

3. Annotations to each story's indications, key contextual variables and lessons learned;
4. An occasional *n.b (nota bene)* from the researcher (note taker).

After summarizing the interview data, summaries were coded. This involved determining which examples of knowledge met the criteria of "*tacitness*" and which summaries were useful to transform into a more usable form for the purpose of later analyzes. According to Sternberg and his team, the format of coding interview summaries is based on a procedural feature of the definition of tacit knowledge. This implies that knowledge is expressed as a mapping between a set of antecedent conditions and consequential actions. The process is as follows:

*Table 5. 1 Coding interview summary procedure or template*

| | |
|---|---|
| Story summary: | |
| Coded item: | IF______________AND/OR ________________<br>THEN ________________________________________<br>BECAUSE ________________________________________ |

With these steps in mind, interview transcripts were analyzed and organised into 35 open codes into NVivo. Each code represented a story, situation or example shared by the interviewees about delivering presentations. The codes were later reduced to 25 in the second phase of reviewing codes and finally to 17. The process consisted of identifying similar stories and examples, consolidating them and aggregating the different answer options given by the participants to deal with the incidents described in the stories. In doing so, 17 scenarios emerged with 5 to 9 actions in each. The themes that emerged from all of the stories are given below:

1. Presentation anxiety.
2. Fear of the unknown.
3. Losing the train of thought during the presentation.
4. Designing a presentation and performing it within allotted time.
5. Presentation disaster (when things go wrong).
6. Knowing the audience.

7. Involving the audience
8. Dispatching roles and managing team presentations.
9. Handling Q & A in group presentations (when a member is struggling).
10. Equipment crashes during a presentation.
11. Having a bad mood on the final day.
12. Dealing with technical audiences.
13. Dealing with numbers and formulas with more informed people.
14. Managing questions and answers (Q & A) and pugnacious questioners.
15. Finding right stories, anecdotes, examples, etc.
16. How to go about body language (cultural issues and interpretation).
17. Managing weaker member(s) in group presentations.

After a pilot study, verification and validation as described in the methodology chapter (pages 162-173), the 17 scenarios were reduced to 11 and grouped into 5 main themes. The final 11 scenarios formed the *Tacit Knowledge Inventory for Business Presenters (TKIBP)*. The five themes covered in the TKIBP tool are given below:

1. Understanding your audience.
2. Preparing your presentation content.
3. Delivering with confidence.
4. Controlling the environment.
5. Managing your group presentation.

We argue that these themes constitute the key topics mastered and implemented by experts in the field of business presentation to succeed most often. Therefore, these topics should be emphasized as the one's to teach novices, in order to develop their understanding and awareness of what it takes to be a successful business presenter.

## 5.3 E-LEARNING SET UP

This section presents the implementation of different components and interventions as prescribed in the conceptual framework for the proposed e-Learning environment of the experiment.

### 5.3.1. Architecture and ICT Facility

As discussed in Chapter two and three, communication and collaboration in e-Learning takes place primarily within an e-Learning environment that is known as a 'Virtual

Learning Environment'. The institution of higher education hosting the e-Learning experiment used Blackboard.

Blackboard is a product of Blackboard Inc., which is an educational technology company with corporate headquarters in Washington D.C. Blackboard is used by tutors to deliver courses and support material to students. It is a commercial product and one of the most popular Virtual Learning Environments in the market. It competes with Moodle (Modular Object-Oriented Dynamic Learning Environment), an open source web application that is widely used in education and businesses. They are both modern Virtual Learning Environments that are fitted with modern ICT tools and features required for the e-Learning testbed. Therefore, using a particular modern Virtual Learning Environment would not affect the findings. Essentially, we expect the Virtual Learning Environment to provide modern tools to ensure enhanced communication for participants including the exchange of texts, videos, images, voice, etc. From this perspective, the institution's Blackboard Virtual Learning Environment offers means to:

- *Enable students to access e-Learning from multiple devices*
  - Laptop or desktop computers, tablets, smartphones and others
  - Multi-device learning experience using responsive design
- *Encourage contacts between students and instructor(s):*
  - Discussion tools;
  - Notifications of recent activities by providing alerts about new discussion postings and content.
- *Develop reciprocity and cooperation among students*
  - Group collaboration tools;
  - Real-time chat;
  - Web conference tools- Blackboard Collaborate.
- *Give prompt feedback*
  - Grade book;
  - Surveys and quizzes.
- *Help students manage their learning time*
  - Assessment tools;
  - Online content (providing the syllabus, lectures and links that students can view at their leisure and manage their time).
- *Communicate (high) expectations*

- Assignments or quizzes clearly explain what is expected. Examples of good, average and poor performance can be given;
- Discussion tools can be used to allow students to post peer evaluations and contributions.

– *Cater to different (preferred) ways of learning*
  - Provision of multiple content formats and learning paths, e.g. audio, text, movie, games, etc.;
  - Repetition of course objectives and information on the course in different locations.

– *Access to a wide range of media*
  - Content repository;
  - Media integration.

The e-Learning program for the experiment was labelled *"Expert Presentation Master Class".* A module with this title was created in the Virtual Learning Environment among others. A visual representation is given in Figure 5.1 displaying Knowledge Objects that are organised into folders. An announcement and learning objectives were given to students to develop the practical skills they need to prepare and deliver an outstanding business presentation with our e-Learning expert presentation master class. They were given practical insights to help them prepare, open, deliver, and close their presentations. Along the way, students should discover how to project confidence, storyboard a presentation, take questions, respond with thoughtful answers, and develop a creative story that adds life to a presentation. The topics included identifying the audience, developing credibility, introducing an agenda, exploring strong opening techniques, developing great body language, understanding room dynamics, handling questions and answers and getting feedback. These were all organized into five Knowledge Objects as described in the next section.


*Figure 5. 1 Knowledge objects into Blackboard Virtual Learning Environment*

Figure 5.2 presents the architecture of the e-Learning environment that was implemented as a testbed for the experiment. This summarizes and provides an overview of the components and processes deployed to foster participants to work collaboratively with others to exchange ideas and experiences in the field. Afterwards, the testing and assessment of students' development of tacit knowledge took place.

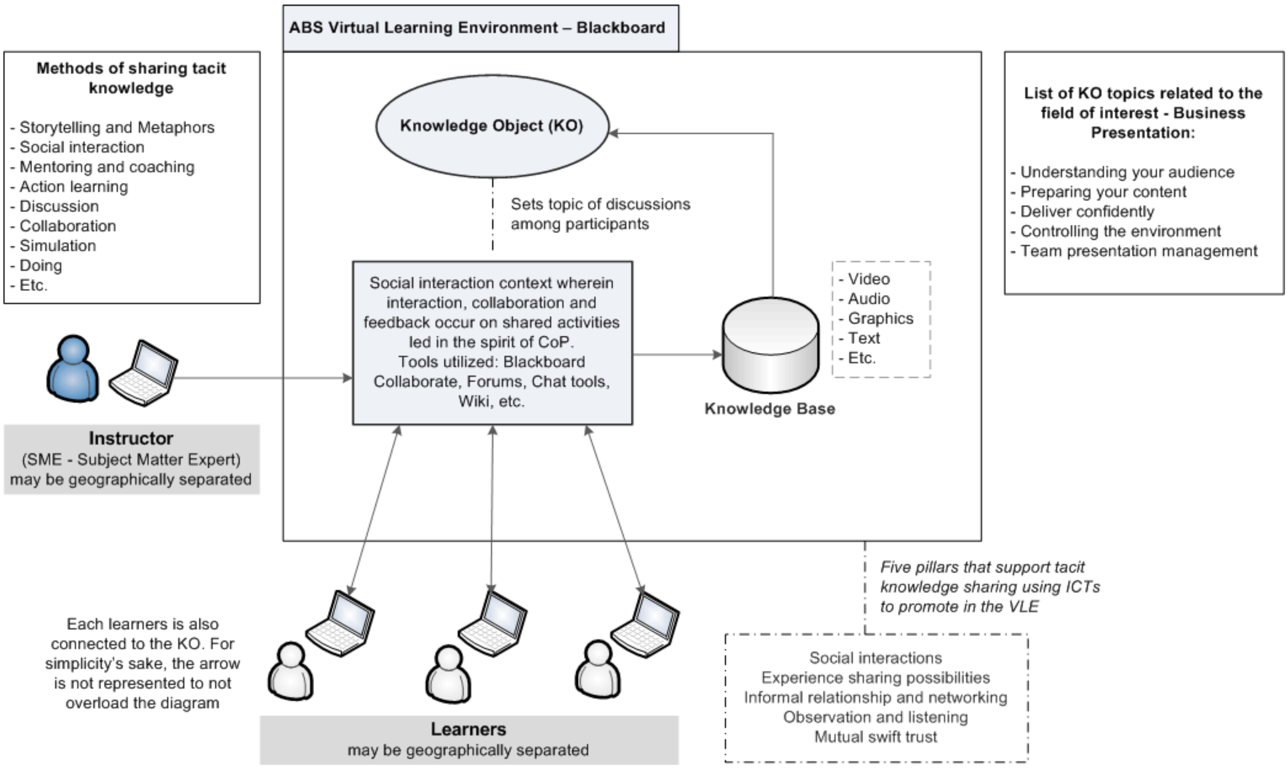



*Figure 5. 2 Architecture to foster tacit knowledge sharing in the VLE*

### 5.3.2. Knowledge Object Building and Learning and Teaching Activities

As presented in Chapter Two, the components of a Knowledge Object according to Merill (1998) are: information component (name, subject, date and status), parts component (objective, keywords, abstract and content), properties component (other attributes that describe an object), activity component (view, search and print) and processes component (set of actions performed to satisfy a goal or set of objectives).

As seen in the development of the TKIBP section above, five themes were found to be key elements of business presentations. This includes understanding the audience, preparing presentation content, delivering with confidence, controlling the environment and managing your group presentation. Each theme was the focus of the Knowledge Object and a total of five Knowledge Objects were developed.

Each Knowledge Object had a clear objective and description of the content covered. It contained practical examples and a demonstration of skills produced through multimedia resources including videos, audios, images, etc. A range of five to seven relevant multimedia resources was attached to each Knowledge Object. Some activities including exercises and quizzes were designed and set in each Knowledge Object to enable learners' self-assessment and reflection. Forums were also configured in each Knowledge Object to encourage participants to interact, collaborate and discuss about a specific topic that was monitored by an instructor. Forums allowed participants to discuss synchronously and asynchronously during formal or informal learning sessions. Table 5.2 presents the layout and components of one of the Knowledge Objects.

*Table 5. 2 Composition of  a Knowledge Object about delivering with confidence*

| KO 3 | DELIVERING CONFIDENTLY |
|---|---|
| **Learning objective** | Using persuasive language in a presentation and creating a positive impression |
| **Description and content** | Managing presentation anxiety and fear of the audience.<br>Engaging the audience when presenting.<br>Delivering with impact: the power of body language (postures, gestures, eye contacts, pace, tone of voice etc.)<br>Importance of stories, humour and being enthusiastic<br>Embracing emotions.<br>Reinforcing key ideas and effective use of repetition |
| **ACTIVITIES** | |
| **Forum** | Setting up a topic and encouraging students to share their experience and ask questions. |
| **Forum topic** | *Is it normal to be anxious about giving a presentation? How do you manage presentation anxiety?* |
| **Webinar** | To be announced |
| **SUPPORTING RESOURCES** | |
| **Video(s)** | Overcoming nerves when giving a presentation.<br>The importance of body language in presentations.<br>The importance of vocal variety in presentations.<br>From BPP-C1, *Professional Speaker and Speaking Instructor*, website |
| **Podcast(s)** | Tips to calm your nerves before speaking,<br>From BPP-C3, *Public Speaker*, website<br>How 'Warren Buffett' conquered his fear of public speaking,<br>From BPP-C3. *Public Speaker*, website |

Each Knowledge Object was packaged into a transferable ZIP file called a "Package Interchange Format" following SCORM (Sharable Content Object Reference Model) specifications using Opus Pro software. SCORM consists of a collection of standards and specifications for web-based electronic educational technology. This process ensures that the content can be easily integrated into the Virtual Learning Environment.

### 5.3.3. Instructors

The subject matter experts were recruited following the process described in the methodology chapter (page 176). They were responsible for carrying out the teachings in the e-Learning platform and developing learning activities to engage learners and to form a Community of Practice around each main topic of the whole field of interest. Applying Community of Practice principles was intended to provide a safe and supportive space for participants to share resources and ideas, explore and question their understandings, solve challenges, and form commitments for action and improvement. They also acted as the facilitators or community coordinators in each room or space of collaborative discussions created for each Knowledge Object.

One of the most important factors for the success of a learning community is the strength of its leadership. In order to succeed, instructors dedicated a significant portion of their time and expertise in performing a number of key functions that included clarifying and reinforcing the purpose of the community, keeping the discussion focused, ensuring that everyone had a chance to participate and helping to ensure that everyone was of the same understanding. This also facilitated opportunities for the group to establish their own goals, identify specific concern to address; and to develop a process that was flexible and adaptable. Instructors blended different approaches to maximize participation and learning. Students were encouraged to suggest activities that they thought could be more beneficial to them. For instance, some learners provided videos of themselves presenting; and these videos were used during some online sessions by instructors for peer review and feedback.

### 5.3.4. Learners

Learners were split in two groups including an experimental or treatment group and a control group. The control group design was adopted to achieve the objectives of the research. The demographics and characteristics of each group of learners are summarized in the table below:

*Table 5. 3 Demographic information of learners*

| | Experimental group, n = 231 | Control group, n = 212 |
|---|---|---|
| Age | | |
| 25 and under | 222 (96%) | 210 (99%) |
| 26 – 35 | 6 (3%) | 2 (1%) |
| 36 – 45 | 3 (1%) | 0 |
| Gender | | |
| Female | 126 (55%) | 114 (54%) |
| Male | 105 (45%) | 98 (46%) |
| Ethnicity | | |
| White | 93 (40%) | 46 (22%) |
| Other (Middle Eastern, Asian, Black, Mixed) | 138 (60%) | 166 (78%) |

Note: values reported as frequency (%)

## 5.4 CHAPTER SUMMARY

This chapter started with presenting some outcomes of interview data that led to the construction of the TKIBP instrument including the identification of the five key elements associated to effective business presentations. Knowledge Objects were developed based on these five elements, which are found to stimulate personal knowledge growth by some researchers. A description of the structure and composition of the Knowledge Object was provided with related activities. The chapter continued with the presentation and configuration of the e-Learning testbed environment, utilizing available ICT tools and features to support learning and teaching activities in line with the conceptual framework. This chapter lays the foundation to start exploring research enquiries from the main experiment data.

# Chapter 6: Research Findings and Analysis

## 6.1 CHAPTER INTRODUCTION

The previous chapter set the scene for data analysis after presenting the design and implementation of the components for the proposed e-Learning environment used as testbed of the experiment. This chapter presents the findings of the analysis of data collected throughout the experiment and responds to the research questions concerning the learners' ability to acquire tacit knowledge within an e-Learning environment, as well as learners' influencing factors that facilitate the acquisition of this knowledge in an e-Learning environment.

The chapter begins by providing a recap of the methodology applied in the research, as well as a reminder of the research questions. Next, a consolidation of the profile of learners is presented, including demographic information, background and other information related to the subject. Then, learners' tacit knowledge scores are analyzed in line with method one (page 163), and compared across different groups including the experimental and control group of students, and group of expert practitioners. Furthermore, an exploration of factors or personal characteristics that played a major role in learners' ability to acquire tacit knowledge from others in an e-Learning environment, is provided. Thereafter, the development of learners' tacit knowledge is analyzed for participants who took part in the Close Monitoring Initiative, in line with method two (page 173). Finally, learners' experiences and perceptions are scrutinized in line with method three (page 174), in order to better understand ways and circumstances that could enable them to gain tacit knowledge of the field in the proposed e-Learning environment. The chapter ends with a summary of the findings.

## 6.2 METHODOLOGY RECAP AND ANALYSIS STEPS

In order to explore whether or not learners are able to acquire tacit knowledge in business presentation field, the following experiment was conducted:

1. We recruited 443 students and randomly assigned them to an experimental or treatment ($n$ = 231) and control ($n$ = 212) groups.
2. The TKIBP instrument was administered to all students twice – pre- and post-intervention. Only students in the experimental group received the e-Learning program intervention. Conversely, students in the Control group had the TKIBP

instrument administered twice at the same time points as the experimental group of students.

3. Each student completed an online questionnaire with demographic information, experience and knowledge in delivering presentations. Furthermore, experimental group of students answered questions related to familiarity and perception of the proposed e-Learning environment, perception of the proposed e-Learning model. At the end of the study, the experimental group of students answered several questions related to the use of technology, and their overall satisfaction with the e-Learning program.
4. The amount of improvement was calculated for each student as a difference between pre- and post- TKIBP score. Positive values indicate a decrease in TKIBP score, suggesting that students' tacit knowledge has improved, bringing them closer to expert status..
5. We randomly recruited 23 students for a Close Monitoring Initiative, then analyzed and compared their improvement at the beginning, halfway, and end points of the experiment.
6. The randomly recruited 24 students' perceptions and experiences were finally examined in-depth.

The broad research question of the study asks: *can e-Learning environments provide conditions that facilitate the acquisition of tacit knowledge?* And if so, how? This led to the following sub-questions:

**RQ1:** Can tacit knowledge be cultivated and retained in e-Learning environments? And if so, how?

**RQ2:** Do the use of Knowledge Objects to design e-Learning content and the coordination of learning and teaching activities in the spirit of Community of Practice facilitate the acquisition of tacit knowledge in e-Learning environment?

**RQ3:** Among the following: age, gender, ethnicity, specialty, experience in the field, English as a first language, familiarity with e-Learning environments, self-competence, perceived usefulness, self-directed learning, motivation, perception of the proposed e-Learning model; what are the major factors or characteristics that positively influence learners' ability to acquire tacit knowledge in an e-Learning environment (based on RQ2)?

## 6.3 LEARNERS' PROFILES

Table 6.1 summarizes the demographic information and background of learners, as gathered through a learners' feedback survey (see Appendix J, Section A from question 1 to 9).

*Table 6. 1 Demographic information and background of the study participants*

| | Experimental group, *n* = 231 | Control group, *n* = 212 |
|---|---|---|
| Age | | |
| 25 and under | 222 (96%) | 210 (99%) |
| 26 – 35 | 6 (3%) | 2 (1%) |
| 36 – 45 | 3 (1%) | 0 |
| Gender | | |
| Female | 126 (55%) | 114 (54%) |
| Male | 105 (45%) | 98 (46%) |
| Ethnicity | | |
| White | 93 (40%) | 46 (22%) |
| Other (Middle Eastern, Asian, Black, Mixed) | 138 (60%) | 166 (78%) |
| Major field of study | | |
| Accounting | 24 (11%) | 34 (16%) |
| Management | 57 (25%) | 64 (30%) |
| Marketing | 18 (8%) | 28 (13%) |
| Other (business, economics, HR management, IT, multiple) | 132 (56%) | 86 (41%) |
| Years of work experience | 3.07 ± 1.80 | 1.04 ± 1.22 |
| Years of experience doing presentations | 2.36 ± 1.45 | 2.02 ± 1.59 |
| Current work status | | |
| Working part-time or full-time | 131 (57%) | 122 (58%) |
| Not working | 100 (43%) | 90 (43%) |
| English as first language | | |
| Yes | 105 (45%) | 66 (31%) |
| No | 126 (55%) | 146 (69%) |
| Baseline knowledge in delivering presentation | | |
| Weak | 80 (35%) | 73 (34%) |
| Medium | 97 (42%) | 89 (42%) |
| High | 54 (23%) | 50 (24%) |

Note: values reported as frequency (%) or Mean ± Standard deviation

Table 6.2 summarizes learners' other attributes about e-Learning, as gathered through a learners' feedback survey (see Appendix J, Section B from question Q10 to Q12).

*Table 6. 2 Other attributes of the study participants in e-Learning experiment*

| | Experimental group, *n* = 231 |
|---|---|
| Are you familiar with e-Learning environment? | |
| Yes | 182 (79%) |
| No | 49 (21%) |
| How many years have you been using e-Learning in your studies? | 4.04 ± 2.98 |
| Self-competence score (SC), 3 questions, score range 3-15 | 12.16 ± 3.76 |
| Perceived usefulness score (PU), 3 questions, score range 3-15 | 12.35 ± 4.03 |
| Self-directed learning (SDL), 5 questions, score range 5-25 | 20.17 ± 6.05 |
| Motivation (MO), 3 questions, score range 3-15 | 12.18 ± 4.79 |

Note: values reported as frequency (%) or Mean ± Standard deviation

Table 6.3 summarizes the overall learners' perception of the proposed e-Learning environment, as gathered through a learners' feedback survey (see Appendix J, Section C, question 13).

*Table 6. 3 Overall students' perception of the proposed e-Learning environment*

| | Experimental group, *n* = 231 |
|---|---|
| I feel I was provided with adequate guidance on how to successfully give a business presentation using the e-learning environment | 3.78 ± 1.32 |
| I believe conditions provided in the e-Learning environment helped me to learn and practice my business presentations skills | 3.83 ± 1.18 |
| I feel it was easy to connect informally with other students and instructors to collaborate and share ideas and stories | 3.97 ± 1.70 |
| I trust other participants in the e-Learning environment | 3.96 ± 1.67 |

Note: values reported as Mean ± Standard deviation, scores are on 5-point Likert scale (1 = strongly disagree, 5 = strongly agree)

## 6.4 ASSESSING TACIT KNOWLEDGE AND INFLUENCING FACTORS

This section includes quantitative techniques that are in line with the Sternberg approach as a means of evaluating the study participants' tacit knowledge score and to explore their characteristics, or factors, influencing their ability to gain tacit knowledge from the instructors and peers in the e-Learning program.

**Calculation of Tacit Knowledge Score**: The consensus of the 28 experts was used to establish a reference. For each of their answers of the 58 items in the TKIBP questionnaire, we calculated the mean and standard deviation (Mi and SDi, where i = item number 1…58). In reference to the standard deviations, we can see that the range is between 0.19 and 1.91, with a median of SD = 0.89, suggesting a similarity in their opinions.

The overall score for each expert (and later, that of each student) was calculated using the following equation: $Score = \sum_{i=1}^{58} \left| \frac{X_i - M_i}{SD_i} \right|$, where Xi is the individual response to the question or item i. A lower score would correspond to individual responses closer to the experts' consensus of opinion. We expect experts to have the lower scores compared to students.

The following subsections address each specific research question.

### 6.4.1. Learners' Tacit Knowledge Score

This section answers research question *RQ1: can tacit knowledge be cultivated and retained in an e-Learning environments?* We examined if learners' tacit knowledge score varied significantly pre- and post- the experiment in the test, as per the TKIBP questionnaire.

Students were randomly assigned to an experimental group (*n* = 231) and a control group (*n* = 212). The experimental group of students was provided e-Learning materials and interventions to improve the tacit aspect of their business presentation skills, for which they had pre- and post- scores available.

- $H_0$: $\mu_{exp} = \mu_{control}$, null hypothesis states that there is no difference in pre-scores between the two groups
- $H_1$: $\mu_{exp} \neq \mu_{control}$, alternative hypothesis states that there is a difference in pre-scores between the two groups

Independent samples of the t-test showed no statistically significant difference in pre-scores between students in the experimental (*M* = 95.15, *SD* = 17.79) and control (*M* = 95.84, *SD* = 19.44) groups; $t(441) = -0.42$, $p = 0.68$. This indicates that experimental and control groups of students have similar presentation skills at the time of the randomization. This was expected, since the students were randomly assigned to each group.

- $H_0$: $\mu_{pre} = \mu_{post}$, null hypothesis states that there are no changes in TKIBP scores pre- vs post- intervention
- $H_1$: $\mu_{pre} \neq \mu_{post}$, alternative hypothesis states that there are changes in TKIBP scores pre- vs post- intervention

In order to examine the effectiveness of the e-Learning program, we compared pre- and post- TKIBP scores for the experimental group of 231 students using paired-samples of the t-test. We found statistically significant improvement (pre- $M$ = 95.15, $SD$ = 17.79; post- $M$ = 74.41, $SD$ = 22.02) of 22.64 on average (95% CI 19.68 to 23.88), $t(230) = 20.44$, $p < 0.001$. Within the control group, the change is not statistically significant (pre- $M$ = 95.84, $SD$ = 19.44; post- $M$ = 95.56, $SD$ = 22.12), $t(211) = 0.55$, $p = 0.58$.

- $H_0$: $\mu_{exp} = \mu_{control}$, null hypothesis states that there is no difference in improvement between the two groups
- $H_1$: $\mu_{exp} \neq \mu_{control}$, alternative hypothesis states that there is a difference in improvement between the two groups

By comparing experimental and control groups in terms of improvement of TKIBP scores, using independent t-test samples, we found (statistically) significantly higher improvement in the experimental group, when compared to the control, $t(441) = 17.46$, $p < 0.001$. The improvement within the experimental group ($M$ = 22.64, $SD$ = 16.00) is greater than the improvement within the control group ($M$ = 0.37, $SD$ = 9.84).

The graphs below show pre- and post- TKIBP scores amongst the experimental group and the control groups of students, in comparison to the TKIBP score of the expert group.

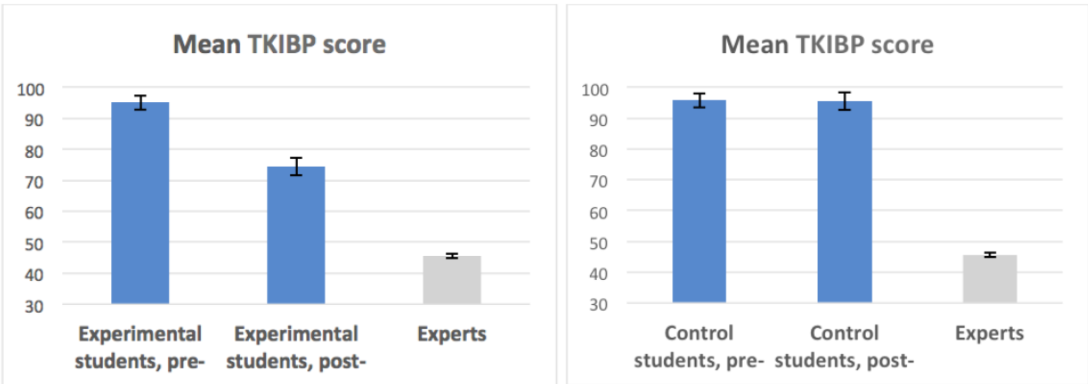



*Figure 6. 1 Mean TKIBP scores between experimental and control groups*

### 6.4.2. Knowledge Object with COP Learning and Teaching Strategy Contribution

This section addresses research question *RQ2: Do the use of Knowledge Objects to design e-Learning content and the coordination of learning and teaching activities in the spirit of Community of Practice facilitate the acquisition of tacit knowledge in e-Learning* *environment?* To answer this question, we sought the learners' perceptions and experiences of the five Knowledge Objects implemented and deployed in the e-Learning environment. This includes corresponding learning and teaching activities coordinated by instructors, and coordinated in the spirit of Community of Practice. We also examined the impact on interactions and performance (or activities) favourable to the acquisition and retention of tacit knowledge. This data was collected through the learners' feedback on the provided questionnaire (see Appendix J, Section D, question Q14).

*Table 6. 4 Overall learners' perception and impact of the proposed e-Learning model*

| | Understanding audience | Preparing your content | Delivering confidently | Controlling the environment | Team presentation management | Overall score |
|---|---|---|---|---|---|---|
| Perception of topic oriented tasks / activities / forums | 4.03±2.12 | 4.13±2.10 | 3.87±1.93 | 3.97±2.07 | 4.10±2.05 | 20.10±5.92 |
| Impact of interacting with relevant people | 3.58±2.08 | 3.61±2.11 | 3.60±2.16 | 3.63±1.99 | 3.29±2.03 | 17.71±6.19 |
| Impact of observing / watching | 4.10±2.10 | 3.82±2.12 | 4.24±2.07 | 3.94±1.98 | 3.93±2.10 | 20.02±6.07 |
| Impact of listening | 4.08±2.17 | 4.16±1.99 | 4.05±2.12 | 4.15±2.14 | 3.87±2.12 | 20.32±5.98 |
| Impact of imitating | 3.91±2.00 | 3.78±2.09 | 3.91±2.11 | 4.00±2.09 | 4.23±2.09 | 19.83±5.91 |

Note: values reported as Mean ± Standard deviation, scores are on 5-point Likert scale (1 = strongly disagree, 5 = strongly agree)

*Table 6. 5 Difference in perception and impact of the proposed e-Learning model between learners who improved and did not improve in scenarios*

| | Understanding audience Scenario 9,10 | | Preparing your content Scenario 7 | | Delivering confidently Scenario 1,2,3,6 | | Controlling the environment Scenario 4,5,8 | | Team presentation management Scenario 11 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Not improve | Improve | Not improve | Improve | Not improve | Improve | Not improve | Improve | Not improve | Improve |
| Perception of topic oriented tasks / activities / forums | 2.05± 1.62 | 4.21± 2.08 | 3.00± 1.80 | 4.23± 2.10 | 2.95± 2.09 | 3.95± 1.90 | 2.58± 1.90 | 4.09± 2.04 | 2.05± 1.58 | 4.28± 1.98 |
| Impact of interacting with relevant people | 2.00± 1.56 | 3.72± 2.07 | 2.37± 1.57 | 3.72± 2.12 | 2.26± 1.59 | 3.72± 2.17 | 2.79± 1.81 | 3.70± 1.99 | 1.79± 1.03 | 3.43± 2.05 |
| Impact of observing / watching | 2.42± 1.61 | 4.25± 2.07 | 1.79± 1.40 | 4.00± 2.08 | 2.53± 1.65 | 4.39± 2.04 | 3.11± 1.73 | 4.01± 1.99 | 1.95± 1.13 | 4.11± 2.08 |
| Impact of listening | 2.16± 1.50 | 4.25± 2.14 | 2.42± 1.74 | 4.32± 1.94 | 2.26± 1.59 | 4.21± 2.09 | 2.53± 1.87 | 4.29± 2.10 | 2.53± 1.81 | 4.00± 2.11 |
| Impact of imitating | 2.84± 1.26 | 4.01± 2.03 | 2.47± 1.74 | 3.90± 2.08 | 2.37± 1.64 | 4.05± 2.10 | 2.53± 1.61 | 4.13± 2.08 | 3.05± 2.12 | 4.33± 2.06 |

Note: values reported as Mean ± Standard deviation, scores are on 5-point Likert scale (1 = strongly disagree, 5 = strongly agree)

After examining students' overall perception as well as the impact of the proposed e-Learning model for each of the five modules, which includes a Knowledge Object along with associated learning and teaching activities conducted, in addition to the Community of Practice learning strategy on tacit knowledge (TKIBP) scores of corresponding scenarios (Table 6.4), along with the difference between students who improved and those who did not improve (Table 6.5), we are able to answer RQ2. Additionally, we performed a correlation analysis to capture the association between improvement in the TKIBP score for specific scenarios, and perception scores of the related module addressing these scenarios in the e-Learning program from question Q14.

- $H_0$: null hypothesis states that there is no association between improvement in TKIBP scenario and corresponding module
- $H_1$: alternative hypothesis states that there is an association between improvement in TKIBP scenario and corresponding module

*Table 6. 6 Correlation analysis between TKIBP scenarios improvement and module perception scores*

| Improvement (or decrease) in TKIBP scenarios | Correlation with corresponding KO# (from Q14) |
|---|---|
| Understanding audience (scenario 9, 10) | $r = 0.72$, $p < 0.001$ |
| Preparing your content (scenario 7) | $r = 0.69$, $p < 0.001$ |
| Delivering confidently (scenario 1, 2, 3, 6) | $r = 0.69$, $p < 0.001$ |
| Controlling the environment (scenario 4, 5, 8) | $r = 0.68$, $p < 0.001$ |
| Team management presentation (scenario 11) | $r = 0.64$, $p < 0.001$ |

The above table shows a highly significant association for each of the five Knowledge Objects and changes in corresponding TKIBP scenarios with the highest correlation ($r$ = 0.72) occurring in understanding the audience and the lowest ($r$ = 0.64) in team management presentation. Greater improvement is shown to be associated with higher perception scores.

### 6.4.3. Learners' Factors Influencing Tacit Knowledge Acquisition

This section addresses research question *RQ3**:** Among the following: age, gender, ethnicity, specialty, experience in the field, English as a first language, familiarity with e-Learning environments, self-competence, perceived usefulness, self-directed learning, motivation, perception of the proposed e-Learning model; what are the major factors or characteristics that positively influence learners' ability to acquire tacit knowledge in an e-Learning environment (based on RQ2)?* In the third chapter, some directions were provided based on literature and previous studies of conditions and learning factors, favourable to acquire tacit knowledge online. Twenty-four factors were determined to examine the association of TKIBP scores to these factors. Data related to these factors was collected through the Students' feedback on the provided questionnaire (see appendix J).

Additionally, we explored factors associated with improvement on the TKIBP score using a bivariate correlation analysis. The table below shows the correlation of coefficients and any associated statistical significance for each factor.

- $H_0$: null hypothesis states that there is no association between TKIBP score improvement and a factor (age, gender, etc.)
- $H_1$: alternative hypothesis states that there is an association between TKIBP score improvement and a factor (age, gender, etc.)

*Table 6. 7 Correlation analysis for TKIBP score improvement and related factors*

| | Correlation with TKIBP score improvement, $n$ = 231 |
|---|---|
| Age group | $r = 0.001$, $p = 0.99$ |
| Gender | $r = -0.05$, $p = 0.43$ |
| Ethnicity (white vs other) | $r = 0.10$, $p = 0.12$ |
| Major field of study | $r = 0.04$, $p = 0.56$ |
| Currently working (part-time or full-time) | $r = 0.002$, $p = 0.97$ |
| Years of work experience | $r = 0.76$, $p < 0.001$ |
| Years of experience delivering business presentations | $r = 0.79$, $p < 0.001$ |
| Self-assessment of business presentation skills (Q8) | $r = 0.50$, $p < 0.001$ |
| English as a the first language | $r = 0.24$, $p < 0.001$ |
| Being familiar with e-Learning environment | $r = 0.43$, $p < 0.001$ |
| Years of using e-learning in academic studies | $r = 0.48$, $p < 0.001$ |
| Self-competence (Q12) | $r = 0.63$, $p < 0.001$ |
| Perceived usefulness (Q12) | $r = 0.72$, $p < 0.001$ |
| Self-directed learning (Q12) | $r = 0.66$, $p < 0.001$ |
| Motivation (Q12) | $r = 0.84$, $p < 0.001$ |
| Provided adequate guidance to give presentations (Q13a) | $r = 0.47$, $p < 0.001$ |
| Conditions in e-Learning to build or stimulate knowledge creation (Q13b) | $r = 0.45$, $p < 0.001$ |
| Informal meetings and experience sharing possibilities (Q13c) | $r = 0.79$, $p < 0.001$ |
| Trust (Q13d) | $r = 0.76$, $p < 0.001$ |
| Social interaction via topic based (Q14a) | $r = 0.72$, $p < 0.001$ |
| Connect and discuss with peers (Q14b) | $r = 0.70$, $p < 0.001$ |
| Observing/Watching (Q14c) | $r = 0.71$, $p < 0.001$ |
| Listening (Q14d) | $r = 0.72$, $p < 0.001$ |
| Imitating (Q14e) | $r = 0.64$, $p < 0.001$ |

Correlation analysis shows that age, gender, ethnicity, major field of study, as well as occupational status, have no statistically significant association with tacit knowledge improvement. However, experience (work, years of delivering presentations, years of using e-Learning), English as a first language, self-assessment of business presentation skills, Q12 scores (self-competence, perceived usefulness, self-directed learning, motivation), perception of the proposed e-Learning environment (Q13), perception of the proposed e-Learning model (Q14), all contribute positive, statistically significant association with improvement in tacit knowledge.

*Table 6. 8 Post-experiment question*

| | Experimental group, n = 231 |
|---|---|
| Overall satisfaction with this experiment | |
| Extremely dissatisfied | 9 (4%) |
| Dissatisfied | 34 (25%) |
| Neutral | 82 (35%) |
| Satisfied | 73 (32%) |
| Extremely satisfied | 33 (14%) |

Note: values reported as frequency (%)

Notably, almost half of the learners (46%) were satisfied or extremely satisfied with the experiment while only 29% indicated dissatisfaction.

## 6.5 CLOSE MONITORING INITIATIVE FINDINGS

We sent out 30 invitations to randomly chosen students to be part of the experimental group (n=231), for the Close Monitoring Initiative. Twenty-three students agreed to participate. Students were asked to provide a video recording of themselves making a business presentation on a topic of their choice, at three different stages: the beginning, half-way, and at the end of the study. Each presentation is assessed by one of the three independent experts using a 9-rubric tool from Kenkel (2011) (see Appendix I). Experts also provided qualitative feedback for the areas or rubrics where a student got the lowest score (0). Moreover, experts were asked to give their opinions on whether students who dealt successfully with critical situations during the Close Monitoring Initiative differed in their tacit knowledge from students who were less successful.

This initiative was undertaken because this study subscribes to the views expressed by Herbig et al (2001) which state that: “experience-guided working is of the utmost importance for dealing with critical situations” and the findings of Matosková et al. (2013), which emphasizes that tacit knowledge is “...practical know-how, which is formed in the minds of people in the course of time on the basis of experience and interactions with their surroundings. The individual is not often aware of it, because they gain it without conscious attention and use it spontaneously. There is an obvious connection with routine actions…" and which Pacovský (2006) states is "because tacit knowledge is stored in our sub-consciousness and it has a tendency to be activated when an incentive appears."

Over time, we examined any changes in the overall score marked by the experts of students from their actual performance. We also explored the average number of rubrics where a student received a score of zero. From a qualitative perspective, we examined the experts' feedback, comments and opinions from watching students in action over time.

*Table 6. 9 Close Monitoring Initiative results*

| | Beginning of the study (PRE) | Half-way | End of the study (POST) | Comparison test |
|---|---|---|---|---|
| Assessment score (0-27) | 15.78 ± 4.00 | 18.65 ± 3.39 | 20.13 ± 2.91 | Repeated-measures ANOVA $F(1.38,30.23) = 59.45$, $p < .001$ All Bonferroni-adjusted pairwise comparison $p < .001$ |
| Number of zero-scored rubrics per student | 1.00 ± 1.09 | 0.57 ± 0.79 | 0.52 ± 0.67 | Friedman test $X^2(2) = 7.47$, $p = .024$ |
| Proportion of students with at least one zero-scored rubric | 57% | 39% | 43% | Cochran's Q test $X^2(2) = 3.71$, $p = .16$ |

Note: values reported as Mean ± Standard deviation

The analysis showed an increase in assessment scores on average, from 15.78 at the beginning of the study to 20.13 by the end (see Figure 6.2). The increase is statistically significant overall (repeated-measures ANOVA $F(1.38,30.23) = 59.45$, $p < .001$), and a statistically significant difference was also found between each stage (Bonferroni-adjusted pairwise comparison $p < .001$). This suggests that participants showed a steady improvement in their presentation skills.

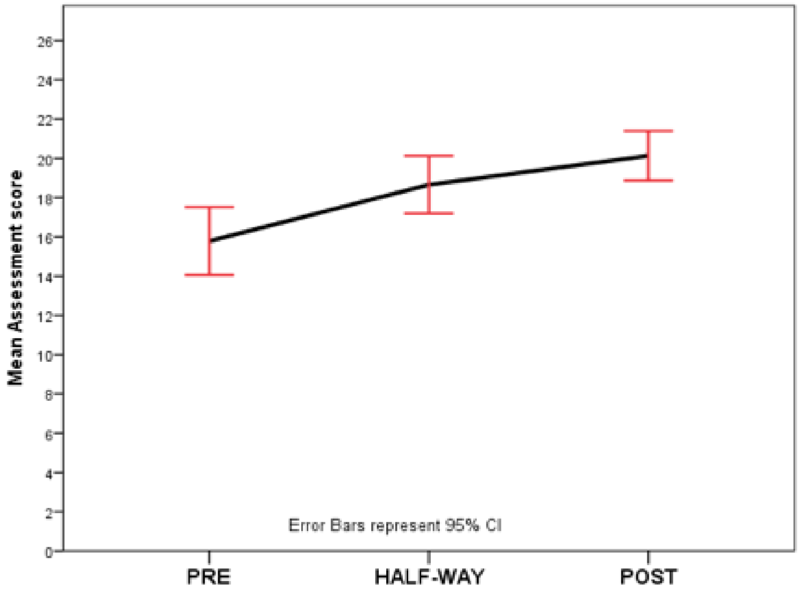



*Figure 6. 2 Change in mean assessment score over time among CMI group students*

The average number of zero-scored categories (per student) also declined from 1.00 at the beginning of study to 0.52 at the end, and the change is statistically significant, as per Friedman test $X^2(2) = 7.47$, $p = .024$.

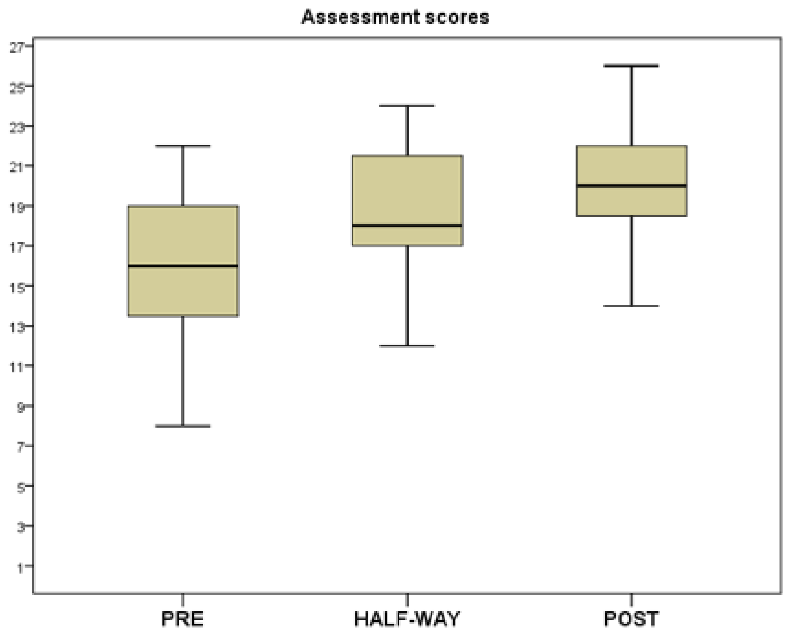



*Figure 6. 3 Change in distribution of assessment scores over time among CMI group students*

We also saw some reduction in a portion of students with at least one zero-scored rubric, from 57% at the beginning of the study to 43% at the end (see Figure 6.4). However, the change was not statistically significant, as per Cochran's Q test $X^2(2) = 3.71$, $p = .16$.

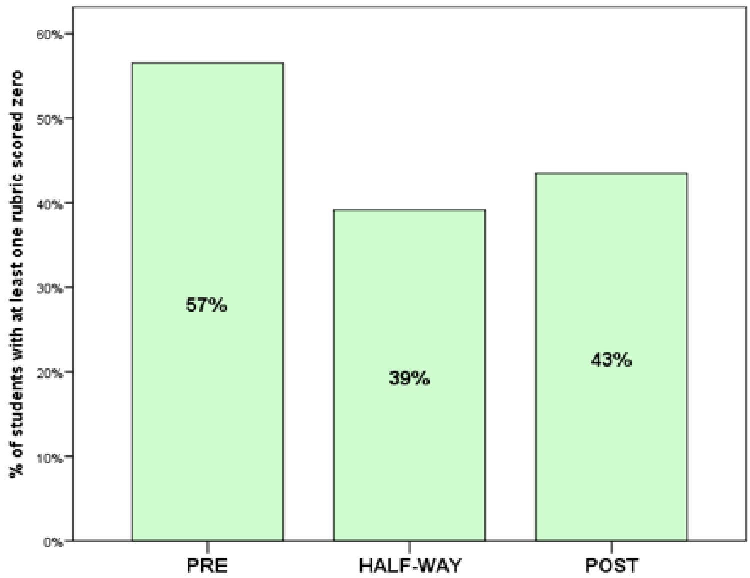


*Figure 6. 4 Change over time in the percentage of students that have at least one zero rubric score*

A qualitative assessment was conducted using feedback and comments provided by experts. Although the overall quality of presentations improved, the comments remained similar throughout the three stages. For example, when the pre-intervention comment read “student avoided eye contact”, the halfway and post-interventions would be similar, “student read slides without making eye contact with the audience” and “student occasionally made eye contact, but relied heavily on reading notes,” respectively. In this example, the student had the weakest skills in presentation organization and category length.

Qualitative analysis suggests that the following words are used most frequently: audience, attention, introduction, information, transitions, mistakes or typos, eye contact, posture, weak and topics. The word cloud diagram below shows key words used by experts within the comments.


*Figure 6. 5 Word cloud diagram of experts' comments to students*

Here are the most typical comments from experts:

- Student's voice was monotone and soft.
- Student was clearly nervous, and did not introduce the topic clearly. Presentation was disjointed and lacked flow. Student ended prematurely, with just a recap of key points.
- Did not make eye contact throughout the presentation. Posture was slumped, and student paced throughout presentation.
- Student had poor posture, and shifted weight nervously.
- Introduction was very weak. In future presentations, student should clearly introduce the topic of the presentation.
- Student should practice speaking more loudly and with more tonal variety.
- Presentation fell outside the allotted time, and included irrelevant information. Student failed to engage with the audience. Student should make an effort to invite questions or comments from the audience.
- Introduction captured audience attention, but was a bit awkward. Student was quiet at some points in the presentation. Conclusion was good, but too long.

A qualitative analysis was finally conducted on experts' opinions after watching the students' performance to examine their actions during situations or incidents that occurred at the beginning, halfway point and end of the e-Learning experiment. Experts were asked to give their opinions on whether students who dealt successfully with critical situations during the Close Monitoring Initiative differed in tacit knowledge from the students who were less successful.

The first step of the analysis consisted of examining students' explanations of their actions and what they thought they achieved during their performance over time. It was noted that students were not able to justify why they a behaved in a certain way while performing particularly when an incident occurred, such as disruptions from the audience, being asked difficult questions, technology issues, and so on. Some comments are quoted below:

- *The consequences were discussed during the Virtual Learning Environment expert presentation master class, so I'd heard of this. I avoid being distracted and keep my focus on the audience. (Student 3)*
- *I practiced a fair bit beforehand. During the presentation, I remained focused on conveying the key message, and my postures and behaviours came naturally. (Student 14)*

Other students were clearly aware of their weaknesses, and their actions reflected their attempts to overcome or hide them:

- *I try to hide my anxiety from the audience by standing behind the lectern. When I do this, I find the anxiety, at the very least, doesn't increase at all. (Student 21)*
- *I've learned of the many tips and techniques, however applying them in practice is an entirely different thing. I'm always tempted to stray from my script; but I know I should follow it, because that's far better than losing your train of thought. (Student 4)*

The second step consisted of examining and consolidating experts' opinions on students' performance over time. Based on the feedback, experts' opinions showed that students who improved or who consistently scored above average on the 9-rubric evaluation tool, demonstrated some common traits that they attributed to practical and procedural knowledge. Some of their comments are as follows:

- *Student 9 did a great job and showed excellent attitude on this question. I do not believe the student is aware of what they'd accomplished, the key part being that many people make mistakes.* Experts noted that *posture and confidence are very important in presentation, especially when faced with a question for which you* *have no answer. In this situation one should avoid ridiculing themselves, and instead exhibit more confidence and make progress in a humble manner.*

- *There is a significant improvement in Student 16's poise and vocals; the confidence is perceptible. This indicates that the student is well practiced and therefore more proficient. A good voice tone that is in sync with the message is also apparent. It is emphasized by experts; and I've also learned through my own experiences; that the more you practice, the less anxious you are and it boosts your confidence. Some of my colleagues have personal rituals to build the energy; and I do as well.*

The experts' opinions on students who did not show consistent improvement had similar patterns and even repetitive failures throughout the Close Monitoring Initiative. Some of the comments are as follows:

- *Student 21 clearly lacks confidence. It shows a lack of dynamism when one freezes during a presentation. Confident speakers use space by walking to different sections of the platform and using expansive gestures to denote confidence.*
- *Student 17 left a bad impression in spending most of the time reading slides. The student doesn't seem to be aware of how monotonous that is.*

On the other hand, experts confirmed that some students were able to demonstrate the expected professional expertise within the business presentation field. This is seen as an indicator of tacit knowledge (Wagner and Sternberg, 1985). The qualitative comments confirm the overall evaluation of the panel of experts after observing students at work over a period of time. This is also backed up by the fact that students who delivered better business presentations, demonstrated an ability to manage fear or anxiety, indicating that the possession of explicit knowledge does not always guarantee success.

## 6.6 LEARNERS' PERCEPTIONS AND EXPERIENCES

In this section, we report on the perspectives and experiences of students from the in-depth interviews. Using semi-structured interviews, we interviewed 24 students and assessed their perceptions and opinions of the e-Learning model, their capacity to develop new ideas, insights and practical knowledge related to the field. The interview included questions designed to better understand students' learning experiences, as well as changes or improvements in their way of delivering business presentations after the experiment.

A qualitative analysis showed that there are four major commonalities in the data that reflect the patterns of experiences and perspectives of students on the potential contributions of the proposed e-Learning system for their tacit knowledge development. The commonalities were selected based on criteria that was frequently cited within the students' interview data. We designated *ns* as the total number of students stating all codes related to the theme. The four themes consist of socializing, practicing, networking, and storytelling.

- **Socializing** (*ns* = 16)**:** students who regularly used the proposed e-Learning system found it to be a social place where they could easily interact with others either formally or informally. They could ask their questions and receive various responses. Furthermore, they could express their opinions freely about a topic posted, and they could engage in live discussions with the instructor and fellow peers. Some students' comments are provided below:

  *I enjoyed attending the webinars because the instructor made live demonstrations. I also enjoyed the discussion thereafter. (Student 14)*

  *I have spoken to students in real time who have experience in this. I gravitate to them because their willingness to discuss both their experiences and past failures makes me feel as though I can trust them. (Student 5)*

- **Practicing** (*ns* = 21)**:** students specified that the e-Learning system gave them the opportunity to watch, observe, demonstrate and imitate best practices. They took advantage of the e-Learning program to create and share audio-video presentations of their own. These have generated mass discussions, comments and sharing of success stories.

  *Today I accessed the Virtual Learning Environment to watch videos about how to overcome nerves and the importance of body language while conducting a presentation. Being able to watch somebody explain and do it, I was able to learn things in both the commentary and visual delivery. In watching videos more than once, I discovered that I learned something new each time. It gave me better insight into creating my own techniques and subject matter to discuss with others. (Student 7)*

- **Networking** (*ns* = 19)**:** according to students, the organization of the module in the Virtual Learning Environment offered an easy way to locate students who have some experience in business presentations – based on their positive contribution to a specific topic. It enabled them to establish relationships and to collaborate with others. Thus, being able to network, chat and get to know one another was one of the main tangible benefits of the e-Learning module. Some students noted that through the e-Learning module, they developed relationships with like-minded peers that they would otherwise not have been able to establish in a classroom. More specifically, it allowed them to track and follow other students' experiences and opinions. It also helped students to share up-to-date information and resources.

*The more you engage in conversation in the Virtual Learning Environment, the more you become aware of the students who are producing good quality information that will help you professionally. (Student 19)*

*I feel that the Virtual Learning Environment gives me access to a greater pool of expertise than I would obtain in the more limited classroom setting. (Student 18)*

- **Storytelling** (*ns* = 22)**:** stories are usually supported by examples, metaphors and models, which enable knowledge to be transferred in an image-by-image manner, rather than word-by-word, making it easy to remember (Strahovnik and Mecava, 2009). Stories can also be in various forms such as oral, written, film or illustration (Carud, 1997). Generally, Virtual Learning Environment features such as blogs and wikis have significant potential for storytelling, such as providing opportunities for case reporting and developing discussions regarding challenging cases. Furthermore, Virtual Learning Environment features also enable the sharing of personal experiences and lessons learned, and provide the platform to present stories in a multimedia format.

*I chose to write about my own personal experiences, as well as writing about people who did unusually well or even unusually poorly; because I felt it might be helpful for other students. I described both the failures and the lessons learned, respectively. I'm proud to say that the instructor endorsed my views and recommended them to other students. (Student 13)*

*The instructor shared a story about a business conference he attended in a foreign country; where he was to deliver a presentation. Body language is interpreted in various ways from one country to the next; and because he hadn't thought this through, the presentation didn't go well for him. Instead of connecting with the* *audience, his body language alienated them. I found this very informative and it's among one of the many useful techniques I've learned. (Student 20)*

Students' experiences, summarized into the four aforementioned themes, touches on the five elements that must be present in an environment for the success of tacit knowledge sharing and acquisition: social interaction, experience sharing, observation, informal relationship/networking, and mutual trust (Panahi et al., 2012, 2013, 2014). Indications that these elements were present in the proposed e-Learning environment throughout the experiment suggest that tacit knowledge sharing and acquisition have taken place successfully. We also note that students acknowledged their ability to learn something that has influenced their approaches to engaging in presentation-related activities and resources. These would include videos, webinars (watching), audios (listening), exchanging resources (e.g. images), texts (reading), and actions (practicing). Moreover, the students' comments are related to the properties of tacit knowledge as classified by Dampney et al., (2002) presented in table 4.1. The process of tacit knowledge development can be triggered by any of these resources and activities, as they can spark deep reflection in students. Students' learning experience also aligns with Kolb's learning stage, suggesting that effective learning occurs when a student progresses through a cycle of four stages including feeling, watching, thinking, or doing. Having various formats of the resources, shared within the platform, are useful for students with preferred learning styles, in reference to Kolb's and Honey and Mumford's learning style findings.

As to whether students could have learned what they did from the e-Learning experiment by reading books or listening to lectures, 87.5% of students answered "*No*" versus 12.5%. Their comments or reasons on why the e-Learning module was better than reading a book or listening to lectures, are noted below:

*The e-Learning setting offers a venue for dynamic discussion and allows everyone to share ideas and perspectives. This is especially helpful for nervous people, as nobody is looking at you. (Student 11)*

*I think this is a wonderful way of teaching! Reading can become overwhelming for even the most seasoned wordsmith; and the visual learning format provides a greater balance for all learning styles. (Student 14)*

> *Taking a program in the Virtual Learning Environment is very convenient because you can attend virtually from anywhere in the world. It also allows for more opportunity to ask questions and follow up; which especially helpful if you're out of time. (Student 22)*

The students' comments confirm Tee and Karney's (2010) findings about the e-Learning environment, as they note that "Knowledge—particularly tacit knowledge—is best shared and cultivated in a climate of love, care, trust, and commitment (resulting in a safe learning environment)" (p. 409).

## 6.7 SUMMARY OF ANALYSIS

This section summarizes key findings from the data analysis, including its strengths and weaknesses. The study methodology adopted three methods to assess and explore the development of students' tacit knowledge in their field of interest. This included influencing factors, as well as experiences and perspectives of students of the potential contributions of the proposed e-Learning system for tacit knowledge acquisition and dissemination.

The first method, the Sternberg-based approach, involved the creation and validation of tacit knowledge inventory questionnaire for the business presentation (labelled TKIBP in this study).

Validity of the TKIBP instrument was examined and verified using the following four techniques:

- Intraclass Correlation Coefficient well above 0.80, suggesting a high level of agreement between participants (both experts and students)
- Comparison of composite scores between three groups showed higher knowledge for experts, compared with experienced students and undergraduate students (one-way ANOVA)
- An inverse relationship between years of experience and composite score, suggesting better knowledge for participants with more years of experience (correlation analysis)
- Strong correlation between TKIBP score and assessment score from independent experts using Kenkel's (2011) 9-rubrics evaluation guide (see Appendix J), confirming external validity

External validity of the TKIBP instrument was confirmed by examining a correlation between the TKIBP score and composite score assessment of independent experts (using Kenkel's 9-rubrics evaluation guide).

The capacity of the proposed e-Learning environment to help learners share and cultivate tacit knowledge of the business presentation field of interest has been confirmed with empirical evidence from an experiment not yet available in related literature. Using Knowledge Objects to design e-Learning content coupled with learning and teaching activities coordinated in the spirit of Community of Practice is a viable approach to facilitate students' ability to acquire tacit knowledge of business presentation in an e-Learning environment. The study also specifies learners' characteristics that positively influence their capacity to gain tacit knowledge from others and instructors in an e-Learning environment. These findings were verified using the following techniques:

- Statistically significant improvement in TKIBP scores for experimental group of students, comparing post- and pre- intervention scores. The improvement in TKIBP score in experimental group is significantly higher than improvement in control group. The mean improvement is 22.64, with 95% confidence interval between 19.68 and 23.88.
- Age, gender, ethnicity, major field of study, occupational status, have no statistically significant association with tacit knowledge improvement.
- Experience (work, years of delivering presentations, years of using e-Learning), English as a first language, self-assessment of business presentation skills, self-competence, perceived usefulness, self-directed learning, motivation, perception of the e-Learning environment, perception of the proposed e-Learning model, all have positive, statistically significant association with improvement in tacit knowledge.
- There is strongly positive and statistically significant association for the perception of the proposed e-Learning model for each of the five Knowledge Objects (understand the audience, prepare your content, deliver confidently, control the venue, and manage a team presentation), and improvement in TKIBP score of the corresponding scenarios.

The second method used a panel of experts as evaluators to complement findings with qualitative feedback. Actual practical know-how in the experimental group was improved based on data from the 23 students in the Close Monitoring Initiative. The average improvement in the assessment score grew from 15.78 (pre) to 20.13 (post), 4.35 units (27% of pre-intervention score).

- Experts' opinion is that students, who were able to deal successfully with critical incidents of the subject, demonstrated high practical knowledge and experience compared to those who were unable to. This can be associated with the tacit knowledge that successful students have, which less successful students do not.

The third method strengthened the understanding of the findings by examining learners' experience and opinions of the e-Learning platform. This revealed that there are four themes, which explain how students interact and collaborate with others to gain new ideas and insights that affect their business presentation practice. These include socializing, practicing, storytelling and networking. The majority of students further specified that they would not be able to learn what they did with the e-Learning experiment from books, or even by listening to lectures, although they did highlight that some face-to-face contact would be valuable.

**Strengths of the data and analysis**

- Large sample from diverse participants.
- Different methods of validating the instrument (high Intraclass Correlation Coefficient, difference between groups, significant correlation with experience years, external validity).
- A composite score that measures the difference between individual responses and consensus/expert opinion that considers the degree of variability amongst experts (normalizing a score using standard deviation amongst experts).
- Validating the effectiveness of an e-Learning program in the development of tacit knowledge by showing improvement in the actual demonstration of practical knowledge of participants by an independent panel of experts.
- Confirming and complementing findings via qualitative analysis of participants' experiences and perceptions of the e-Learning platform.

**Weakness of the data analysis**

- Participants recruited mainly in English speaking countries such as UK (Europe), USA and Canada (North America). Therefore, it would be difficult to generalize results into other geographic areas, or regions of the world.

## 6.8 CHAPTER SUMMARY

In this chapter, the results of the study were described. Firstly, a recap of the methodology, including research questions, was presented. Secondly, learners' profiles, as well as main research participants were described. Thirdly, the chapter provided answers to the research questions. The first question covered the improvement of learners' tacit knowledge. The second question addressed the benefit of using the Knowledge Object concept associated with learning and teaching activities, based on Community of Practice learning strategy, for facilitation of the acquisition of tacit knowledge in an e-Learning environment. The third question dealt with influencing factors or characteristics that positively impact learners' ability to acquire tacit knowledge of a field in an e-Learning environment. Fourthly, results obtained from Close Monitoring Initiative were presented to strengthen and complement understanding of students' acquisition of tacit knowledge in the e-Learning environment. Fifthly, students' experiences and perceptions of the e-Learning model were also described for a better understanding of the findings. Finally, the chapter summarizes key findings, including their strengths and weaknesses. The next chapter will discuss the research results.

# Chapter 7: Discussion and Research Synthesis

## 7.1 CHAPTER INTRODUCTION

The abundance of literature presented in chapters Two and Three demonstrates an absence of empirical as well as experimental studies either proving or disproving students' ability to gain tacit knowledge in e-Learning environments. It also confirms an absence of conceptual frameworks on e-Learning implementation that offer an in-depth understanding of factors which play a major role in the acquisition of tacit knowledge of a given field, at the individual level. After proposing a conceptual framework to facilitate the sharing and acquisition of tacit knowledge in e-Learning environments, this study investigated the level of tacit knowledge acquired at the individual level and learners' factors that influence their ability to acquire such knowledge. The goal is to enhance our understanding of the often hidden capacity of learners to gain tacit knowledge from instructors and peers on a real e-Learning platform, and to propose practical guidelines to facilitate tacit knowledge acquisition in online education. The sixth chapter provided information to assess the conceptual framework presented in the third chapter, and to reach the objectives of this study. This chapter seeks to synthesize the findings with related literature, and revise the proposed conceptual framework. As a result, the revised conceptual framework to facilitate learners' ability to acquire tacit knowledge in E-Learning environments will be proposed. Such a conceptual framework can be used as a tool in decision-making when implementing and administering online education.

## 7.2 RECAP OF THE OBJECTIVES AND STUDY CLAIMS

In order to achieve the research goal and answer the research questions, the following objectives were pursued:

- **O1:** To critically analyze the literature related to tacit knowledge acquisition and its dissemination in e-Learning, and examine whether people are able to capture and retain tacit knowledge using the e-Learning channel [RQ1] (Chapters Two and Six).
- **O2:** To review the learning theory, adult learning theory, learning styles, Knowledge Management and e-Learning literature for an in-depth understanding of the learning process and knowledge development. To identify concepts or ideas concerning e-Learning implementation in order to propose practical guidelines for

developing an e-Learning system that promotes the externalization and internalization of tacit knowledge. Finally, to establish core concepts for the experiment [RQ1, RQ2] (Chapters Two and Three);

- **O3:** To develop a conceptual framework for e-Learning implementation offering an in-depth understanding of the concept of Knowledge Object and learning strategy based on Community of Practice principles, and factors that play a major role in learners' ability to capture and retain tacit knowledge in an e-Learning environment [RQ2] (Chapters Three);
- **O4:** To validate the proposed conceptual framework through an experiment followed by an examination of the development of students' tacit knowledge of the business presentation field at the individual level and influencing factors [RQ3] (Chapter Five and Six);
- **O5:** To revise and modify the conceptual framework based on empirical findings to propose practical guidelines for a successful design and management of e-Learning environments. Additionally, to explore evidence (findings) and ideas (conceptual framework, methodology) in order to advance the debate on tacit knowledge related research in e-Learning, and to encourage scholars to seek further experimental and empirical studies in the field (Chapters Seven and Eight).

As per the objectives, the following claims were formulated:

- **Claim 1** - Learners can acquire tacit knowledge in a well-prepared e-Learning environment [RQ 1]. A properly coordinated program in an e-Learning environment creates conditions to support the activities and learning processes necessary for learners to acquire tacit knowledge.
- **Claim 2** – A viable model to facilitate the acquisition of tacit knowledge in e-Learning environments consists of preparing content using Knowledge Objects and applying Community of Practice strategy to coordinate learning and teaching activities. This approach promotes collaboration and helps students locate and connect with like-minded peers to exchange ideas and to develop deeper insights and understandings filled with tacit knowledge [RQ 2].
- **Claim 3** - Among the following: age, gender, ethnicity, specialty, experience in the field, English as a first language, familiarity with e-Learning environments, self-competence, perceived usefulness, self-directed learning, motivation, perception of the proposed e-Learning model; there are important influencing factors or

characteristics that positively impact the learners’ ability to acquire tacit knowledge in an e-Learning environment [RQ3].

The subsequent sections offer a discussion on the study’s findings against these claims. This commences with a discussion of the tools, methods and instruments developed to test for tacit knowledge of business presentation to answer all research questions using a mode of inquiry absent from literature.

## 7.3 DISCUSSION OF THE TACIT KNOWLEDGE TESTING TOOLS

As noted in Chapters Two and Four, theoretical claims about the tacit knowledge construct are abundant within the literature. However, there is a shortage of empirical studies supporting those claims. Reasons for this situation are associated with the problems of defining and conceptualizing tacit knowledge, as well as the lack of empirical measures and instruments. This leaves many questions and areas related to tacit knowledge unanswered and unexplored. And yet, testing for tacit knowledge is not impossible. Problems such as how to obtain, define, capture and quantify tacit knowledge have become obstacles in research, but they cannot be the reason for preventing the exploration and measurement of tacit knowledge. Busch (2008) quoted Sternberg and his team by stating “One of the major hurdles to tacit knowledge related research stems from its soft nature which by definition does not lend itself easily to articulation and therefore measurement. Sternberg… and his research team shows us that tacit knowledge is able to be tested for, where a majority of researchers seems typically to be content with discussing its existence.” (p. 7).

Polanyi introduced the tacit knowledge concept in 1966. He described it as knowledge that cannot be easily articulated from his popular statement “we know more than we can tell.” Riding a bicycle is one of the commonly cited examples of this sort of knowledge from Polanyi’s work. Polanyi claims that we learn to ride a bike without being given any explicit rules of riding and although we may know how to ride a bike, we cannot explicitly explain the process. Hence, Polanyi concludes that the ability to ride a bike is tacit knowledge. Collins (2010) specifies that the way Polanyi explained the rules of bike riding is actually bike balancing, which can be easily codified. The difficulties of acquiring the skill of bike balancing are associated with the nature and limitation of the human brain and body. The real problem seems to be manoeuvring through traffic while riding a bike which according to him, is tacit knowledge and not transferable. However, “Google’s driverless car travelling guide system proves that with advances of technology even this seemingly complex type of tacit knowledge can also become fully transferable” (Kabir, 2012, p. 239). Another eminent example is found in Artificial Intelligence with Deep Blue, the machine that beat the chess world champion Garry Kasparov. This demonstrated that tacit or complex knowledge can be operationalized through technology.

Some researchers argue that “tacitness...is a matter of degree” and that the same knowledge may be more tacit for one person than another (Nelson and Winter, 1982, p.78). Others argue that there is a middle ground between tacit and explicit knowledge, which is articulable tacit knowledge (Busch et al., 2003; Sternberg et al., 2000; Nonaka and Takeuchi, 1995). Much of the literature that deals with the measurement of tacit knowledge has investigated the tacit knowledge concept from a psychological perspective, and viewed tacit knowledge as an aspect of practical intelligence. Tacit knowledge is then treated on an individual level, whereby the concept is closely related to skill learning (Polanyi, 1966) and expertise where “tacit knowledge distinguishes more successful individuals from less practically successful” (Sternberg et al., 2000, p.105). Similarly, Von Krogh and Roos (1995) argue that tacit knowledge is an individual characteristic, which is embedded in action within specific contexts.

Individual tacit knowledge has characteristics such as difficulty-to-express, high individualization, culturally dependence, unconsciousness, and so on. This is bound to bring on many difficulties if we evaluate tacit knowledge directly, which is hard to imitate, express and spread. Tacit knowledge has many special characteristics, but it is attached to specific cognitive subjects and has great effects on the activity and practice of cognitive subjects. Therefore, the measurement of tacit knowledge can be implied indirectly. The measurement can commence from the study of the extraverted behaviour and cognitive characteristics that tacit knowledge shows. In fact, it is easier to measure the individual tacit knowledge by analyzing a cognitive subject’s way of thinking and the characteristics of their behaviour for quantification.

Hedlund (2003) taught us ways to recognize whether tacit knowledge is present in a person’s competent performance through the following characteristics:

- Tacit knowledge is acquired on one’s own, with limited resources and support. The individual decides what is important and makes it meaningful.
- Tacit knowledge is a form of procedural knowledge, which is the knowledge of how to perform activities, as opposed to factual knowledge.

- Tacit knowledge relies on the individual's own experience, and it is action-oriented.
- Tacit knowledge is often demonstrated as "practical intelligence," rather than "abstract, academic intelligence."

In simpler terms, it boils down to seeing and making judgments from a person's performance, guided by the quality and success of that person. This is why even if one cannot easily explain all skills necessary to be a leader or a bicycle rider via language, the effective ones can be judged and recognised from their actions or performances. Despite the challenge, scholars around the world completed many assessment studies on tacit knowledge by evaluating individuals' behaviour when they use the tacit knowledge (experience or intuition) to cognize the objective world and deal with the practical problems. Regardless, this has achieved great success.

In general, individual tacit knowledge has been measured at the articulated level of abstraction and has been found to explain such concepts such as individual differences in management effectiveness (Wagner and Sternberg, 1991), in leadership effectiveness (Hedlund et al., 2003), in sales teams (Sternberg and Wagner, 1988), in academic psychology (Wagner and Sternberg, 1985), and with military leaders (Hedlund et al., 2003). This is achieved by using a form of self-reporting on situational judgment tests (SJT) (Sternberg et al., 2000), subjects' observation (Herbig et al., 2001), experiments in artificial grammar (AG) learning (Reber, 1995), and mental scanning (Reed et al., 1983). Qualitative case studies have also been applied in tacit knowledge sharing (e.g., Desouza, 2003) and through using SNA (Busch et al., 2003). Overall, expert knowledge forms the basis for tacit knowledge measures. Despite criticism, the Sternberg-based approach is the most practical and well-accepted technique for tacit knowledge testing. It is drawn from positivist approaches, which uses the power of statistics, to gain an advantage in exploring the concept.

Given the ethereal nature of tacit knowledge, Richards and Busch (2000) argued that positivist approaches are not ideal in investigating tacit knowledge concepts, and requires balancing with interpretivist methods. The authors proposed triangulation as a means of attempting to integrate positivist and interpretivist strengths for tacit knowledge research through: tacit knowledge testing of a psychological nature using a Sternberg based instrument, direct participant observation with a sociological character in order to validate their measurements and, Formal Concept Analysis for knowledge modelling to add rigour to their analysis, and to aid comprehension and eventual internalization.

This study subscribes to approaches which measure individual tacit knowledge at the articulated level of abstraction justified in the literature review chapter. This enables comparison and more importantly, to meet the research objectives. To add rigour to the research, the view of Richards and Busch (2000) was adopted to achieve the primary goal of the research by balancing both positivist and interpretivist methods, and strengthening the findings (pages 161-175). Business presentation is the focus of the study to address all research questions, since it is an activity that relies on the practitioner's expertise to create and deliver a professional presentation rather than mastery of the facts and rules pertaining to explicit knowledge. As noted by Woo (2004), there is increasing evidence that tacit knowledge is "the important strategic resource that assists in accomplishing a task". The following techniques were employed to assess tacit knowledge of the participants of the main study:

- Tacit knowledge testing using the Sternberg-based approach. Sternberg's technique takes on workplace-related scenarios with answer options, and to test a respondent's approach to dealing with these workplace situations, for which no clear answer necessarily exists. Since business presentation has not been subjected to such research, this requires building a Tacit Knowledge Inventory for Business Presenter labelled TKIBP. This would follow Sternberg's steps with the recommended guidelines from McDaniel and Whetzel (2009) amongst others, in order to mitigate issues of faking, which are inherent to the SJT format.

  Drawn from the Sternberg approach, instructions and structures were used to develop TKIBP that ensures variety in content as well as substantive, structural, and generalizable validity. The content validity was further verified using a panel of experts on the relevancy of each item to be included in the final TKIBP questionnaire. The TKIBP instrument was validated using internal validity, consistency, external validity as part of an online survey, groups of participants such as the expert group, an experienced student group, and an undergraduate student group. The results confirmed that the instrument has high validity and reliability. As noted in previous studies, a factor like the number of years of experience is perceived as highly correlated to the possession and application of tacit knowledge, which has been confirmed with this TKIBP.

- Close Monitoring Initiative was sought as a complement of the TKIBP test results. The literature widely confirms that tacit knowledge is associated with a realization of given tasks (e.g. Matosková et al., 2013). Thus, the Close Monitoring Initiative was designed to see e-Learning trained students at work. Close Monitoring Initiative involves watching students making business presentations and observing their attitudes and behaviours at the beginning, halfway point and the end of the experiment. A panel of experts was selected to evaluate the students, which is a similar approach to Herbig et al. (2001). Experts independently assessed each student's performance and provided their opinions on students’ possession of tacit knowledge in dealing with critical presentation tasks. Commonalities and patterns among experts’ comments about students’ improvement were identified and reported accordingly.
- Experiences and perceptions of students on the e-Learning program were consolidated and used to deepen understanding of the contribution of this proposed e-Learning system to students. Several indicators related to tacit knowledge sharing amongst people (e.g. observation, storytelling and experience sharing possibilities) and tacit knowledge acquisition (e.g. impacts and changes in performing business presentation tasks) were noted.

It would have been preferable to have a validated tacit knowledge testing instrument for the field, in order to focus on the main research inquiry. Having to build an instrument and implement each described method was challenging but essential and complementary, as they ensured credibility of the findings, while achieving the main goal of the research.

After validation, these approaches supported the investigation of tacit knowledge in e-Learning through a unique way that is missing from the literature. Previously, Yi (2006) claimed tacit knowledge externalization in e-Learning environments solely through participants’ opinions. On the other hand, Hildrum (2011) argued that tacit knowledge sharing’s effectiveness used semi-structured interviews which examine participants’ experiences with e-Learning and its impact on their daily tasks. Meanwhile, Tee and Karney (2010) proposed an advanced study using the naturalistic methodology to scrutinize and analyze e-Learning participants’ exchanges and discussions, in order to justify the capacity of the e-Learning environment in facilitating tacit knowledge sharing and acquisition. The tools proposed in this study are more advanced in comparison to existing research. The findings through these tools are expected to shed light on the long-lasting debate on tacit knowledge acquisition in e-Learning. As a result, this would inspire and encourage similar studies within different subjects that are increasingly taught online. Regarding these existing studies, there is still is no means to assert whether or not learners are able to gain hidden knowledge from their masters (teachers) or peers, compared to traditional face-to-face training or apprenticeship which have been cited as the best media to acquire tacit knowledge from the master.

## 7.4 TACIT KNOWLEDGE ACQUISITION IN E-LEARNING ENVIRONMENTS

Learning theories teaches us how individuals acquire, retain and recall knowledge through a set of principles, which can be used as guidelines to help select instructional tools, techniques, and strategies to promote learning. Focusing on the tacit knowledge form, there are abundant ideas and examples of how individuals can gain that knowledge. Traditionally, apprenticeship, mentoring, hands-on learning, storytelling, and so on, are presented as the best ways where novices could gain tacit knowledge. These usually involve direct contact, observations, experiences, as well as trial and error.

For example, riding a bicycle is more easily learned by first observing somebody else riding it and then actually getting on the bike and experimenting, than it is by reading a book about bike parts or the physics of bike movement. The same holds true for learning a language or kneading dough. Neither of these activities can be mastered by reading a list of instructions from experts. These activities require the difficult-to-describe, intuitive, experience-based knowledge labelled as tacit knowledge.

There has been a debate on the capacity of people to acquire such knowledge within an online space that typifies virtual contact and reliance on information and communication technology (ICT). However, some critics' views on this question have significantly changed with time and the level of sophistication of ICT tools. Busch's (2003, 2006, 2008) conclusions about the use of ICT to impart tacit knowledge in organizations are now challenged by its own conclusions with Venkitachalam, where they acknowledged cases in which ICTs help to transform and pass on tacit knowledge among people (Venkitachalam and Busch, 2012).

There are clear ideas on how tacit knowledge sharing and acquisition take place within an online space. Primarily, it is about transferring best practices, telling stories, and metaphors that could be translated and enriched with audio and video illustrations. These are supported by many studies, but often overlooked by opposing views. Direct contact is also achieved in the online world by both synchronous and asynchronous online connection forms. In traditional learning environments (classrooms), tacit knowledge is transferred to students by their instructors and via interactions with their peers. In an e-Learning environment, transferring tacit knowledge is quite a challenging task, but it is not impossible. Methods to achieve this include discussion forums that can help to exchange explicit as well as tacit knowledge among participating students. This helps students to develop cognitive, social and communications skills. Discussions allow students to think critically, analyze the arguments of others and reflect on them. This involves application of one's own knowledge, and also adaptation of knowledge shared by others. These align with the learning process and the acquisition of knowledge that "in theory" should create in the minds of students some receptors, which could make tacit knowledge forming and molding easier. A useful asset in e-Learning environment is the opportunity to watch recorded webinars, which can be rewound, paused and reflected on endlessly. On the other hand, this is not possible with traditional face-to-face learning methods. Thus, the main goal of this research was to offer a purposefully designed, and conducive, adult learning online environment to evaluate tacit knowledge gained through valid tools.

In most cases, tacit knowledge is hard to notice and often, a person himself is not aware of the possession of tacit knowledge. Real experts have guides that show the steps of their work; making it easy to follow. This offers important context, and also makes it easy for students to establish direct links between what the expert is doing and the subject being taught; which allows for greater self-discovery This aligns with the procedural and action-oriented characteristics of tacit knowledge (Sternberg et al., 2000; Hedlund, 2003). For example, we cannot easily explain how to ride a bicycle, but we can demonstrate the steps that a novice can imitate and eventually succeed in applying. Cultivating and sharing tacit knowledge is also possible within a group of people sharing similar interests, who gather to exchange their know-how through social media. These are forms of activity where information is not the only thing that is transmitted. There is also the transmission of nonverbal components of communication and understanding, which are enhanced by various forms of interactivity. With these considerations, this study sees potential in the ability of students to acquire tacit knowledge of a field in e-Learning environments.

Diptee and Diptee (2013) noted that tacit knowledge in an online environment does not flow between people as traditionally likened to the pouring of water from one jug to another. They raised a point for consideration about time exposure:

> "... a precise and finite codified knowledge inoculation occurs to a recipient primarily by a trusted informant, at which point tacit knowledge subconsciously self-generates around that new knowledge. With prolonged exposure the recipient enters a reinforcing loop of tacit knowledge acquisition as observations continuously meet expectations" (Diptee and Diptee, 2013).

Diptee and Diptee's note on time exposure is not an isolated claim, as other authors such as Lindley and Wheeler (2001), Howells (1996), Mládková (2005) agree that time is also necessary for tacit knowledge transfer and formation. This is because the student must be given enough time to capture, process and absorb the knowledge. However, Mládková (2005) warns that it is not possible to expect a work-loaded student to be able and willing to give their time to new knowledge. Yang and Farn (2009) emphasize the role of time, by claiming that internalization of this form of knowledge requires a long time, both for individual and organizational forms of knowledge. Yang and Farn claim that experience is a long process,and that reflecting upon these experiences is a time consuming, but also necessary path to develop tacitness in one's work.

According to Haldin-Herrgard (2000), the time factor is viewed as a drawback. This is due to the turbulent business world and the need for fast responses, which in turn, puts more pressure on employees. It is vital to remember that few organizations actually provide enough time for their employees to gain tacit knowledge. However, there is no clear idea of what should be the exact time needed or expected for students or employees to develop tacit knowledge successfully.

With the time factor in mind, our purposefully designed e-Learning platform assembles relevant features and components for tacit knowledge sharing among participants. This platform was opened for fourteen weeks during which instructors (subject matter experts) had the key role to form a Community of Practice spirit among students. They also had to monitor and bolster learning activities within the community, as well as coordinate teaching activities more conducive to students sharing their ideas, experiences and opinions (further discussed in next sessions) on a subject. More specifically, the study measured the pre- and post- tacit knowledge scores of each student and found significant improvement with the experimental or treatment group of students. The control group of students, who did not receive the treatment or attend the program, did not show any significant improvement. Moreover, when comparing experimental and control groups in terms of improvement of TKIBP scores using independent t-test samples, there was statistically significantly higher improvement in the experimental group than the control group, $t(441) = 17.46$, $p < 0.001$. This improvement in the experimental group ($M = 22.64$, $SD = 16.00$) is greater than improvement in the control group ($M = 0.37$, $SD = 9.84$).

These results were confirmed using 23 random students for a Close Monitoring Initiative along with the assessments by a panel of experts. Analysis showed an increase in assessment scores, on average, from 15.78 at the beginning of the study to 20.13 at the end. The increase is statistically significant overall (repeated-measures ANOVA $F(1.38,30.23) = 59.45$, $p < .001$) and a statistically significant difference was also found between each time point (Bonferroni-adjusted pairwise comparison $p < .001$). The experts commonly agreed that students who performed the presentation tasks successfully throughout the Close Monitoring Initiative differed significantly in tacit knowledge, from those who were less successful. Interestingly, students who dealt successfully with some critical incidents had an improved ability to solve real workplace problems, and displayed behaviours that suggest that they were able to think at a greater level of abstraction than students who dealt with the same incidents less successfully. It was also noted that students were not aware of their actions and of the things that made them successful (unconsciously competent), while others acknowledged their weaknesses (consciously incompetent). These findings strengthened the first results on the improvement of tacit aspects of business presentation delivery by students, a field where the mastery of facts and rules (or explicit knowledge) did not help deal with things like anxiety, connecting with the audience, communicating eloquently, etc. There was a significant improvement of students' tacit knowledge scores as a result of learning in an e-Learning environment, but the results also show a clear gap difference between students' improvement and experts. Hence, this study provides clear indicators that can be used to understand students' development from a novice to an expert. For example, the time spent in this study shows how much students have improved, and provides an idea of what it may take them to become experts.

This finding is consistent with theoretical claims found within the literature. For example, Falconer (2008) believed in the power of new technologies and advocated that they are potent tools for effective and efficient transference and acquisition of tacit knowledge in e-Learning. The level of acquisition of tacit knowledge achievable in an e-Learning environment is now clear from this study and should be expanded further for greater understanding. Similarly, the findings in this research also shed light on online courses and training – tagged as skill based courses – which pretentiously claim to teach and transfer experienced-based knowledge and practical skills to attendees in a short time frame. The performance observed from this e-Learning experiment in this research, shows that the effective acquisition of soft knowledge claimed by online training providers is plausible. However, care should be taken regarding the timeline, as a few weeks will not yield the expected results.

The tacit knowledge scores and the performance of participants observed in this study are also consistent with notes from Wagner and Dibia (2013). Wagner and Dibia conducted an experimental study involving 35 novices and explored the effectiveness of online roleplay gaming in the acquisition of complex and tacit knowledge. The researchers concluded that novices were able to acquire knowledge that falls within the tacit spectrum (p. 373). They also indicated that learners acquired more knowledge than they were able to recall, which can be attributed to the relatively short time frame allotted to the experiment. Their experiment was only 1-hour in length, which may explain why novices were unable to recall and apply the knowledge as expected. Time (a lot of which is required to process, retain and internalize new knowledge) is one of the five difficulties of sharing tacit knowledge (Haldin-Herrgard, 2000). Durrance (1998) also warns that time for reflection and interpersonal exchange in any training exercise should be considered and planned to adequately facilitate and cultivate tacit knowledge. This was a factor that Wagner and Dibia did not pay attention to. This study's findings are adding new meaning and information to that of Wagner and Dibia. Furthermore, the time factor is also discussed in learning theory, as some individuals need time to reflect, to adjust their learning style, to apply and eventually, to internalize their newfound knowledge. However, there is no study with indications for a realistic time frame to allot to such experiments which, in turn, may impede concrete conclusions. Again, this study can be a reference for future research.

An explanation of the results obtained in this work lies in our understanding of how tacit knowledge is acquired in an e-Learning environment. It requires exposure to new experiences and repetitive exposure to existing experiences produced through e-Learning content. This would be coupled with learning and teaching activities, including discussions initiated and maintained within the proposed e-Learning platform. Instructors, as recommended by Hattie (2012) and Hattie and Yates (2014), should be subject matter experts or expert teachers who play a major role in facilitating, encouraging and monitoring learning activities in the e-Learning environment. Expert teachers have the capacity to help students develop deep and conceptual understandings of a subject.

Immersed under such conditions, whenever students see or hear something new, like an experience about dealing with a particular scenario of business presentation, they go through a series of cognitive processes, which an individual uses to incorporate new knowledge, resulting in learning and leading to intellectual development and experience. Some of these cognitive processes are attention, memory and perception that do not require face-to-face contact to function. Students reviewed and reflected on them at their own pace and ultimately coordinated the acquired knowledge via other series of activities provided in the e-Learning platform until it eventually became intuitive. The more realistic the experience is made for students in the e-Learning environment, the more likely the experience will develop into subconscious knowledge. Once students reach this point, they do not need to reflect on that particular scenario in business presentation since they would potentially have been exposed to and learned to cope with a range of similar situations within the e-Learning program. They are, however, seldom able to articulate the acquired knowledge upon inquiry.

As reported throughout this thesis, individual tacit knowledge is the collection of one's life experience, as well as education that resides outside conscious awareness. It is the knowledge one possesses that helps guide intuition, a vital component to making high-stress, high-consequence, split second decisions. Another explanation of the current result is that as a student went through the e-Learning experiment, they purposefully acquired a lot of information. The student also acquired as much, if not more, information unintentionally. Thus, the student's senses were perceptive to environmental clues and cues, always processing and analyzing what was happening around him/her despite the lack of physical presence of participants. Normally unaware of what is going on, a student's brain would have been recording and storing some of those experiences that became part of their tacit knowledge. The student's brain would have stored patterns of information from those experiences that became routine for the brain to recall and ultimately guide their decision-making processes and accomplishments. Such stored patterns are partly tacit knowledge that students could not articulate upon inquiry. This is supported by an example of an unconscious competence case reported in the analysis chapter, where some students brilliantly accomplished certain tasks and performed certain actions in the delivery of their presentation but they did not recall or explain how they behaved or acted in a certain way that helped them connect with audience and performed confidently (e.g. posture, poise, body language used that resulting in catching their audience's attention). In this particular example, students have apparently listened to their peers and instructors' sharing of and warning about their failures and successes regarding the control and management of an audience during a business presentation, through webinars associated with the Knowledge Object and other activities in the e-Learning environment. These experiences and lessons shared by others became eventually ingrained in the brains of students.

Another explanation for the acquisition of tacit knowledge stems from the students' experiences and opinions about exchanges within the e-Learning platform. Students confirmed that socializing, networking, practicing and storytelling were ways in which they came to learn new ideas and insights from their peers and instructors. This comprised of cases where they had to seek help from students they thought were experienced in the field, as well as from those with whom they discussed their past experiences. These elements align with the Panahi et al. (2012, 2013) conceptual framework of tacit knowledge on sharing success using social media. It is also consistent with Panahi's (2014) findings where the researcher found that physicians were more efficient in performing daily tasks, because of sharing and acquiring tacit knowledge from their colleagues over social media tools, without any face-to-face contact. Moreover, the acquisition of tacit knowledge claimed and verified in this study is consistent with Zack's (1999, p. 2) conclusion, which suggests that tacit knowledge is understood and applied subconsciously and developed from direct experience and action. It is usually shared through interactive conversation, storytelling and shared experience regardless of physical presence.

Upon examining students' experiences and perceptions, the findings show that students' learning experience referred to social learning theory, based on the idea that we learn from our interactions with others in a social context. On the other hand, by observing the behaviour of others, people develop similar behaviour. They assimilate and imitate that behaviour, especially if their observational experiences are positive ones, or include rewards related to the observed behaviour. According to Bandura, imitation involves the actual reproduction of observed motor activities (Bandura, 1977). The Nonaka-Takeuchi model of learning indicates two ways of gaining tacit knowledge, that is, socialization and internalization. Socialization refers to interpersonal communication and/or intrapersonal insights that occur within the online learning community. Internalization occurs when a student enhances and changes their opinion or perceptions, according to the feedback from their peers and instructors.

Another relevant aspect that can substantiate the results found in this study is related to the time and space factors. Ubon and Kimble (2002) taught us that the most serious obstacle in e-Learning remains the constraints of time and space. Students in the same time zone potentially play a positive role in keeping up-to-date and involved with online peers, without major interruptions. This is in contrast to cases where students are located in countries with a large time difference.

Theoretical arguments, which tend to disprove e-Learning environments can support tacit knowledge sharing, were discussed in the literature review chapter. Their limitations were exposed and counterexamples were given in which people shared and acquired tacit knowledge and developed their professional effectiveness in Hildrum (2009), Tee and Karney (2010), Yi (2006), Falconer (2006), Harris (2009), Al-Qdah and Salim (2013), as well as Panahi et al. (2012a, b, 2013, 2014). Maintaining the argument that an e-Learning environment is a text-based learning environment – meaning that people only share text and email, therefore, information or explicit knowledge – is no longer a valid argument. Busch, among others, have clearly acknowledged the irrelevancy of such arguments with his colleague (Venkitachalam and Busch, 2011).

Modern Virtual Learning Environments such as Blackboard or Moodle support audio, video and text based discussions. These technologies are available in modern Virtual Learning Environments, which are mitigating the need for in-person communication with notable usage and application of tools such as video-based lectures, virtual seminars or webinars, multimedia browsers, and chat facilities. These advancements demonstrate a transition from the reliance on face-to-face education, and increase the acceptance of the viability of multimedia-based learning over the Internet.  For example, in this study, Blackboard Collaborate is the Web-based conference tool used to conduct webinars throughout the e-Learning experiment, which enabled students and instructors to speak, write, watch, and listen each others; and to share images. The face of the active speaker can be shown on the main board, enabling others to see their facial expressions, emotions, body language, and so on. This enabled live demonstrations.  The composition of Knowledge Objects described in Chapter Five, involved videos that were embedded and available for students, and used by instructors during e-Learning activities. Recall that Wang (2006) acknowledged that experience sharing is one of the most common reasons for the use of video applications. Mavromoustakos and Papanikolaou (2010) confirmed that people can share their experiences through images, pictures and videos. Nilmanat (2011), Räisänen; and Oinas-Kukkonen (2008) and Eraut (2000) determined video, voice and pictures as media that is important in the transfer of tacit knowledge.

Further, Geri (2012) showed that videos may be helpful and suitable solutions to increase retention and mitigate the distance and learner loneliness (inactivity), which are two factors influencing skills acquisition and application. The capacity of e-Learning environments to support tacit knowledge sharing and acquisition is proven in Tee and Karney's (2010) study using the naturalistic methodology as the mode of inquiry. This study has not only confirmed the results of Tee and Karney through an experiment, but also provided empirical evidence missing in literature against theories that challenge ICT-mediated tacit knowledge sharing in general.

In conclusion, tacit knowledge of any field, is knowledge that becomes so thoroughly embedded in the mind of the holder, that they no longer think about what they are doing and instead; they simply do it. The first part of this study showed that an e-Learning environment can provide a viable context in which people can acquire such knowledge. It was verified by the significant level of improvement of trained students in the accomplishment of business presentation tasks compared with those who did not receive training, in a proposed e-Learning environment. Sveiby (1997) stated that knowledge can be considered an "actionable information" and linked with the capacity for action. Tacit knowledge, on the other hand, is often associated with professional expertise and effectiveness. Transferring explicit knowledge using ICT is possible whenever proper encoding is available, while transferring and acquiring tacit knowledge over ICT has been a subject of contention. Having observed and examined students' actions and proficiency in the business presentation field, the results of this study confirm that learners are able to acquire tacit knowledge of a given field in well-prepared e-Learning environment. The following section discusses the approach proposed in this study to facilitate the acquisition of tacit knowledge in e-Learning environments and its contribution.

## 7.5 FACILITATING TACIT KNOWLEDGE ACQUISITION IN E-LEARNING ENVIRONMENTS

Many studies have addressed questions related to the capacity of e-Learning environments to create conditions conducive to acquiring tacit knowledge. These studies are often based on theoretical claims of dissatisfaction in many subjects. This research confirmed through an experimental study, that learners are able to acquire tacit knowledge in e-Learning environments. The abundance of theoretical claims on tacit knowledge sharing and cultivation in e-Learning promoted a myriad of methods, techniques and strategies that claim to facilitate the transfer of tacit knowledge, which look correct in theory. Yet, there is no evidence on the effectiveness of such approaches. Moreover, there is a scarcity of practical guidelines and recommendations to conduct an e-Learning program that facilitates students' ability to acquire tacit knowledge.

The proposed e-Learning platform was developed based on principles of learning theories, particularly adult learning theories. A blend of learning theories was applied, due to the diversity of students expected in the undergraduate program at a UK institution which welcomes students with different learning styles and preferences. Riding and Rayner (1998) noted that people learn in different ways, which tends to depend on their personality, cognitive processes and previous learning experiences. Hayes and Allinson (1996) emphasized that this involved developing a range of activities designed that offer the same learning content, modifying instructional treatment or verbal and visual content in order to accommodate a wider range of learning styles, within a single learning activity. Instructors' role was to coordinate learning activities with these points in mind on the e-Learning platform. Beyond the learning aspect, the study focused on one key concept and a learning strategy to create conditions, which facilitate the sharing, and acquisition of tacit knowledge in an e-Learning environment. This is based on Knowledge Objects associated with learning and teaching activities conducted in the spirit of Community of Practice.

Tacit knowledge may be difficult to transmit with language, but certain strategies allow a person to infer tacit knowledge from stories, conversations, and social interactions. Other strategies enable a person to acquire tacit knowledge through conscious practice, experience and mindful reflection. Tacit knowledge is often unsuspected and its explanation in the form of words, numbers or symbols, is not easy and often, not possible (Matošková, 2008, p. 43–44). Tacit knowledge teaching and its transfer are difficult, but not impossible. Transferring tacit knowledge would be consistent with the source and is often not possible, as everyone forms their own tacit knowledge based on previous experience, knowledge, skills and mental models (Mládková, 2008; Athanassiou and Nigh, 2000). However, a well-prepared program can at least make tacit knowledge form faster, or can create some receptors in the mind of the individual, which could make the forming and molding of tacit knowledge easier (Matosková et al., 2013).

In order to teach tacit knowledge, suitable methods must be chosen. Hendrich et al. (2000) say that it is important to combine learning in both formal and informal contexts. According to Choi (2001), students must be encouraged to think and to consider finding a solution. This aligns with the view that the methods used must support the reflection of trainees, as claimed by Torff and Sternberg (1998) and Yeh et al. (2012). According to Torff and Sternberg, it is advisable to build on any previous knowledge of students in tacit knowledge teaching.

Knowledge Objects have largely been applied to Artificial Intelligence, particularly around building intelligent tutoring systems or expert systems. A Knowledge Object represents information that has been semantically conceptualized (Ruffner and Deibler, 2008). It is "... a chuck of electronic content that can be accessed individually and that completely accomplishes a single goal," as noted by Horton (2001). According to Sabitha et al. (2015), "Tacit knowledge in a knowledge conversion process can be considered as the content for Knowledge Object" (p. 5), and Merrill (1999, 2000) defines Knowledge Object as "A record of information that serves as a building block for a knowledge Management System. It has content, a method of organizing the Knowledge Base (metadata), rules to identify and categorize Knowledge Components." Liebowitz and Frank (2011) stated that Knowledge Objects coupled with a knowledge base, whereby a learner can access an interactive pool of knowledge in online learning, can boost personal knowledge.

Özdemir (2008) warned that "webibying instructional content' does not guarantee knowledge creation and transmission in e-Learning environments". Owens and Floyd (2007) argued that people are the most critical factor in knowledge transfer. They create knowledge, share knowledge, learn knowledge, and use knowledge to complete tasks. Owens and Floyd maintained that barriers to knowledge-sharing occur because the process relies heavily on human interaction, and relationships are not often taken into account when designing the knowledge-sharing environment. These considerations inspired the decision to associate Knowledge Object with learning and teaching activities in the spirit of the Community of Practice.

A Community of Practice consists of a group of people who share a common interest in a specific area of knowledge, and are willing to work and learn together, over a period of time, to develop and share the knowledge online. Hence, we argued in favour of forming a Community of Practice spirit as learning strategy among participating students because it would encourage students to engage and share their ideas, opinions and experiences. This, in turn, would support each student to ease into Kolb's learning cycle to develop new knowledge and eventually, capture tacit knowledge from instructors and peers.

Using the validated TKIBP instrument, the presentation of eleven (11) real life scenarios related to business presentation, where each scenario mapped out one of the five Knowledge Objects based on the learning objective, goal and workplace incidents addressed in the Knowledge Object compiled and implemented as a module. Each module includes learning and teaching activities on the Knowledge Object conducted in the spirit of Community of Practice, in the e-Learning environment. The five modules consist of (m1)- Understanding audience (mapped with scenario 9, 10), (m2)- Prepare your content (mapped with scenario 7), (m3)- Deliver confidently (mapped with scenario 1, 2, 3, 6), (m4)- Controlling the environment (mapped with scenario 4, 5, 8) and (m5)- Team management presentation (mapped with scenario 11). Students' opinions and perceptions of the e-Learning model for each module were collected, and we performed correlation analysis looking at the association between improvement in TKIBP score for specific scenarios, and the corresponding module. The results showed positively strong and statistically significant association for each of the five modules and improvement in TKIBP corresponding scenarios with highest correlation ($r = 0.72$) for understanding audience (m1) and lowest ($r = 0.64$) for team management presentation (m5). This result confirms Liebowitz and Frank's theory (2011), which claimed that Knowledge Object coupled with a dynamic knowledge base created from interactive and collaborative learning and teaching activities among participants would improve a learner's personal knowledge.

These results are further confirmed by the high level of satisfaction of students and the qualitative analysis of students' comments. The structure of the program in the e-Learning environment seems easy to follow and each module addresses a clear and specific goal with learning materials available. These can be found in diverse formats such as text, audio, video based resources, which is suitable for students with preferred learning styles. Students mentioned their ability to self-assess themselves via quizzes available for each

Knowledge Object, to attend and participate in webinars in the e-Learning environment. There, they were able to watch, listen instructions or imitate behaviours from learning materials as well as other participants' demonstration of preparation and delivery of their business presentations. In addition, students were able to discuss further the information, and ideas captured, with instructors and their peers over social media tools available in the proposed e-Learning environment. Such situations and circumstances are often related to indicators or conditions that promote cognitive processes leading to tacit knowledge acquisition. According to Polanyi (1962, p. 53), by watching the instructor and emulating his efforts, the student (novice) subconsciously picks up the rules of the art, including those that are not explicitly known by the instructor himself. These hidden rules can be assimilated.

By having a specific forum of discussion of each module, students confirmed the ease with which to connect with people having a particular interest in the topic being discussed and eventually, become more knowledgeable on the topic. Therefore, the student could spend more time interacting with them through the chat facilities on aspects they need to improve. Looking at these experiences, we argued that the proposed e-Learning platform offers a space for motivated students to immerse themselves in reflection and discussion on the subject and that they eventually expand their tacit knowledge much faster than students who do not have such a space.

The model implemented in this study presents a viable approach to facilitate the acquisition of tacit knowledge. Knowledge Objects associated with learning and teaching activities conducted in the spirit of Community of Practice create conditions and meaningful opportunities for participants to engage and participate in activities involving reflection, social interaction and the sharing of ideas and experiences. This approach also favours the interplay of content, or field-specific knowledge and personal tacit understandings, leading to the emergence of tacit knowledge at the individual level in e-Learning environments.

## 7.6 LEARNERS' FACTORS INFLUENCING TACIT KNOWLEDGE ACQUISITION

Factors or characteristics that impact someone's ability to acquire tacit knowledge in e-Learning environments are not fully explored in the tacit knowledge and e-Learning literature. Many studies talked about trust, motivation or years of experience, and their influence on the acquisition and possession of tacit knowledge. However, they ignore individuals' characteristics associated with learning effectiveness in general, and e-Learning effectiveness in particular. Yet, Spencer (2008, p. 165) recalled "…it is remarkable how seldom learning theory is even referred to in the KM literature". Edwards and Rees (206, p. 167) also emphasized that "It is clear that managing behaviour, learning and knowledge cannot be separated from one another". This is not a surprise given the lack of instruments to measure and investigate tacit knowledge at individual level. Thus, this current study endeavoured to produce and to shed light on those unexplored factors.

Factors that influence learning effectiveness as well as knowledge sharing and acquisition in e-Learning at individual level were discussed in Chapter Two, and those that influence tacit knowledge acquisition in e-Learning were discussed in Chapters Two and Three. The experimental study that was carried out in this research helps out to identify factors relevant for the case of the acquisition of tacit knowledge in the business presentation field, at individual level. Exploring factors associated with the improvement in TKIBP score using bivariate correlation analysis, results show that age, gender, ethnicity, major field of study, occupational status have no statistically significant association with tacit knowledge score improvement. On the other hand, experience (work, years of delivering presentations, years of using e-Learning), English proficiency, self-competence, perceived usefulness, self-directed learning, motivation, perception of the proposed e-Learning environment, all have positive, statistically significant association with the tacit knowledge score improvement. This section offers a discussion of these factors.

**Factors with no significant influence:** This study confirms that age, gender, ethnicity, specialty and work status of students do not impact their ability to acquire tacit knowledge in the business presentation field of the proposed e-Learning environment.

The age factor in relation to tacit knowledge has been questioned within the literature. For example, senior staff and executives were known to use tacit knowledge differently, depending on age (Colonia-Willner, 1999). In this study, students' ages varied from 25 and under (96%), 26 – 35 6 (3%) to 36 – 45 (1%). The results showed that age does not guarantee that one can gain tacit knowledge in e-Learning environments. It depends on the nature of experiences and interactions that the learner is immersed into, which may facilitate the acquisition of tacit knowledge. This explanation applies to other attributes such as gender (Female - 55% and Male - 45%), and ethnicity (White - 40% and other: Middle Eastern, Asian, Black, and Mixed - 60%).

**Factors with significant influence:** This study reveals a set of characteristics that positively influence students' capacity to acquire tacit knowledge of a field in an e-Learning environment. These factors are discussed under five broad factors, including motivation, years of work experience in the field, language, self-competence, perceived usefulness, self-directed learning, and perception of the proposed e-Learning environment and model in light of the aforementioned literature.

*Motivation:* Several authors such as Hildrum (2009), Yi (2006), Bonk (2002), Moshinskie (2001), Chen and Tseng, (2012), Chokri (2012) and Taha (2013) identified motivation as a major factor that impedes or facilitates one's ability to engage in a learning process and acquire new knowledge in e-Learning. Hildrum's (2009) propositional framework for tacit knowledge sharing in e-Learning systems, validated by Cisco platform, has put motivation at the core of the process. These research findings indicate that motivation is one of the key factors that must be considered and planned for, before implementing E-Learning, in order to see students acquiring tacit knowledge. According to Hildrum (2009), motivation can be facilitated through the participation in online networks of practice, but in order to access and benefit from these networks, people require a certain threshold of technical relevant knowledge, which is most easily generated in local communities of practice. In fact, the Community of Practice learning strategy was applied in the implementation of our proposed e-Learning system. There are three potential sources of motivation as an influencing factor for learners to acquire tacit knowledge in e-Learning environment.

Firstly, we live in an era characterized by rapid and increasing progress in ICT that has led to the wide use of technologies. These enable various opportunities and dimensions to broaden the sphere of knowledge, perform certain learning tasks, and enjoy entertainment or social networking, which contributes to creating and forming students' positive attitudes and motivation towards technology. Secondly, technology and its applications have also stimulated and raised students' enthusiasm towards learning in general. Thirdly, the effective use of e-Learning provides more opportunities to implement some of the basic ideas brought about by the constructivist approach, where instructors can design a simulated and individualized learning environment. This environment facilitates the assimilation of knowledge and skills by encouraging more responsibility and productivity.

*Years of experience in the field comprising work experience*: Busch (2008) noted that the literature seems to agree with the concept that years of experience impact the possession and application of tacit knowledge. Wagner and Sternberg (1985), as cited in Busch (2008), have a slightly different viewpoint, by claiming that tacit knowledge is not automatically acquired with years of experience, but that it is really what one learns from experience that separates them from people who are less capable of making use of their tacit resources of knowledge. This study confirms that years of experience in the field, play a role in students' ability to acquire and apply tacit knowledge. One reason for this factor is that without previous experience or ideas of things that are critical to succeed in a field, any metaphors, best practices, or insights shared with the students, would not make any sense to them. Lei et al. (1996) noted that it is difficult for outsiders to decode metaphors. Students, who have been confronted with real life situations, have the capacity to visualize and reflect on other experiences and ideas. For example, we feel anxiety when we are about to deliver a presentation, and we are more likely to correct our mistakes from learned lessons or past failures when we receive an expert's tips or techniques to reduce the anxiety. A novice, without experience, will not have the same perception and appreciation, and will not even know why they should care about.

*Language as a first language:* Languages other than English are argued to have a bearing on tacit knowledge utilization (Busch, 2008). The research findings of this study confirm this factor. This is because being a good business presenter also requires fluency in speaking a language. Another aspect is that participants' stories, ideas or advice, may have a different connotation for others of a different culture, for whom English is not the first language.

*Self-competence, perceived usefulness, self-directed learning*: Self-directed learners' characteristics include independence, willingness to take initiative, persistence in learning, self-discipline, self-confidence, and the desire to learn more. Self-directed learning supports Knowles's andragogy, the learning theory that addresses the needs of adults. Alem et al. (2016) note that self-competence refers to judgment of the ability to deploy skills in the use of any computer tool, not only in the acquisition of these skills. They further noted that various authors have stressed the importance of having a certain level of technical computer skills before taking courses online. Perceived usefulness is defined as the degree to which a person believes that using a system would enhance his performance at work (Devis, 1989). Alem et al. (2016) his perceived self-competence, perceived usefulness, and self-directed learning as main influencing factors for student success and retention in the online learning environment. This study confirms that it is also important to pass on and receive tacit knowledge within an e-Learning environment. One should be competent in browsing and interacting on the e-Learning platform, so they can focus on the learning process, lest they struggle on the subject being taught, rather than the tools or access in the e-Learning platform. Furthermore, believing that e-Learning can enhance one particular skill (e.g. presentation skills), is vital and may drive motivation to network with others and work collaboratively at activities in which tacit knowledge sharing and acquisition usually take place.

*Perception of the proposed e-Learning environment and model:* This factor confirmed the findings reported in section 7.5 on the usefulness and effectiveness of the e-Learning model proposed in this study. The model presents the design of e-Learning content and the strategy to conduct learning and teaching activities that facilitate students' engagement and interactions with other participants.

## 7.7 REVISING THE CONCEPTUAL FRAMEWORK

Based on the investigation and exploration of research issues identified and presented in Chapter Six and the research syntheses and analysis carried out in this chapter, the conceptual framework presented in Chapter Three can be revised. The revisions consider the validated research hypotheses discussed in Chapter Six, and the newly discovered factors influencing learners' ability to acquire tacit knowledge in e-Learning environments discussed in this chapter.

The conceptual framework proposed in Figure 3.4 and implemented in the e-Learning environment within this research, focused on enabling conditions for cultivating and sharing tacit knowledge and learners' ability to acquire tacit knowledge in e-Learning environments. Some concepts were applied to create those conditions and hypotheses were formulated based on potential factors identified in the literature around e-Learning and tacit knowledge transfer. The revised conceptual framework considers the findings from the experiment and aims to provide a practical guideline for educational settings to enhance the implementation and development of E-Learning by focusing on concepts and factors identified. It also offers a clear vision to manage and plan an e-Learning course.

Firstly, Knowledge Object associated with learning and teaching activities conducted in the spirit of Community of Practice is a viable approach to build on when designing, planning and orchestrating the learning process in an e-Learning environment. Referring to Liebowitz and Frank (2011), Knowledge Object that enriches learning in e-Learning and the construction of Knowledge Object followed in this study, is also one important contributor. Each Knowledge Object deployed in the e-Learning was enriched with the data collected from subject matter experts when constructing the tacit knowledge inventory tool (TKIBP). This direction helps determine the number of relevant Knowledge Objects, in order to identify key elements of business presentation to be shared and taught to students. The building process of Knowledge Object includes an instruction designer and subject matter expert (or instructor), to ensure the quality of these learning resources. Conducting learning and teaching activities in the spirit of Community of Practice is also a positive strategy to facilitate students' ability to acquire tacit knowledge in e-Learning environments. With the myriad of concepts and techniques in the literature associated with facilitation of tacit knowledge sharing, acquisition and its dissemination in e-Learning environments, this study proposed a practical and viable model that can be exploited and replicated for the betterment of online learning and teaching.

Secondly, the list of factors provided below have a significant impact on learners' ability to acquire tacit knowledge in e-Learning environments:

- Motivation,
- Years of experience in the field,
- English as a first language,
- Self-competence,
- Perceived usefulness,
- Self-directed learning,
- Perception of the proposed e-Learning environment and model.

Some of these factors, such as motivation and years of experience, were already discussed in the literature despite not being tested and verified empirically. The findings in this study confirm that these factors should be considered with care in the design and management of e-Learning environments. Motivation can be enhanced with an incentive system. A supportive infrastructure that acts as a scaffold could be provided for students without experience, in order to gain some insights and basic knowledge of real life work before diving in the main e-Learning program. This could be achieved with a game-based learning program, simulation, or virtual reality technology. English as a first language is found to be significantly important in the business presentation, but should be different in another field. However, students with different cultures could be provided with experts or instructors from their respective backgrounds. This is also emphasized by the importance of having multiple subject matter experts in training to provide different views and experiences to students, rather than a single expert. Other factors refer to the aspect of e-Learning readiness and learning attitudes to equip students. Furthermore, basic ICT skills and instructors should take the lead in activities that help students to carry out their own research and initiatives.

## 7.8 LESSONS LEARNED FROM THE RESEARCH DATA FINDINGS

It was noted that the e-Learning environment, did not cause any constraints per se, except for the issues faced and revealed by the instructors. This underscores the belief that people have of face-to-face settings bring the ideal medium to perform better, demonstrate complex concepts and skills, and therefore, externalize their tacit knowledge more easily. The online option required a lot of investment and effort to make sure the ideas went through successfully. Regarding the face-to-face concern, students had different opinions, as some wished to have the expert in-person to witness how he would deal with unexpected questions and the reflection of body language, for example. On the other hand, some students preferred being online, as they could ask their questions and express their ideas more comfortably, as long as they have get them answered. Overall, the level of satisfaction with the e-Learning environment was high, and the target of the experiment was achieved.

The role played by the instructors was also very important to achieve the results found in this research. The instructor should not only be knowledgeable or an expert in the field, but also be dedicated and aware of techniques to promote tacit knowledge sharing in an online community. That is the reason why Hattie (2010) proposed a subject matter expert, or an expert teacher. These were part of the criteria of selection for the instructor described in Chapter Four. The students' feedback survey also confirmed their satisfaction with instructors.

Another factor already mentioned in this chapter is time. Such an e-Learning program should be conducted within a reasonable amount of time to enable students to absorb, reflect and apply the knowledge. A few weeks may not be sufficient and may produce a different outcome. Although time is referred to in the literature, there is no exact threshold level. Fourteen weeks, as conducted in this experiment, has yielded significant improvement, and it would be preferable to seek more for replication rather than less.

## 7.9 CHAPTER SUMMARY

This chapter considered the theoretical background and findings of this study. It set out to discuss students' ability to acquire tacit knowledge in e-Learning environments, to discuss the model proposed to facilitate tacit knowledge acquisition in e-Learning environments, and to discuss factors influencing learners' ability to acquire tacit knowledge in e-Learning environments. It started by reviewing and discussing the findings. Afterwards, the chapter revised the conceptual framework to facilitate tacit knowledge acquisition in an e-Learning environment. Based on the research gap presented in Chapter Two, this chapter has revised the research conceptual framework proposed in the study due to consideration of a new factor emerging from this study, which influences the successful implementation of e-Learning for tacit knowledge acquisition.

The revised conceptual framework presented in section 7.8 is a novel contribution, as it summarizes the following:

- This conceptual framework is one of the first attempts to explore important concepts and factors for sharing and cultivating tacit knowledge in e-Learning environments. At the same time, it also aims to understand and examine students' ability to acquire tacit knowledge in an e-Learning environment at the individual level. The initial conceptual framework provided a strong and theoretically supported frame of reference for studying an E-Learning system.
- This conceptual framework presents a practical guideline for decision makers as a tool to develop and implement E-Learning courses including a strategy to facilitate tacit knowledge acquisition.
- The revised conceptual framework includes a comprehensive set of factors that impact learners' ability to acquire tacit knowledge in e-Learning environments. The factors discussed in the conceptual framework were initially suggested in the literature but had not been examined nor tested in practice.
- Academics and researchers can use the revised conceptual framework presented in this chapter to understand and analyze other aspects influencing the sharing and acquisition of tacit knowledge in e-Learning environments.

# Chapter 8: Conclusion

## 8.1 CHAPTER INTRODUCTION

The aim of this study was to investigate whether or not learners can acquire tacit knowledge in an e-Learning environment. Theoretical claims about the transfer and sharing of tacit knowledge in e-Learning environments are abundant and likely to increase with the integration of advanced technologies such as game-based simulators and virtual reality in e-Learning platforms. Nonetheless, there is a lack of empirical studies proving or disproving such claims not only due to the lack of instruments for tacit knowledge testing of a given field but also to the low commitment of researchers to assess tacit knowledge of learners acquired in e-Learning environments at individual level. In this situation, a myriad of concepts and ideas claiming to facilitate the sharing and acquisition of tacit knowledge have emerged but this produced dissatisfaction in practice due to the lack of evidence and practical guidelines to certify that learners can gain tacit knowledge using the online learning mode. On the other hand, some researchers are still contending with the capacity of online platforms, e-Learning environments in particular, to support activities in which people share and gain tacit knowledge. This research set out to answer the question *"Can e-Learning environments provide conditions that facilitate the acquisition of tacit knowledge?* And if so, *how?"* Thus, the primary goal of this study was to explore whether previous findings that support the use of e-Learning platforms as a tool to pass on and acquire tacit knowledge also hold true for the study's sample based on the business presentation field. The strategy consisted of conducting an experiment in a purposefully designed e-Learning environment, testing and exploring participants' development of tacit knowledge using validated instruments and methods.

In education, e-Learning has become widespread with the advancement of ICT. It can provide a space where students work collaboratively, construct their own knowledge, and enhance problem solving and critical thinking skills. E-Learning is also characterized by the flexibility of access to information and provides opportunities for students to interact with peers asynchronously and synchronously. This, in turn, reduces the distance issue. Given the ethereal nature of tacit knowledge, there was a need to develop a conceptual framework to drive the implementation of e-Learning environments in which learners can acquire tacit knowledge successfully. Therefore, this study had three goals. The first goal was to investigate concepts to design and coordinate an e-Learning environment that facilitates learning and teaching processes, storytelling and expertise sharing favourable to the externalization and internalization of tacit knowledge. The second goal was to investigate major factors that influence the acquisition of tacit knowledge in e-Learning environments. The third goal was to develop a conceptual framework that integrates concepts and factors to create conditions that facilitate a learners' ability to acquire tacit knowledge in e-Learning environments. This chapter presents the conclusions drawn from the research.

The chapter starts with a summary of the key research findings. The contributions of this research are presented in Section 8.3. Section 8.4 presents practical implications. The limitations of the study are presented in Section 8.5. Section 8.6 presents the conclusion and the future research direction.

## 8.2 SUMMARY OF KEY FINDINGS

The motivation for this research was made clear at the introduction chapter of the thesis, leading to the development of the research questions and research objectives. The objectives were achieved from an experiment that first involved setting up an e-Learning environment as prescribed in the conceptual framework including using Knowledge Object to design e-Learning content of the program to teach as well as conducting learning and teaching activities in the spirit of the Community of Practice. Secondly, conducting the experiment based on business presentation field in the proposed e-Learning environment with the study's participants. Thirdly, assessing tacit knowledge level of learners at individual level at the beginning, during and end of the experiment, including learners' factors that influenced their ability to acquire such knowledge in an e-Learning environment. Finally, guidelines were posited to facilitate and enhance the acquisition of tacit knowledge in e-Learning environments.

In order to investigate the development of students' tacit knowledge of the field of interest (business presentation), a Tacit Knowledge Inventory for Business Presenter (TKIBP) instrument was built and validated. A panel of experts was recruited to evaluate and provide their opinions on students' professional expertise and possession of tacit knowledge in the field. This was based on 23 students at the beginning, halfway and end of the experiment and it was labelled Close Monitoring Initiative. Finally, students' experiences and perceptions of the e-Learning program were analyzed on a number of variables. These include the effectiveness of the e-Learning program, the impact of lessons learned from delivering presentations and the circumstances in which they learned new ideas or understandings. These three dimensions enabled us to determine the change in tacit knowledge of students, from quantitative and qualitative angles. They also enabled us to explore the factors that played a major role in students' improvement.

**Acquisition of Tacit knowledge in e-Learning Environments**

Overall, e-Learning environments can provide conditions that facilitate the acquisition of tacit knowledge. This has been verified by the ability of students to acquire tacit knowledge in the business presentation field in the proposed e-Learning environment used as testbed for the experiment in this research. The findings reveal a statistically significant improvement in the TKIBP score for the experimental group of students when we compare post- and pre- intervention scores. The experimental group's improvement in the TKIBP score was significantly higher than the improvement in the control group. The mean improvement was 22.64, with a 95% confidence interval between 19.68 and 23.88.

Tacit knowledge is known to have a significant impact on one's quality of work and professional efficiency and is often associated with practical know-how, competence and expertise. Another result produced in this study showed that the practical know-how of the business presentations of students was improved, based on 23 students selected in the Close Monitoring Initiative throughout the study and evaluated by a panel of experts in the field. The average improvement in the assessment score increased from 15.78 (pre) to 20.13 (post), 4.35 units (27% of pre-intervention score). Also, according to experts' opinions, some successful students during the Close Monitoring Initiative demonstrated and applied tacit knowledge that students who were less successful did not. This complemented result was obtained from tacit knowledge scores via the TKIBP instrument which then confirms an improvement in students' tacit knowledge level acquired in the proposed e-Learning environment.

After examining students' experiences and opinions of the e-Learning environment that hosted the experiment, the results revealed that students were able to learn, interact and collaborate with their peers and instructors while exchanging and utilizing different resources in various formats including text, audio, video, image, including video conference meetings, where they can hear, speak and see themselves in real-time. In doing so, they were able to share stories and past experiences, to gain new ideas, tips and insights that they now pay attention to in their preparation and delivery of business presentations. In addition, the majority of students highlighted that they would not have been able to learn what they did in the proposed e-Learning environment throughout the experiment by merely reading books or attending lectures in a classroom, referring to traditional face-to-face lectures. In fact, although it is difficult to transfer tacit knowledge through language, some mechanisms allow students to infer tacit knowledge through stories, conversations and social interactions. Other mechanisms enable students to acquire tacit knowledge through conscious practice, reflection and practical experience immersion. E-Learning environments are capable of accommodating and facilitating these mechanisms, which can be also enhanced using multimedia resources. For example, in this study, the instructor used some videos and images to illustrate how poor postures and anxiety could undermine one's business presentation. These resources were available for students to review, rewind and reflect on later on at their own convenience. The instructor may not easily articulate what he does and how he does it to eliminate anxiety and hold a good posture. But through illustrations, comments and discussions, students were equipped to have a representation in their mind about the impact of both posture and anxiety factors in business presentations for reflection. This marked the beginning of some cognitive processes that students go through, resulting in learning from the instructor's experience. The more these factors were repeated with realistic illustrations during the e-Learning program, the more likely they became intuitive to students who can respond better to stimuli related to those factors in their business presentation tasks, although being unable to explain their actions or applied techniques upon enquiry. In fact, some students may only be mimicking the tacit knowledge of the instructors by reproducing the steps or actions presented.

Researchers in Psychology have devoted a substantial amount of attention to understanding how learners, in particular novices, acquired the tacit-oriented skills of experts. One perspective that has gained considerable traction among scholars is that of Anderson's (1987) ACT theory. Anderson contends that the acquisition of tacit-oriented skills involves three stages. In the first stage, learners learn declarative knowledge via written or verbal description pertaining to explicit knowledge. In the second stage, the declarative knowledge is converted into procedural form through considerable practice. By repeatedly working on a task with an instructor, learners begin to encode more abstract understandings of the task. Such abstract understandings involve storing declarative information in long-term memory. The final stage involves automatization of the skills associated with the tasks. Through continued practice, learners are able to refine their approaches to complete the task and respond to stimulus without diverting any attention or conscious cognitive resources. Speelman and Kirsner (2005) reported that the ACT theory was found valid in explaining the process through which individuals acquire the largely automatic (i.e., tacit) skills of experts. However, the theory does not place any restriction on the context or space in which these stages should take place. It exhibits that an environment which supports learners through these three stages to improve tacit-oriented skills successfully is appropriate.

Based on the results obtained from the experiment conducted for the research, this study confirms that a well-prepared e-Learning environment can provide circumstances that facilitate a learners' ability to go through processes resulting in the acquisition of tacit knowledge of a given field.

**Facilitating the Acquisition of Tacit Knowledge in E-Learning Environments**

One goal of the research was to come up with a comprehensive set of practical guidelines to design and coordinate learning and teaching activities, in an e-Learning environment to facilitate the acquisition of tacit knowledge. This study integrated Knowledge Objects to design content and Community of Practice learning strategy to create a model to support learning and teaching activities in an e-Learning environment. The results confirm a strong, positive and statistically significant association of students' perception of the proposed model and an improvement in tacit knowledge scores. This was complemented by students' comments on the ease of use of the e-Learning platform, usefulness of learning resources and ability to locate and connect with peers who possess relevant knowledge or experience on a particular topic. Given the organization and structure of the content in the e-Learning platform, students also reported the ease and efficiency of keeping track of exchanges. Based on these results, the approach proposed in this study using Knowledge Objects associated with learning and teaching activities in the spirit of Community of Practice facilitate the acquisition of tacit knowledge in e-Learning environments. This approach promotes collaboration and helps students locate and connect with like-minded peers, to exchange ideas and to develop deeper insights and understandings filled with tacit knowledge.

Findings in this study provide better understanding of the theoretical claims concerning Knowledge Objects and give new meaning to integrating a model Knowledge Object concept coupled with learning and teaching activities in the spirit of Community of Practice, in e-Learning environments. This approach creates conditions that facilitate learners' opportunities to engage, learn and connect with other participants, to share knowledge of a field and eventually acquire tacit knowledge that is often hidden among participants. The model proposed in this study represents a viable tool that can be used to carry out learning and teaching activities in e-Learning environments, to facilitate the forming and molding of tacit knowledge among participants.

Tacit knowledge teaching and transfer is difficult since it is often unsuspected and its articulation using words, numbers or symbols is not easy (Matošková, 2008, p. 43–44). To transfer tacit knowledge, and be completely consistent with the source, is often not possible. In fact everyone forms their own tacit knowledge on the basis of their previous experience, knowledge, skills and mental models (Mládková, 2008; Athanassiou and Nigh, 2000). However a well-prepared program can at least make tacit knowledge forming and molding easier (Matošková et al., 2013). Consequently, an aspect of designing and conducting a program in an e-Learning environment involves designing a course and creating learning tasks that will enable learning to take place through reflection, collaboration with others and interaction with the learning materials. Consequently, Knowledge Object entails moving from learning materials that mostly consists of text-based resources to multimedia-oriented resources, along with an interactive pool of knowledge generated from participants' exchanges and stored in a knowledge base. Each Knowledge Object focuses on a single objective or concept to teach and incorporates a variety of media such text, images, audio-video components and activities to practise and self-assess. In fact, the media richness theory states that the more ambiguous and uncertain a task is, the richer the media format is needed. Oz and White (1993) specify that retention rates for the different presentation formats are 75% for seeing, hearing and doing, 40% for seeing and hearing, 20% for hearing.

Knowledge Object designing, as implemented in this study, applies the principle of dividing a program into small pieces since individuals have substantial limits to the amount of information that can be stored in their short-term memory. This process improves the speed in which knowledge is recalled from memory, but also tends to diminish conscious awareness in individuals of the underlying details and considerations associated with the knowledge in a given skill (Anderson, 1982). Since the aim is to illustrate real workplace scenarios and practical examples to learners to more easily convey the hard-to-articulate knowledge, subject matter experts (or instructors) are required in the construction of Knowledge Objects to add detail and appropriate examples. This better facilitates the flow of information to learners and provides information to start and follow exchanges on the topic in the e-Learning environment. Organizing and conducting learning and teaching activities in the spirit of Community of Practice helps promote engagement and nurtures the culture of sharing and the constant interactions among participants, in which tacit knowledge forming take place.

**Learners' Factors Influencing Positively the Acquisition of Tacit Knowledge in e-Learning Environments**

The study investigated students' factors or characteristics that influence their ability to acquire tacit knowledge in e-Learning environments using the TKIBP instrument. Years of experience in the field, English as a first language, self-competence, perceived usefulness, self-directed learning, motivation, and perception of the proposed e-Learning environment and model all have a positive, statistically significant association with the improvement in tacit knowledge score. Previous studies show that years of experience and English as a first language impact the possession and application of tacit knowledge. In general, students' characteristics were ignored in discussions related to tacit knowledge acquisition in an e-Learning environment. The results of this study confirms that a set of students' factors are important to value and consider while developing learning and teaching activities in e-Learning environments in order to facilitate tacit knowledge acquisition.

## 8.3 CONTRIBUTION TO THE KNOWLEDGE

The purpose of carrying out this research was to make a significant contribution to the existing body of knowledge in the acquisition of tacit knowledge in e-Learning environments. From the seven chapters presented so far, a substantial contribution is identified in the context of theories, practice and methodology. A combination of the three concepts of research was important in such contributions. The aim of the research played a leading role in the formulation of the research questions and research objectives as well as the robust methodology used to investigate students' ability to acquire tacit knowledge in e-Learning environments. The findings are discussed under the specific area of contribution.

### 8.3.1 Contribution to Theory

In the previous chapter, the current study's contributions to the existing body of knowledge have been discussed in detail and each result of the study was discussed with reference to the literature. While the findings of the study had connections with previous studies investigating tacit knowledge acquisition over advanced technologies, they added new meaning.

The findings of this research contribute to theory in the area of Knowledge Management and e-Learning, including Information and Communication Technology. Many theoretical claims have been echoed in Knowledge Management and E-Learning without empirical evidence, causing debate and dissatisfaction in research and practice.

Firstly, the study has advanced the debate about the acquisition of tacit knowledge in e-Learning with evidenced-based information. It presents the development of learners' tacit knowledge at the individual level, in a purposefully designed e-Learning platform, in a specific field. This confirms that ICTs are potent tools people can use to pass on and internalize tacit knowledge online, without face-to-face contact. The study also provides insights on learners' development of expertise or practical how-know through e-Learning mode and what it may take for a learner at the novice stage to become an expert.

Secondly, the study establishes an integrated and holistic model. This model combines a comprehensive set of concepts and strategies such as designing content using Knowledge Objects and conducting learning and teaching activities in the field taught, in the spirit of Community of Practice in e-Learning environments, for better implementation of e-Learning to facilitate learners' ability to gain tacit knowledge that is often hidden in peers and instructors. Nonaka and Takeuchi's SECI model describes the process of converting tacit knowledge into explicit knowledge (in virtual or physical *ba*) and even suggests supportive activities. However, it is too vague when it comes to the application and implementation in a context like the e-Learning environment. Gourlay (2006) argues that some of the processes and examples mentioned in Nonaka and Takeuch's SECI model for knowledge conversions are ambiguous and not supported by sufficient evidence. Using Nonaka and Takeuchi's language, this study presents a concrete and viable model, including the processes and activities, in which evidence of a significant internalization of tacit knowledge at the individual level is provided and can be replicable.

Thirdly, the study has specified the learners' characteristics or factors that play a positive and significant role in their capacity to acquire tacit knowledge in e-Learning environments. These include years of experience in the field, English as a first language, self-competence, perceived usefulness, self-directed learning, motivation, and perception of the proposed e-Learning model. These factors are largely ignored in the discussions related to tacit knowledge sharing and acquisition in e-Learning environments. Knowing these factors will aid in the better implementation of e-Learning in practice and help move research forward.

### 8.3.2 Contribution to Practice

One of the key practical contributions of this research is evidence-based information on the acquisition of tacit knowledge of a specific field in e-Learning environments. Making use of successful business presentations provides insight and understanding into the teaching and acquisition of practical knowledge; something that is otherwise difficult to articulate in an e-Learning environment. Thus, this study can be useful to online business programs. As Russ (2009) noted, faculty must provide students with the communication skills demanded by employers. Campbell et al. (2001) emphasised that oral presentations skills must be mastered to have a successful professional life. For Kuzma (2007), businesses expect employees to have strong communication and presentation competencies in order to be effective in their jobs. However, Kenkel (2011) draws attention that “oral presentations are often eliminated from online courses because of the logistics involved.”

Based on the findings of the current study, e-Learning environments can provide conditions wherein students can acquire tacit knowledge of business presentation that enables them to improve the quality of their deliveries. This is consistent with Kuzma’s (2007) findings about the positive contribution of online technologies to enhancing student presentation skills. In addition, this study presents a model to conduct business presentation learning and teaching activities in e-Learning environments in way that will facilitate students’ acquisition of tacit knowledge. It also showcases factors influencing students to acquire the soft knowledge of business presentations in e-Learning environments.

### 8.3.3 Contribution to Methodology

The contribution this research makes in the context of methodology is seen in two major areas. These areas are the structure of the research and the research instrument.

**The structure of the research**

This research resorted to the use of diagrams to illustrate concepts to the reader. These diagrams, which started from theoretical framework (Figure 3.3), integrate major concepts from Knowledge Management and e-Learning synergy concerning tacit knowledge sharing. The derived conceptual framework (Figure 3.4) pieces together arguments evolving from the theoretical framework used for investigations. The architecture of e-Learning environments (Figure 5.4) used for the experiment combines concepts and processes to bolster the acquisition of tacit knowledge in an e-Learning environment.

The methodology of the research may also be useful for other tacit knowledge related research in online environments in different fields. The research design adopted is suitable to evaluate the acquisition of tacit knowledge of online participants in other fields. The steps described in Chapter Four are replicable for other fields.

**The research instrument**

On the other hand, assessment toolkits for tacit knowledge are limited and not available in every field. The *Tacit Knowledge Inventory for Business Presenters (TKIBP)* developed and validated in this research may be useful to evaluate practical knowledge associated with business presentations. It can also be utilized to train students and develop their awareness of critical incidents or situations of the job.

## 8.4 PRACTICAL IMPLICATIONS

Capturing and leveraging tacit knowledge is one of the main concerns of knowledge management initiatives in organizations. Education and training sectors are deeply affected as the current knowledge economy requires competitive and experience-based knowledge. Face-to-face styles of education or training such as apprenticeships are considered the best ways for novices to learn while acquiring tacit knowledge and honing their practical skills from the masters. However, face-to-face instructions are no longer the principal way to learn in current business models and society, particularly when students (or novices) and instructors (or subject matter experts) are not geographically close. Moreover, the face-to-face learning and teaching style is not always feasible due to the limited resources such as time, equipment, budget, etc. Thus, there is a need to ensure that people are able to acquire, retain and recall tacit knowledge online, which involves using ICT tools to learn and collaborate with other participants. Šarkiūnaitė and Krikščiūnienė (2005) remind us that the use and optimization of ICT for facilitating tacit knowledge in e-Learning is almost inevitable today.

There is currently widespread scepticism and mistrust of the viability of ICT for effective tacit knowledge transfer and acquisition (Cain, 2011). This study gives evidence of tacit knowledge acquisition in an e-Learning environment where participants learn, interact and collaborate together and eventually capture and retain tacit knowledge of the field being taught using ICT tools. The study applies the Knowledge Object concept to design e-Learning content of the program to teach, coupled with learning and teaching activities in the spirit of Community of Practice in the e-Learning platform. This provides proof of the viable approach to facilitate the acquisition of tacit knowledge in e-Learning environments.

The proliferation of online courses adds a burden to organizations and individuals to make appropriate choices. Previous research has shown some interest in this situation. Murphy et al. (2013) designed an instrument to evaluate online training programs. The instrument helps decision makers to assess multiple online training programs against best known practices. It uses a weighing process to take context specific training needs into account. The tool, developed by Murphy and his team, focuses on the capacity of online training to enable the transfer of best practices, practical knowledge and tacit knowledge, to some extent. It was found to have consistent rankings by raters across multiple online programs. This current study can enhance and add more value to Murphy et al.'s approach as it focuses on tacit knowledge, and in particular, its acquisition and the ability of learners to acquire it in online platforms. The assessment of tacit knowledge shown in this study does not rely on the way a program is conducted but on validated instruments and a robust methodology, which are more appropriate to test for tacit knowledge.

The study findings could also help online course providers, administrators and decision makers by providing them a valuable lens through which they can understand the scope and impact of learning and teaching in the e-Learning platform. Through this study, they are made aware of the potential outcome of a participant's level of acquisition of tacit knowledge, including factors that have a significant impact in their ability to acquire such knowledge. This can help them define a better strategy for ICT usage, content design and influencing factors to improve their e-Learning platform. In addition, existing and new Virtual Communities of Practice around the world that conduct their activities in an online platform with an already well-established culture of engagement, collaboration and best practices, can follow the approach proposed in this research to improve their efficiency to bolster the acquisition of tacit knowledge in the field of interest. They can use a typical Virtual Learning Environment, design learning content or topic for discussions in the form of Knowledge Objects and proceed with their traditional way of communicating, interacting and collaborating, to facilitate the acquisition of tacit knowledge among participants.

## 8.5 LIMITATIONS

Researching tacit knowledge, as discussed in the introduction and literature review chapters, is problematic from both the theoretical and methodological perspectives (Rebernik and Sirec, 2007; Ambrosini and Bowman, 2011). The current study also had theoretical and practical limitations.

Theoretically, the aim of the study was to study tacit knowledge acquisition in e-Learning environments. Explicit knowledge was supposed to be excluded from the study. However, tacit knowledge is a complex concept, with many dimensions. The distinction between tacit knowledge and explicit knowledge, in reality, is not as clear as the theoretical definitions, due to the fact that the nature of tacitness changes according to the level of expertise (novice or expert), time and context in which knowledge is shared.

Although the tacit-explicit continuum was adopted for the purpose of the study like others (e.g. Chennamaneni and Tend, 2011; Haldin-Harrgard, 2000; Jasimuddin et al, 2005), making decisions about the type, quality and relevancy of knowledge shared among participants in business presentations within the e-Learning context and interpreting them within tacit knowledge definitions was not always simple. Similarly, although the steps given by Sternberg and his team were followed in constructing the tacit knowledge inventory for the field of interest (TKIBP), the final TKIBP construct may be subject to criticism. Before proceeding in the research, the reliability and validity of the TKIBP instrument was proven to be of high quality and additional methods from qualitative angles were sought to complement and strengthen the credibility of results. These decisions will help achieve triangulation.

Another practical limitation is related to transmitting the meaning of tacit knowledge when conducting interviews with practitioners and students during the study. This was sometimes difficult. During the pilot study, it was noticed that some of the participants either did not understand or missed the meaning of tacit knowledge. To solve this issue, a group of terms found in the literature and terms that were close to the meaning of tacit knowledge were used to communicate with participants with different levels of understanding. Additionally, it was decided that participants should be allowed to talk freely about their experience in the field and that it should be the researcher’s role to identify and extract what falls into the tacitness spectrum from the data during the analysis process.

Despite the limited ability to generalize the findings, the study unearthed new aspects about the acquisition of tacit knowledge in e-Learning environments. It has opened doors to new discussions in this regard, which had not adequately been explored previously. The debate as to whether or not people are able to gain tacit knowledge online, particularly in e-Learning environments, now has clearer direction to move forward.

## 8.6 CHAPTER SUMMARY AND FUTURE RESEARCH

The purpose of the research was to investigate and explore the acquisition of tacit knowledge in e-Learning environments through an experimental study that is absent in the literature. Theoretical claims about tacit knowledge in e-Learning using ICTs are abundant but lack empirical evidence. This research demonstrates students' ability to cultivate and retain tacit knowledge in a purposefully designed e-Learning environment.

In summary, the findings confirm that an e-Learning environment can provide conditions in which individuals can learn, socialize, discuss their issues, write and share their stories and best practices in an interactive way, increase their involvement, obtain knowledge from each other and eventually acquire tacit knowledge of the field being taught. Using Knowledge Objects associated with learning and teaching activities in the spirit of Community of Practice is a viable approach to create an atmosphere in an e-Learning environment that enriches learning processes, engagement and collaboration, to facilitate the acquisition of tacit knowledge.

The study proposed and revised a conceptual framework that describes conditions and factors, which play a major role in a learner's ability to acquire tacit knowledge in an e-Learning environment. The model is unique in terms of contributing and updating the existing literature associated with the acquisition of tacit knowledge in e-Learning environments.

The study also acknowledges the need for further research in several areas. Although the study bridges the gap of knowledge in the area of tacit knowledge acquisition in an e-Learning field, there is a need for more empirical studies. For example, the study viewed tacit knowledge more broadly as consisting of different types of experiential, personal, implicit knowledge and practical know-hows that are associated with professional expertise and the ensuing quality of accomplished tasks. Investigating other views and dimensions related to tacit knowledge, in the context presented in this research, is a potential theme for future research.

The overall research methodology of the study can also be replicated for other fields to validate the findings. Employing or designing other means and techniques for measuring tacit knowledge to validate the conceptual framework and generalize its findings could be a major theme for future research.

It would be interesting to replicate this study within a "real" e-Learning institution like the *Open University* in the United Kingdom conducting "pure" e-Learning. This will ensure that participants' meetings are essentially virtual and will perhaps add new meaning to the current findings of how people gather together in an e-Learning environment to share knowledge. Such a study may help design and better organize online courses and activities to leverage the sharing and acquisition of tacit knowledge.

Only one set of learners' factors or characteristics has been investigated in this study. Knowing that learners are generally from diverse social, cultural, economic, linguistic, and religious backgrounds, expanding the investigation to these factors constitute major areas for future research. Other external factors pertaining to the instructor(s), the e-Learning environment per se, as well as ICT tools used in the e-Learning environment can also be subject to further research. This will enable a more complete picture of internal and external factors that influence a learner's ability to acquire tacit knowledge in an e-Learning environment. Another interesting area of research would be examination of the impact of individual technologies available in an e-Learning environment on a participant's ability to share and acquire tacit knowledge. For example, how intensely a particular technology impacts learning processes necessary for learners to acquire tacit knowledge. It could be expanded to include the role played by each type of digital device that participants use in e-Learning that bolsters engagement, motivation or willingness to take part in activities that stimulate the foundation and cultivation of tacit knowledge.

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# Appendices

## APPENDIX A – PARTICIPANTS INVITATION LETTER

Cyfranogwr Rhif Adnabod:
Participant Identification Number:

| Ffurflen Ganiatâd Cyfranogiad | Participation Consent Form |
|---|---|

Teitl y prosiect / Project title: ***An Investigation into the Acquisition of Tacit Knowledge in e-Learning Environments: An Experimental Study***

**Researcher name**: Annel Ludovic Ketcha Djiffouet **Email address**: 1202643@student.uwtsd.ac.uk

Many thanks for agreeing to participate in my research project. The project must be completed to fulfill my PhD program, so your assistance is valued and appreciated.

**Purpose of the research**: the study aims to investigate whether or not students are able to acquire tacit knowledge in a en e-Learning environment. To meet the objectives of the research, 'business presentation' is chosen as the field of interest to conduct an e-Learning experiment. This requires an instrument to measure students' tacit knowledge at an individual level and examine influencing factors. This initiative is an attempt to understand the lessons that domain experts have learned through their on-the-job experiences in order to develop a tool that will enable me to assess students' business presentation professional expertise as an indicator of their tacit knowledge level.

**What is involved in participating**: I want to identify examples of informal knowledge about presenting with polished quality and professionalism. I want to find examples of the ins and outs of delivering presentations that are not written in books or taught in classes. As a rule of thumb this knowledge is often not discussed openly, but nevertheless is used by expert presenters as they meet the demands of their jobs. This knowledge may have been learned because of some issues you faced. It may have been acquired by watching someone else's successes or failures. In a nutshell, I am interested in the incidents, problems and challenges you faced or witnessed, and what you have learned from those experiences at your level, in business presentation. I am not interested in the party line or the doctrine or theory about presentations, but rather what works.

The full interview will be kept strictly confidential and will be available only to the researcher. Excerpts from the interview results may be made part of the final research report.

Your signature below signifies that you have read the above information and agree to participate in this study.

I permit the researcher to record the interview ☐ Yes ☐ No

| | | | |
|---|---|---|---|
| Participant's name:<br>(Please print in capital letters) | | | |
| Organization: | | Job title: | |
| Signature: | | Date: | |

Researcher signature: ________________________________________

# APPENDIX B – INTERVIEW GUIDE FOR TK ELICITATION IN BP

Cyfranogwr Rhif Adnabod:
Participant Identification Number:

PRIFYSGOL CYMRU Y Drindod Dewi Sant
UNIVERSITY OF WALES Trinity Saint David

**INTERVIEW GUIDE**

***Eliciting Experience-based, Tacit Knowledge in Business Presentation***

| | | | |
|---|---|---|---|
| Interviewee's name: | | E-mail: | |
| Organization: | | Job title: | |
| Gender: | | Ethnicity: | |
| Date and time: | | Place: | |

**EXPLANATION OF THE KEY TERM**

**Experience-based** or **tacit knowledge:** domain-specific knowledge and skills that people usually gain individually through their on-the-job experiences, as opposed to published academic knowledge. Examples include but not limited to hands-on experience, rule of thumbs, tips, know-how, tricks of the trade, insight, perspectives and experiences from handling rare cases.

**INTERVIEW OPENING STEPS**

1. Thanking the interviewee for accepting to participate;
2. Describing the goals of the study;
3. Pre-empting likely misunderstandings;
4. Orienting the participant;
5. Addressing any ethical issues or concerns on the part of the respondent;
6. Seeking permission to recording the interview;
7. If authorized, placing the recorder conveniently to ensure proper recording.

**SECTION A BACKGROUND INFORMATION**

1. What is your current job, and how long have you held it?
2. Are you a member of any professional body (*e.g. Chartered Institute of Personnel and Development*)? If yes, please name them and indicate the number of years you have been affiliated.
3. What are the three most important parts of your job in connection with business presentations?
4. How often does your job involve delivering, assessing or attending business presentations?

**ECTION B PERSONAL EXPERIENCES**

In this section, I will distinguish **individual presentations** and **group presentations**.

**Individual Presentations**

**1.** Tell me some stories or incidents in which you have learned something important about individual business presentations.

For each story, follow-up questions are as follows:

**1.1.** Please provide more details about the context of the case (e.g. formal/informal, large audience or small audience, audience of peers or laymen, sales pitch or informational, etc).

**1.2.** Tell me more about challenges and problems you faced.

**1.3.** What was the critical factor?

**1.4.** What actions did you take to deal with each issue? What exactly did you hope to accomplish? What was your thinking process at that point?

**1.5.** What else did you consider doing at the time?

**1.6.** What do you think you learned from that experience?

**1.1.** How has that experience affected your approach in delivering presentations?

**Group Presentations**

**2.** Tell me some stories or incidents in which you have learned something important about group business presentations. For each story, follow-up questions are as follows:

**2.1.** Please provide more details about the context of the case (e.g. formal/informal, large audience or small audience, audience of peers or laymen, sales pitch or informational, etc).

**2.2.** Tell me more about challenges and problems you faced.

**2.3.** What was the critical factor?

**2.4.** What actions did you take to deal with each issue? What exactly did you hope to accomplish? What was your thinking at that point?

**2.5.** What else did you consider doing at the time?

**2.6.** What do you think you learned from that experience?

**2.7.** How has that experience affected your approach to teaming up in a group presentation?

*In this section, "you" refers to you as a member and the entire group.*

**SECTION C SUMMARY**

1. What are the key lessons about presenting that you have learned through your on-the-job experiences?
2. Is there anything you would like to add that you think we have not covered during this interview?

**INTERVIEW CLOSING STEPS**

1. Thanking the interviewee again for participating in the research.
2. Giving the participant an opportunity to ask questions.
3. Asking for any supporting documents that can further enrich the interview.

## APPENDIX C – INTERVIEW DATA CODING SHEET

*Part A - Interview Summary Protocol*

Directly after each interview, the researcher will write an interview summary. Each interview summary should contain the following:

**1.** Subject information (i.e. subject number, branch, time in job, race/gender designation);

**2.** Summary of each story discussed in the interview;

**3.** Annotations to each story's indications, key contextual variables and lessons learned;

**4.** An occasional *n.b* (nota well) from the researcher, note taker.

Following this stage, coding the interview summary takes place.

*Part B - Coding the Interview Summary*

Determining which examples of knowledge meet the criteria for tacitness and usefulness, in order to transform the summaries into a more usable form for the purpose of later analysis. The format of coding interview summaries is based on the procedural feature of the definition of tacit knowledge. The knowledge is expressed as a mapping between a set of antecedent conditions and a set of consequential actions.

The format is as follows:

| | |
|---|---|
| **Story summary**: | |
| **Coded item**: | IF ____________________ AND / OR ____________________<br>THEN ______________________________________________<br>BECAUSE ___________________________________________ |

## APPENDIX D – EXAMPLE OF CODING INTERVIEW DATA (NVivo)

| Name | Sources | References |
|---|---|---|
| Avoid giving excuses at the beginning | 1 | 1 |
| Body languages | 1 | 1 |
| Control de room | 1 | 1 |
| Dealing with Q&A | 1 | 1 |
|   Dealing with difficult questions or pugnacious questionner | 1 | 1 |
| Engaging the audience | 2 | 2 |
| Fear in public speaking | 3 | 5 |
| Group presentation | 1 | 2 |
|   Group member struggling with a question | 1 | 1 |
|   Managing weakesr speaker(s) in a group presentation | 1 | 1 |
|   Presenters' attitudes and behaviour during in a group presentation | 1 | 1 |
|   Researsal in group presentation | 1 | 1 |
| Having a bad day or bad mood | 1 | 1 |
| Imagination | 1 | 2 |
| Loose your train of thoughts | 1 | 2 |
| Moderating a team presentation | 1 | 2 |
| Presentation content | 0 | 0 |
|   Customize presentation content for audience | 1 | 1 |
|   Dealing with numbers | 1 | 1 |
|   Pictures and illustrations | 1 | 1 |
| Rehearsal and practice | 2 | 7 |
| Remembering the presentation | 1 | 1 |
| Speaking or presentation engagement | 1 | 2 |
| Starting strong and ending strong | 1 | 1 |
| Telling stories, anedoctes and jokes | 2 | 3 |
| Timing | 3 | 3 |
|   Be prepared to shorten the presentation | 1 | 1 |
| Understanding audience | 2 | 3 |

## APPENDIX E – KNOWLEDGE OBJECTS DESIGN

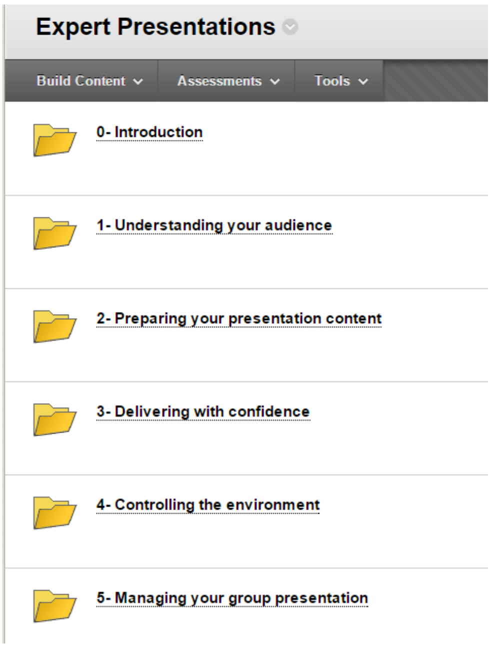
| KO 1 | UNDERSTANDING YOUR AUDIENCE |
|---|---|
| **Learning objective** | Connect with an audience and ensure that the presentation achieves the desired goals |
| **Description and content** | Determine who the members of the audience are.<br>Find out what they want and expect from your presentation. What do they need to learn? Do they have entrenched attitudes or interests that you need to respect? And what do they already know that you don't have to repeat?<br>Create an outline for your presentation, and ask for advance feedback on your proposed content. |
| **Activities** | |
| **Forum** | Set up a topic and encourage students to ask questions and share their experiences. |
| **Forum topic** | *What is your approach to knowing more about your future audience?* |
| **Webinar** | To be announced |
| **Supporting Resources** | |
| **Video(s)** | BPP-C2, *Lecturer, Consultant, Voice Actor and Speaking Instructor*, website<br>What You Must Know About Your Audience<br>BPP-C4, *Speaking Instructor*, website<br>Killer Presentation Skills (cover all presentation skills as a whole) |
| **Podcast(s)** | **Benefits of Understanding Your Audience**<br>From *The Public Speaker's – Quick and Dirty Tips* – BPP-C3 |

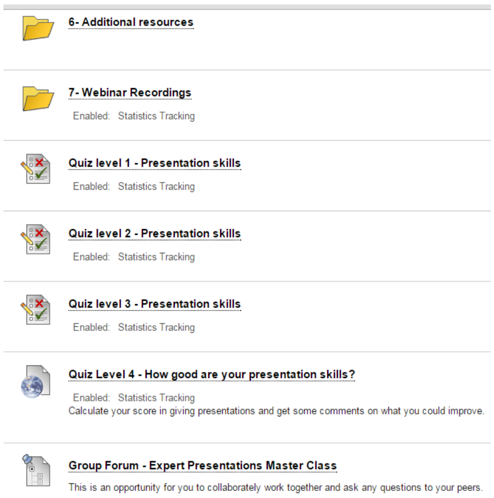
| KO 2 | PREPARING YOUR CONTENT |
|---|---|
| **Learning objective** | Present information in an organized and engaging way. |
| **Description and content** | Selection and organization of materials.<br>Effective use of visual aids.<br>Content synthesis to something clear, logical, simple, engaging and effective.<br>Plan ahead and establish backup for disasters or worst-case scenarios. |
| **Activities** | |
| **Forum** | Set up a topic and encourage students to ask questions and share their experiences. |
| **Forum topic** | *What do you consider when preparing your content?* |
| **Webinar** | To be announced (TBA) |
| **Supporting Resources** | |
| **Video(s)** | BPP-C2, *Lecturer, Consultant, Voice Actor and Speaking Instructor*, Website<br>How To Avoid Presentation Disasters |
| **Podcast(s)** | **Presentation Disasters: What to Do When Things Go Wrong**<br>From *The Public Speaker's – Quick and Dirty Tips* – BPP-C3 |

| KO 4 | CONTROLLING THE ENVIRONMENT |
|---|---|
| **Learning objective** | Managing the space to control the room and influence results |
| **Description and content** | Preparing a great opening and closing..<br>Capturing audience attention.<br>Practicing in the presentation room if possible.<br>Do your own setup.<br>Testing your timing. |
| **Activities** | |
| **Forum** | Set up a topic, encourage students to ask questions and share their experiences. |
| **Forum topic** | *How do you control the presentation room and capture audience attention?* |
| **Webinar** | To be announced |
| **Supporting Resources** | |
| **Video(s)** | BPP-C5, *Master Trainer and Speaking Presentation Teacher*, website<br>How to Do a Presentation - 5 Steps to a Killer Opener<br>BPP-C1, *Professional Speaker and Speaking Instructor,* website<br>Great Openings and Closings |
| **Podcast(s)** | **Understand your audience and the venue logistics**<br>From The Public Speaker's – Quick and Dirty Tips – BPP-C3. |

| KO 5 | TEAM PRESENTATION MANAGEMENT |
|---|---|
| **Learning objective** | Plan and direct winning team presentations |
| **Description and content** | Managing a group presentation and importance of leadership.<br>Managing weaker member(s) and organizing the presentation sequence.<br>Handing over between speakers.<br>Attitude of team members during the presentation on the final day.<br>Introducing and concluding a group presentation.<br>Handling question and answer sessions, and assist struggling members. |
| **Activities** | |
| **Forum** | Set up a topic, encourage students to ask questions and share their experiences. |
| **Forum topic** | *What would people say is the biggest challenge in giving a group presentation?* |
| **Webinar** | To be announced |
| **Supporting Resources** | |
| **Video(s)** | BPP-C2, *Lecturer, Consultant, Voice Actor and Speaking Instructor*, website<br>How to introduce your team<br>How to introduce the next speaker in a group presentation<br>BPP-C6, *Dragons Den Winners*<br>Team presentation (good synchronization and transitions)<br>BPP-C7, *Professional Speaker and Speaking Instructor*, website<br>Working With Your Audience and Handling Q&A |
| **Podcast(s)** | **Tips for Conducting a Successful Team Presentation**<br>*From The Public Speaker's – Quick and Dirty Tips* – BPP-C3. |

# APPENDIX F – E-LEARNING SET UP AND INTEGRATION



## APPENDIX G – STUDENTS INVITATION FLYER

| | | |
|---|---|---|
| PRIFYSGOL CYMRU Y Drindod Dewi Sant / UNIVERSITY OF WALES Trinity Saint David | University of Wales Trinity Saint David<br>Department of Management and Information Technology<br>School of Business | **PARTICIPATE IN RESEARCH**<br>**Information for Prospective Participants** |

***An Investigation into the Acquisition of Tacit Knowledge in e-Learning Environments: An Experimental Study***

***Research Team Contacts***

Principal Researcher: **Annel Ludovic Ketcha** - PhD Student
Email:1202643@student.uwtsd.ac.uk

Associate Researchers: **Paul Bocij** – Principal Supervisor
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**Professor Jokull Johannessen** – Director of Studies
Email: jokull.johannesson@northampton.ac.uk

**Please contact the research team members if you require further information about the project.**

***What is the purpose of the research?***

This study is intended to investigate and explore students' ability to share and cultivate tacit knowledge (professional expertise) in a purposefully designed e-Learning environment. The field of interest is 'business presentation', and what we mean by tacit knowledge is the personal, job-specific, experience based, not documented and even sometimes difficult to fully articulate; that enables the holder to accomplish tasks with quality and efficiency.

***Why are you looking for people like me?***

The research team is looking for participants who:

- Want to learn and improve their business presentation skills;
- Are willing to share their experiences (challenges, lessons learned, successes, failures, etc.) in business presentations with other students within an e-Learning environment (also known as Virtual Learning Environment);
- Will participate in activities and work collaboratively with the instructors and peers on business presentation topics (e.g. How to engage an audience) set up in forums;
- Suggest activities that may be more useful to them.

***What will you ask me to do?***

Your participation will involve taking part to activities provided in a Virtual Learning Environment (e.g. *Blackboard*); such as tutorials and webinars conducted by an expert business speaker, asking questions, sharing your experience to others participants about business presentation and receiving feedback. We will need you to answer a questionnaire provided before and after the process to help us understand the impact of that e-Learning program to your business presentation tacit-oriented skills.

Those chosen for the control group will follow the process at a different time from those chosen for the experimental group. Please ask the research team for further information.

***Are there any risks to me for taking part?***

The researcher does not believe there are any risks beyond normal day-to-day living associated with your participation in this research. However, it should be noted that if you agree to participate, you can withdraw from participation at any time during the project without explanation or penalty.

***Will I be compensated for my time?***

We would very much appreciate your participation in this research. We believe it may:

- Help you develop your expertise in business presentations in order to present with polished quality and professionalism.
- Benefit educational institutions and students adopting the online learning method by shedding light on the capacity of e-Learning platforms to create conditions in which students can acquire tacit knowledge or professional expertise from subject matter experts and other students.

***I am interested – what should I do next?***

If you would like to participate in this study, please contact the research team for details of the next step.

You will be provided with further information to ensure that that you are fully informed in your decision to consent and participate.

**Thank You!**

# APPENDIX H – TKIBP QUESTIONNAIRE

*Part B: Tacit Knowledge Inventory - Scenario 1*

**S1** *

You have to give a presentation to a small group of employees from a partner company, the purpose being to share knowledge on a particular service and best practices by allowing audience to ask many questions. Therefore, you spent a huge amount of time preparing, practising the presentation as well as anticipating all possible questions.

As the final day is approaching, you start worrying, feeling nervous and stressed which are damaging your confidence to satisfy the audience.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

**This question is mandatory. Please complete all parts.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| You postpone the presentation as soon as possible until you eliminate that anxiety entirely. | | | | | | | |
| You try to stay calm by practising relaxation exercises, laughing, etc. and start thinking about other stuffs you need such as your dresses, equipment, etc. to make sure everything is clean and ready to go. | | | | | | | |
| You keep on rehearsing repeatedly and invite some colleagues and friends to give you feedbacks. | | | | | | | |
| You try to manage and calm your nerves. Then, focus on improving your knowledge and understanding of the topic. | | | | | | | |
| You stay hydrated by drinking more water and making sure to bring one bottle of water on the final day so you can drink at some points during the talk. | | | | | | | |

**S1suggestion**

Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Part B: Tacit Knowledge Inventory - Scenario 2*

**S2** * You will be presenting your company's services in front of an audience that is totally unusual to you. You have been preparing and rehearsing with the help of your colleagues and friends providing feedbacks. Everyone is certain you can succeed but the fear of facing that public is increasing and embarrassing. On the final day, your stomach is queasy, your heart is pounding so hard, your palms are sweaty, your mind has gone blank, and your knees grow weak.

The presentation room has a large stage with a podium, a microphone, a projector and a remote control to freely control slides.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| The audience will notice with certainty that you are uncomfortable. Therefore, once you enter the room, you stand behind the podium and make sure no one realizes what is happening at least with your body. Then, you start presenting. | | | | | | | |
| You take some time to relax your body, keep on self-motivating yourself and deep breathing. Then, try to think more about the information you are about to share with the audience. | | | | | | | |
| You turn up early to socially interact with first attendees and familiarize with them before the talk. | | | | | | | |
| You make sure you have memorised your opening sentences to connect with the audience and help you regain your confidence. | | | | | | | |
| You avoid standing at the podium. Instead you put some efforts to associate your body and movements when talking. | | | | | | | |
| You make sure there is some water that you can drink whenever your voice gets weaker during the presentation. | | | | | | | |
| You put someone familiar to you in the audience and look at him or her whenever you feel stressed or disconnected. | | | | | | | |

**S2suggestion**

Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Part B: Tacit Knowledge Inventory - Scenario 3*

**S3** * You are presenting at a business conference. The large audience looks attentive and interested in your talk and suddenly you lose your train of thought. The panic sets in you and you get embarrassed.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| You try the best you can to get your idea back via your slides or any notes you have brought with you. | | | | | | | |
| You politely apologize to the audience for the circumstance and suggest coming back to it whenever you can recall it. | | | | | | | |
| You try not to freeze. Instead, relax yourself and ask politely, diplomatically or in a fun way to the audience what you just said. | | | | | | | |
| You just move to the next point and avoid drawing attention to the audience that you have missed your point. | | | | | | | |
| You take the opportunity to take a pause, drink some water, gather your thoughts and carry on with the next point. | | | | | | | |
| You directly move to the following point. Whenever that idea comes back to your mind then you highlight it if it was important information to cover. | | | | | | | |

**S3suggestion**

Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Part B: Tacit Knowledge Inventory - Scenario 4*

**S4** * You are on the list of presenters at the annual conference of your company in another city. The president ordered you to talk about the financial health of your branch for about 45 minutes. You start preparing, rehearsing and anticipating plausible questions the audience may ask. You then build a series of slides on discounted cash flow to show to HR people that Finance is a serious business, a few product comparison graphs so Sales will know you are on top of things and also charts on price fluctuations for the last five years.

All materials are finally ready and you pack everything into your suitcase for the trip. At arrival, you realised that the airline has lost your suitcase with slides and your notes for tomorrow.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| You inform the president quickly about the disastrous situation and request to be taken out of list of speakers. | | | | | | | |
| You keep calm and change your approach by telling to the audience the 3 to 6 key points of the presentation you prepared even if it will not last the 45 minutes allotted for you. | | | | | | | |
| You try not to waste your energy and keep focused. Hence, you visit the venue as soon as possible to familiarize yourself with the location and find out any other equipment you can use to illustrate what you prepared. | | | | | | | |
| Tomorrow you start by apologizing to the audience about what happened and try your best to present something. | | | | | | | |
| You request a computer in your hotel room as soon as possible so you can spend the night re-building your slides the best you can. | | | | | | | |

**S4suggestion**
Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Part B: Tacit Knowledge Inventory - Scenario 5*

**S5** * You have prepared and rehearsed a presentation for a long period of time. You feel secured, confident and knowledgeable on the topic. On the final day, there is a technical issue stopping your slides.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| You stop presenting and let the audience clearly know what happens. Then, try to fix it as quick as possible before resuming. | | | | | | | |
| You ask for help from staff, walk away from the issue, get the audience's attention back to you and carry on presenting. | | | | | | | |
| You take a break and apologize to the audience. Then, wait the technician to fix the issue. | | | | | | | |
| You try to be more creative on what to associate or use to help the audience visualize your thoughts while continuing to present. | | | | | | | |

**S5suggestion**
Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Part B: Tacit Knowledge Inventory - Scenario 6*

**S6** *
It is the final day and many group presentations will perform. You and colleagues are starting first. So you turn up early to ensure everything is working well. Everyone in the group looks confident and excited to deliver except you. You seem to be in a bad day, feeling uncomfortable, panicking and anxious.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| As soon as your group starts, you stand behind the more comfortable group member(s) to avoid the audience to spot anything wrong with you. | | | | | | | |
| You relax, let the audience clearly notice your presence and try to pay attention to the team member who is currently speaking. | | | | | | | |
| You request to the group leader to get someone else to present your section and find something else you can do than speaking. | | | | | | | |
| You find anything you can hold, use or think about to unleash the pressure before your turn. | | | | | | | |

**S6suggestion**
Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Part B: Tacit Knowledge Inventory - Scenario 8*

**S8** * You have been chosen by your company to deliver a presentation on a subject you master very well and better than your colleagues. The audience will be mixed comprising people with technical and practical knowledge on the topic and the general public.

On the final day, you spend 10 minutes talking smoothly with an audience fully attentive and interested. As you start taking question(s), a member of the public contradicts a point you made and challenges your opinion with pugnacity.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| You confront the questioner by providing more evidence knowing that you are confident about all information you have carefully included in your slides and mentioned in your speech. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You find a courteous way to skip his or her query and follow up with another question. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You first try to shed more light on his or her question. If that member persists then you suggest discussing further with him or her at the end. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You try not to waste time on that question and suggest to that member to review your notes and discuss with him or her at the end if possible. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You apologize if he or she had a contradictory opinion regarding what you mentioned and jot some notes. Then follow up with a next question. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You try not to lose the face on a presentation you have seriously prepared and started brilliantly. Therefore, you try to back up your point as much as you can. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

**S8suggestion**
Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Part B: Tacit Knowledge Inventory - Scenario 9*

**S9** * You are working for a medium-sized company specialized in designing and developing software. After each update, there is a routine presentation the company does for its partners and customers located in the same region. For a period of time, you have been delivering that traditional presentation to almost the same attendees. Feedbacks of your performances are positive and satisfactory.

The manager is offering you an opportunity to give the same presentation in different other countries although the company has internal presenters for such tasks. You are free to accept or reject the offer regarding what you think it may involve.

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| It is a routine presentation you are used to. Therefore you seize the opportunity, gather all previous materials and make sure to repeat the same previous experiences. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| A completely different region and country is out of your scope. You politely turn down the offer to leave the company speakers carrying out the job. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You accept the challenge, gather all previous materials, remove everything that is too specific to your branch or region, generalise your content to make it reusable everywhere. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You accept the offer unless the company provides a translator or a cultural guide in each country you will be presenting. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You accept unless the agenda give you enough time to customize each presentation, and practise suitably for each circumstance. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

**S9suggestion**
Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

*Part B: Tacit Knowledge Inventory - Scenario 10*

**S10** * You participated in the design and realisation of a new tablet in your company and the manager has entrusted you with the task to present it at the forthcoming conference. You start preparing the presentation and consider including some activities to get the audience interacting to illustrate how the new tablet could be more efficient for them.

A week earlier, the list of attendees is ready and then sent to you. You realise you will be talking in front of shrewd business people, VIP, influential persons and top managers. Would you amend your presentation design?

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| You amend your approach and focus on being elegant, eloquent and persuasive on the final day. Indeed, your language and posture matter the most on that day. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| It could be a waste of time for such an audience. Therefore, you remove any activity or game from your presentation design and you make sure not to go over the allotted time. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You stick to your presentation initial design as well as all activities planned. Then, you emphasize on your opening sentences and strategy to get them involved. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| It may be disrespectful and useless asking to such audience members to do something during the presentation. Therefore you better focus on the core message of presentation. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You reinforced your presentation design with some jokes, stories and humours related to the presentation to relax the atmosphere. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Due to the quality and importance of the audience, you prefer using more short video(s) and/or image(s). | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

**S10suggestion**
Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

**S11** * You are part of a group presentation to perform in one week time. Aware of challenges of a group presentation, you and your team started rehearsing long time ago. Everyone seems comfortable with his or her part and transitions between speakers flow smoothly except one member who is really struggling. His or her performance could belittle the group achievement. What would you do?

**Rate each of the following responses in relation to the given scenario. It is advisable to read all of the responses before replying.**

| | Very ineffective | Moderately ineffective | Slightly ineffective | Neutral | Slightly effective | Moderately effective | Very effective |
|---|---|---|---|---|---|---|---|
| You suggest the entire group to take extra rehearsal sessions until he or she could reach other members level. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You find a possibility to get him or her doing something else than presenting on the final day. For instance changing slides on screen or replying question(s) if he or she is able to response. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You give the introduction to that member and leave the strongest presenters to throw more light after. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You find a slot for him or her somewhere at the middle. Therefore, the strongest member will introduce and conclude the presentation. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| You give the conclusion to that member and put the strongest presenters at the beginning. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

**S11suggestion**

Do you have any suggestions for how you would deal with the above scenario (or perhaps change the wording of the scenario) in addition to the options presented above?

## APPENDIX I – EVALUATION RUBRIC FOR BP BY PANEL OF EXPERTS

| | Distinguished | Apprentice | Novice | Unacceptable |
|---|---|---|---|---|
| **Introduction** | Introduced established rapport and explained the purpose of presentation in creative, clear way capturing attention. Appeared poised and confident. | Introduced presentation in clear way. Slightly uncomfortable but attempted to establish rapport. | Started with a self introduction or "My topic" is before capturing attention. May have looked down at notes to start. | Did not clearly introduce purpose of presentation. Clearly uncomfortable and nervous; failed to establish rapport with the group. |
| **Vocal Qualities** | Clear strong voice (level 8) with vocal variation to demonstrate interest in the subject. Precise pronunciation of terms. | Voice is clear but drops below level 8 at times; still uses vocal variation to show interest. | Voice is soft or lacks vocal variation. | Voice is both soft and monotone. |
| **Eye Contact** | Maintains eye contact; seldom returning to notes; presentation is like a planned conversation. Speaker obviously prepared and has a solid grasp of the subject. | Student maintains eye contact most of the time but frequently returns to notes. Speaker spent significant time preparing and appears at ease but doesn't elaborate. | Some eye contact, but not maintained and at least half the time reads from notes. Speaker needed more practice or knowledge of their topic. | Reads all or most of report with no eye contact. It is likely the speaker did not practice out loud. Unlikely the speaker would be able to answer questions about the topic. |
| **Gestures/ Posture** | Confident demeanor, gestures add to style, and hands are used to describe or emphasize. | Confident demeanor; may need to add or subtract gestures to emphasize points. | Slumping posture, hands stuck at sides or on podium OR Shifting weight or pacing. | Slumping posture, hands stuck at sides or on podium AND Shifting weight or pacing. |
| **Transitions** | Effective smooth transitions that flowed in a smooth manner. | Included transitions to connect key points but relied on power robbers such as um, ah, or like. | Included some transitions to connect key points but over reliance on power robbers was distracting. | Presentation was choppy and disjointed with a lack of structure. |
| **Organization & Length** | Subject was informative and easy to follow; time used efficiently. Within 20 seconds of allotted time. | Within 40 seconds of allotted time. Most information relevant, some topics needed expansion or shortened. | Within 1 minute of allotted time. Information was valid but not related enough to the purpose. | Too long or too short. Information was not relevant to the audience. |
| **Audience Attentiveness** | Involved audience in presentation; held their attention throughout by getting them actively involved in the speech and using original, clever, creative approach. | Presented facts with some interesting "twists"; held attention most of the time by interacting with them. Good variety of materials/media. | Some related facts but went off topic and lost audience. Failed to utilize method to pull the audience into the speech. Lacked originality. | Avoids or discourages active audience participation. |
| **Conclusion** | Ends with an accurate conclusion tying the content back to the opening with a dynamic 25 words or less close. Transitioned into close so audience was ready for it. | Ends with a summary of main points showing some evaluation but over the 25 word limit. Transitioned to close. | Ends with a recap of key points without adding a closing twist or ended abruptly. | Ends with only a recap of key points prematurely. |
| **Appearance of speaker and visuals.** | Completely appropriate for occasion and audience. Slides professional and easy to read. | For the most part, appropriate for the occasion and audience. Slides contain too much or too little information. | Somewhat inappropriate (hair keeps falling in eyes, jewelry distracting). Slides with typos. | Inappropriate (sloppy clothes, excessive skin showing. Typos on slides. |

*(From Kenkel, 2011, p. 416)*

## APPENDIX J – STUDENTS FEEDBACK QUESTIONNAIRE

PRIFYSGOL CYMRU
Y Drindod Dewi Sant
UNIVERSITY OF WALES
Trinity Saint David

Cyfranogwr Rhif Adnabod:
Participant Identification Number:

| **Ffurflen Ganiatâd Cyfranogiad** | **Participation Consent Form** |
|---|---|
| Teitl y prosiect / Project title: ***An Investigation into the Acquisition of Tacit Knowledge in e-Learning Environments: An Experimental Study*** | |

The purpose of this questionnaire is to understand student's experiences with the e-Learning program and factors that affect the student's ability to acquire tacit knowledge (or practical knowledge) in the field of interest – business presentation – in an e-Learning environment, without face-to-face contacts; knowing these factors provide opportunities to enhance online education.

**Section A**

For demographic purposes, please indicate

Q1- Age group:

☐18 - 25 ☐26 - 30 ☐31 - 35 ☐36 - 40 ☐41+

Q2- Gender:

☐Female ☐Male

Q3- Ethnicity: ____________________

Q4- Major field of study (specialty): _______________

Q5- Are you currently working (part-time or full-time)?

☐No ☐Yes

Q6- How many years of work experience do you have?

Q7- How many years of experience do you have in delivering business presentations?

Q8- How good are your business presentation skills at present?

☐Weak ☐Medium ☐High

Q9- Is English your first language?

☐No ☐Yes

**Section B**

Q10- Are you familiar with the e-Learning environment?

☐No ☐Yes

Q11- If yes, how many years have you been using e-Learning in your studies?

Q12- Please indicate how much you agree or disagree with the following statements.

(1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree)

**Self-competence (SC)**

**a)** I am a competent computer user.
b) I am confident with computers.
c) I feel confident in my knowledge and skills of managing software for online learning.

**Perceived usefulness (PU)**

a) Online learning improves my performance in my studies.
b) Online learning will increases my productivity.
c) Online learning enhances my effectiveness in my studies

**Self-directed learning (SDL)**

a) I effectively take responsibility for my own learning.
b) I am confident in my ability to independently prioritize my learning goals.
c) I am able to set my own learning goals.
d) I am autonomous.
e) I am able to manage my study time effectively and easily complete assignments on time.

**Motivation (MO)**

a) I am able to complete my work even when there are distractions in my home (e.g. television, children, and such).
b) I am able to complete my work even when there are online distractions (e.g. friends sending emails or websites to surf).
c) Even in the face of technical difficulties, I am certain I can learn the material presented in online learning.

**Section C**

Q13- Please indicate how much you agree or disagree with the following statements.

(1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree)

a) I feel I was provided with adequate guidance on how to successfully give a business presentation using the e-Learning environment.
b) I believe the conditions provided in the e-Learning environment helped me to learn and practice my business presentations skills.
c) I feel it was easy to connect informally with other students and instructors in order to collaborate and share ideas, stories and experiences.
d) I trust other students in the e-Learning environment

**Section D**

Q14- Please indicate how much you agree or disagree with the following statements.

(1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree)

a) I think that the resources and the forums on each topic available in the e-Learning environment improved my insights and understandings about business presentation. Please rate each item:
   i) [KO1] Understanding audience
   ii) [KO2] Preparing your content
   iii) [KO3] Delivering confidently
   iv) [KO4] Controlling the environment
   v) [KO5] Team presentation management

b) In the e-Learning environment, I find it easy to informally connect and discuss with students who have relevant knowledge on a specific topic about business presentation. Please rate each item:
   i) [KO1] Understanding audience
   ii) [KO2] Preparing your content
   iii) [KO3] Delivering confidently
   iv) [KO4] Controlling the environment
   v) [KO5] Team presentation management

c) For each topic, I learned best in the e-Learning environment from observing/watching materials and techniques shared. Please rate each item:
   i) [KO1] Understanding audience
   ii) [KO2] Preparing your content
   iii) [KO3] Delivering confidently
   iv) [KO4] Controlling the environment
   v) [KO5] Team presentation management

d) For each topic, I learned best from listening materials and techniques shared in the e-Learning environment. Please rate each item:
   i) [KO1] Understanding audience
   ii) [KO2] Preparing your content
   iii) [KO3] Delivering confidently
   iv) [KO4] Controlling the environment
   v) [KO5] Team presentation management

e) For each topic, I learned best from imitating materials and techniques shared in the e-Learning environment. Please rate each item:
   i) [KO1] Understanding audience
   ii) [KO2] Preparing your content
   iii) [KO3] Delivering confidently
   iv) [KO4] Controlling the environment
   v) [KO5] Team presentation management

**Section E - Comments**

Q15- How often do you get to connect with the instructor and/or other students?

Q16- Indicate your overall satisfaction with this experiment.

☐Extremely dissatisfied ☐Dissatisfied ☐Neutral ☐Satisfied ☐Extremely satisfied

Please explain.

Thank you for completing this survey.

If you wish to contact the researcher representative, please email

Annel Ludovic Ketcha Djiffouet: 1202643@student.uwtsd.ac.uk

## APPENDIX K – STUDENT IN-DEPTH INTERVIEW GUIDE

PRIFYSGOL CYMRU
Y Drindod Dewi Sant
UNIVERSITY OF WALES
Trinity Saint David

Cyfranogwr Rhif Adnabod:
Participant Identification Number:

| **Ffurflen Ganiatâd Cyfranogiad** | **Participation Consent Form** |
|---|---|
| Teitl y prosiect / Project title: ***An Investigation into the Acquisition of Tacit Knowledge in e-Learning Environments: An Experimental Study*** | |

The purpose of this questionnaire is to deepen our understanding of the proposed e-Learning system as it pertains to students' capacity to acquire tacit knowledge (or practical knowledge) of the 'business presentation' field of interest.

Q1- Tell me a little a bit about yourself. How important are business presentations skills to you?

Q2- Can you describe times when you have learned something important related to business presentation from others in the e-Learning system? Please provide concrete examples for each:

1. Please provide more details about the context (i.e., formal or informal).
2. What do you think you learned? Did you obtain a new idea, tip or insight?
3. How does it affect your approach in delivering business presentations? What is different about your presentation delivery today than it was when you first started the e-Learning program?

Q3- Do you think you would have been able to learn what you have learned from the e-Learning program by reading books or attending business presentation lectures in a classroom setting?

Q4- Have you ever had an unusual case for which you referred to the e-Learning program to find someone to help you? If so, please explain.

Q5- What potentials do you see in the e-Learning environment that enable you to improve your business presentation skills?

1. Does it help you to develop networking with other like-minded students? If so, how is this networking helpful?
2. Do you participate in forums? Do you think these collaborative tools help to share and/or gain knowledge?
3. Do you or others share images, audio or video clips in the proposed e-Learning space? Can you tell me what the purpose of sharing was and how it helped you?
4. How easy was it to express your ideas and opinions clearly in the e-Learning environment? How easy was it to capture, visualize or understand the ideas and opinions of others? List the tools used and name those that you found more effective than others? Explain why?

Q6- What are the main challenges you faced in exchanging your ideas and sharing your experiences in the e-Learning environment? Have you found any limitations or difficulties?

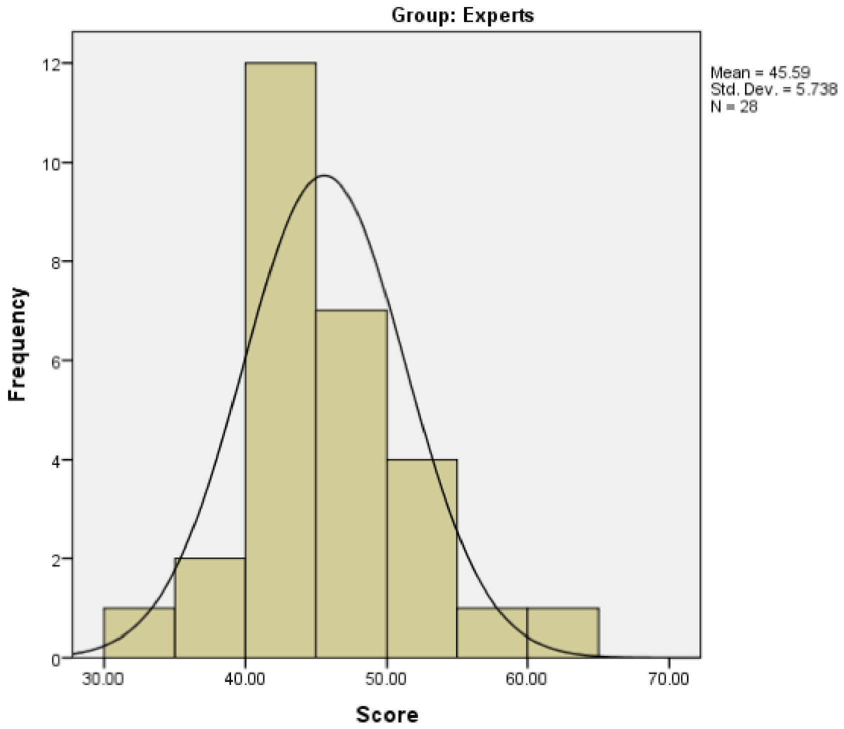
Q7- Are there any other related things that you wish to add to the e-Learning business presentation program?

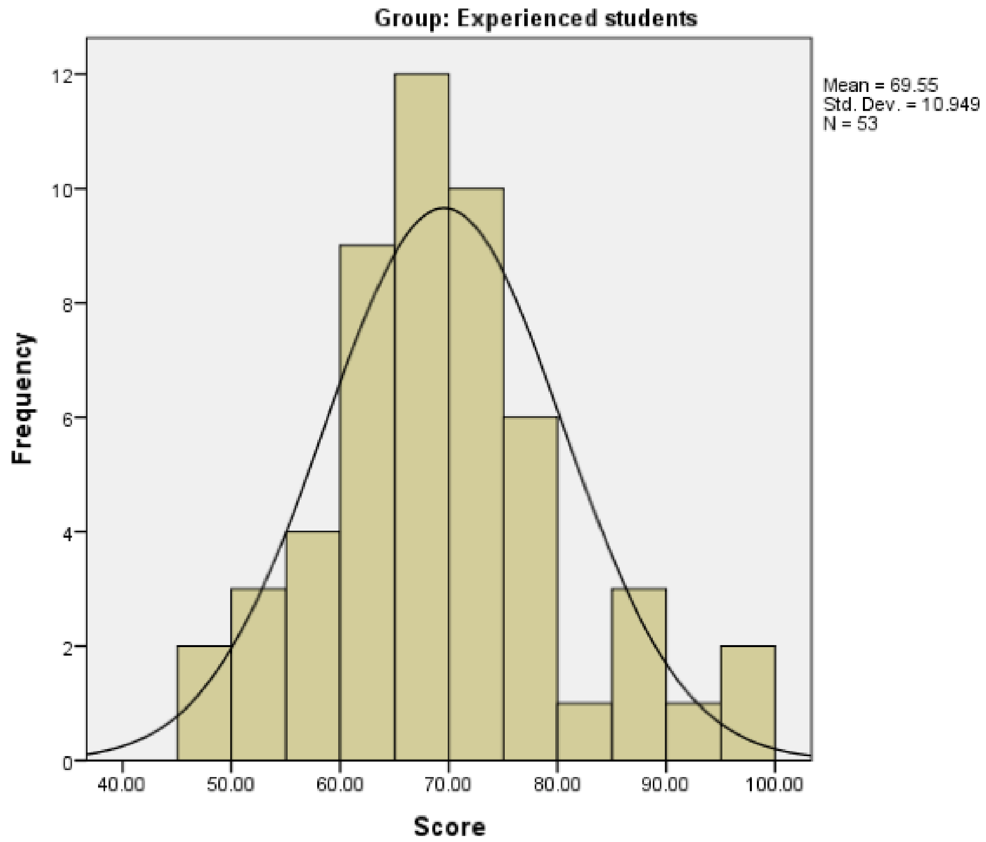
Thank you for answering this questionnaire.

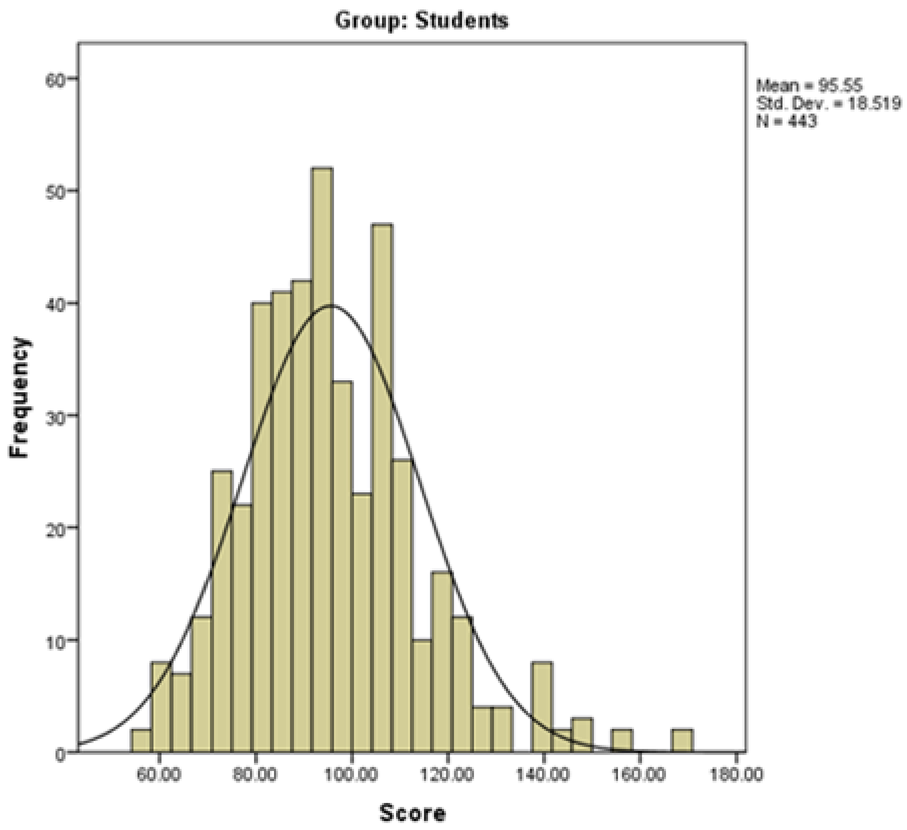
If you wish to contact the researcher representative, please email:

Annel Ludovic Ketcha Djiffouet: 1202643@student.uwtsd.ac.uk

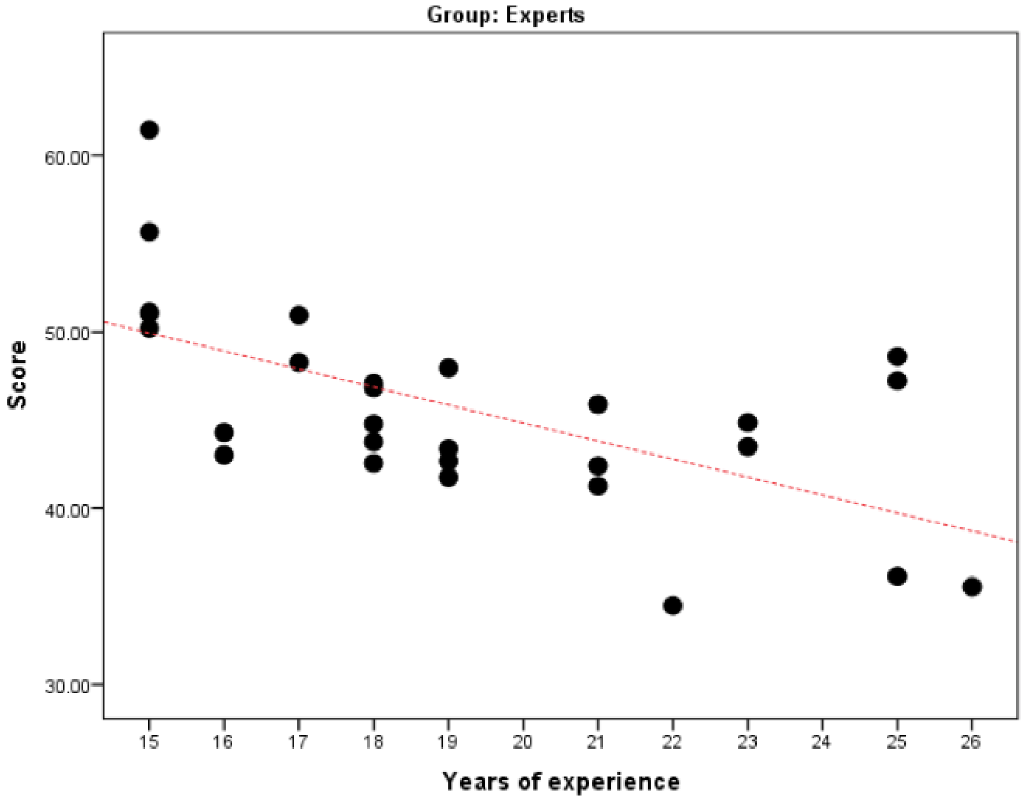
## APPENDIX L – DISTRIBUTION OF TKIBP SCORES (HISTOGRAMS)

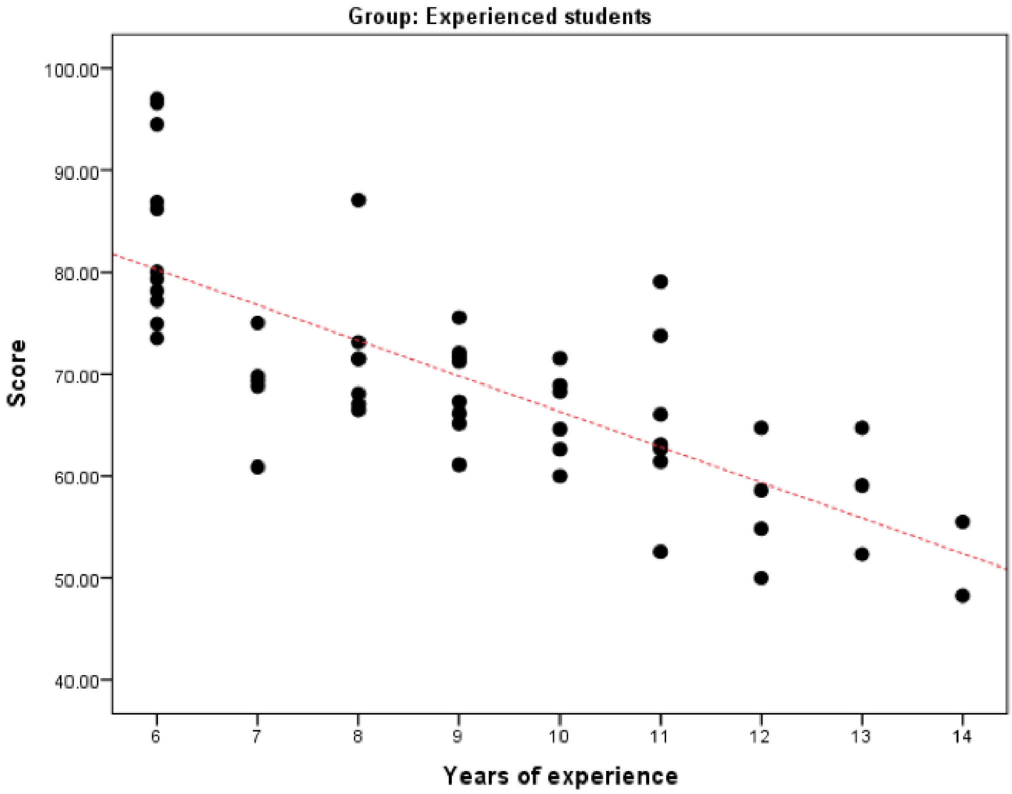


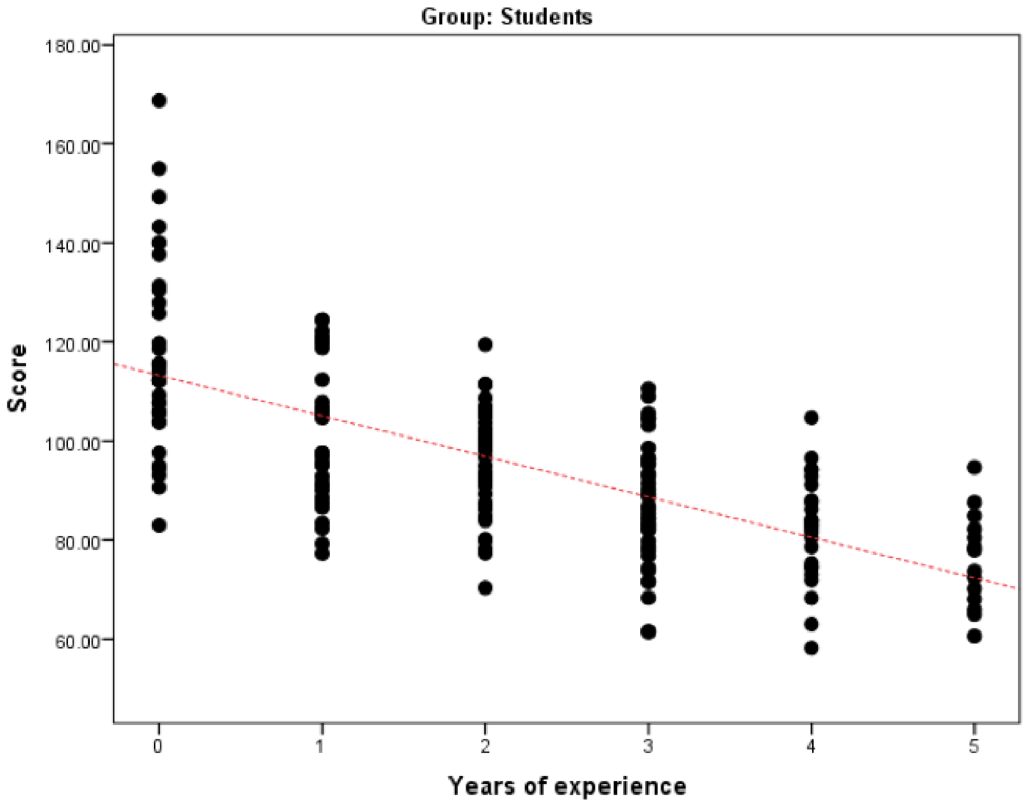




Group: Students
Mean = 95.55
Std. Dev. = 18.519
N = 443
Frequency
Score
0
10
20
30
40
50
60
60.00
80.00
100.00
120.00
140.00
160.00
180.00

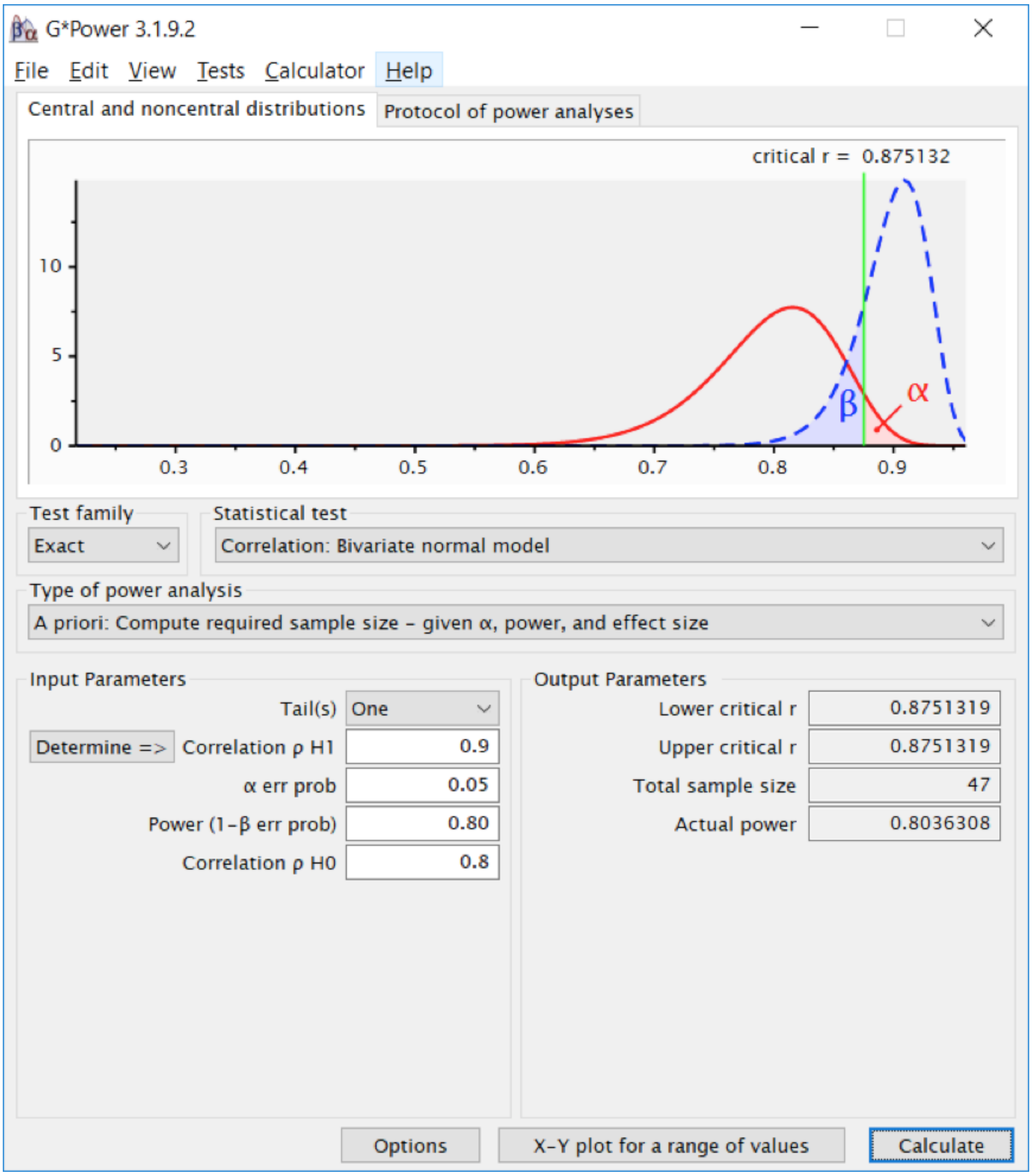
**APPENDIX M – SCATTERPLOTS FOR ASSOCIATION BETWEEN YEARS OF EXPERIENCE AND COMPOSITE SCORE WITHIN EACH GROUP OF PARTICIPANTS.**



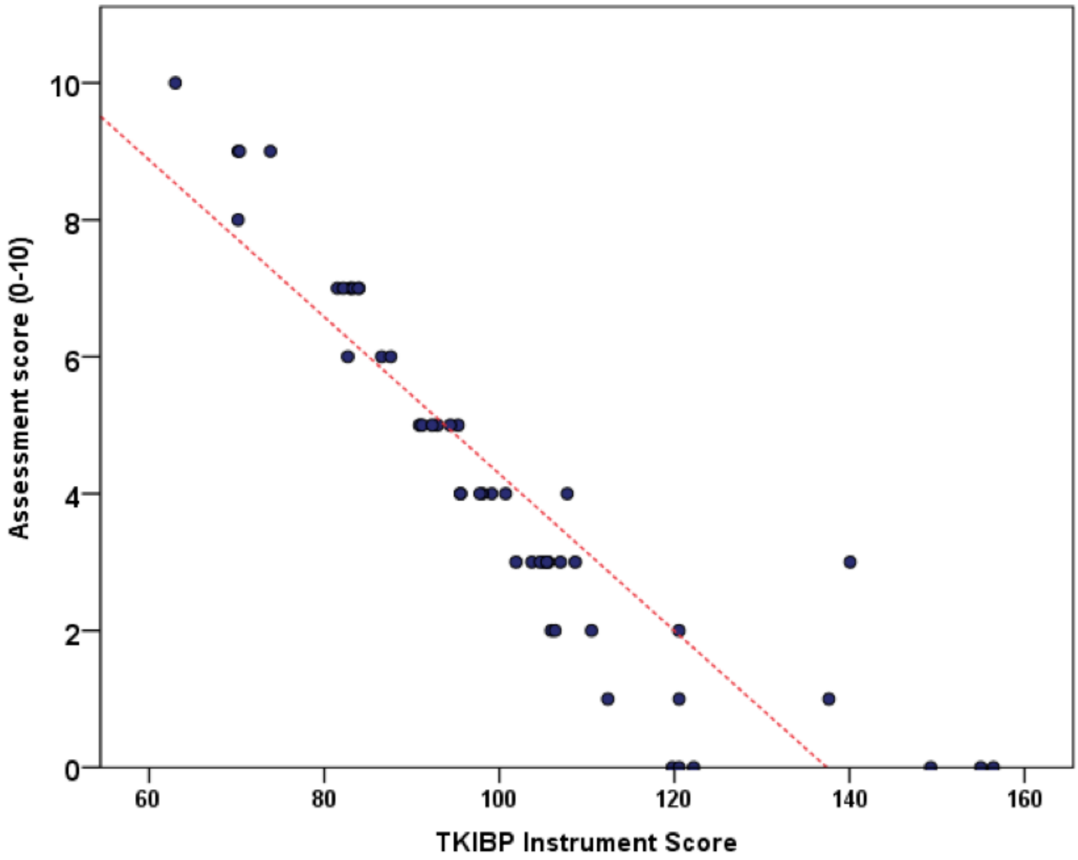




Group: Students
180.00
160.00
140.00
120.00
100.00
80.00
60.00
Score
0
1
2
3
4
5
Years of experience

## APPENDIX N – SAMPLE SIZE CALCULATION FOR EVALUATING TKIBP EXTERNAL VALIDITY



**APPENDIX O – CORRELATION BETWEEN TKIBP INSTRUMENT SCORE AND ASSESSMENT SCORE, N = 50**



# List of Publications

– *Journal*

Ketcha, A., Johannesson, J. and Bocij, P., (2015). Tacit Knowledge Acquisition and Dissemination in Distance Learning. *European Journal of Open, Distance and E-learning,* 18(2).

– *Conferences*

Ketcha, A., (2014), Assessment of tacit diffusion in online distance learning and improvement of student performance via knowledge objects, *eLearning 2.0 Conference*, Brunel Business School

Ketcha, A., Johannesson, J. and Bocij, P., (2015), Acquiring and sharing tacit knowledge in e-Learning environments: the state of the art, *EDULEARN15 Proceedings*, pp. 5139-5149.

Ketcha, A., Johannesson, J. and Bocij, P., (2016), Leveraging tacit knowledge transfer within online learning systems with the use of knowledge objects: a conceptual framework, *EDULEARN16 Proceedings*, pp. 2911-2918.

– *Working papers*

Ketcha, A., Johannesson, J. and Bocij, P., (2019), Tacit knowledge inventory for business presenters (TKIBP): establishing construct validity and exploring applications.

Ketcha, A., Johannesson, J. and Bocij, P., (2019), Empirical assessment of the acquisition of tacit knowledge in online learning.