# Using Virtual Reality to Enhance Informal Learning in Small and Medium Enterprises

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## Dedication

This thesis is dedicated to my father Jim, for his ongoing love and support and to my mother Rita, who could not see this thesis completed. I am ever indebted to my parents for providing me with the very best of education and setting me off on my lifelong learning journey. For my Partner Rob: not only did he offer unstinting love, support and encouragement, but he has proved himself to be a man who is proud to have me as his partner.

## Abstract

My original contribution to knowledge is the use of computer generated, three-dimensional (3D) virtual worlds using Second Life® as a three-way sustained engagement and a mechanism for a genuinely productive dialogue between Further Education (FE) colleges, employers, employees and apprentices. This thesis shows how the use of virtual worlds creates meaningful employer engagement where Small and Medium Enterprises (SMEs) are involved in planning and contributing to learning (Healey et al, 2014).

A radical rethink is taking place about the way we should learn. That is that most learning is informal, at work, under the guidance of non-educationalists and that this situation is universal in the government's priority area of apprenticeship (HM Treasury, 2015) and among most private providers. I will discuss how virtual environments allow SMEs to work in ways they cannot in real life and juxtapose this against the real world, in order to reveal the previously misunderstood connections between the two. The question of Further Education (FE) reform has been widely debated (Bailey et al, 2015, Kelly, 2015) with former Skills Minister, Nick Boles, questioning whether the general FE college model has a future (Evans, 2015) and The Centre for Vocational Education Research (2015) reporting "FE needs to be rethought and rebuilt". The gap in research for UK vocational education is significant, in comparison to school or university education (Coffield 2008, Grollmann, 2008) and detrimental to the UK government's drive to recruiting 3 million apprentices by 2020 (Gov.UK, 2015a). This thesis addresses the use of virtual worlds to enhance work transitions both educationally and work related with special attention to apprentices. Specifically, I will be looking at research that pays attention to the socio-cultural context of situated learning (Lave and Wenger, 1991, Vygotsky, 1978), in order to show communities of practice in virtual worlds, transferring motivation and knowledge management.

I argue working in virtual worlds bridges the gap between education and industry to develop a modern workforce for the continuation of learning across formal and informal settings (Vavoula et al, 2007) and how its use is endless and hugely enriching by allowing learning to be much more opportunistic. There are so many opportunities in the use of virtual worlds, related particularly to a three-way partnership in learning between apprentices and employees, employers and FE colleges: co-ordination of off- and on-the-job learning; real-time oversight for employers of their employees' progress; use of virtual events at work to enrich learning, demonstrations of processes and development of learning communities.

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## Acknowledgement

I wish to thank The University of Glasgow for generously providing me with free tuition and a living stipend during my PhD study, as well as supporting study related overseas travel and expenses. I am indebted to the Open University for first sparking my interest in educational technology and to my supervisor, Professor Vic Lally, who gave me latitude to explore the topic in my own way while constantly providing encouragement, advice and guidance. Vic patiently read and commented on work in progress, helped with methodology and provided me with valuable feedback and many interesting ideas. Thank you also to Dr Fiona Patrick for generously giving her time to reading my thesis and providing detailed feedback prior to submission. This thesis relied on the willingness of many employers and employees who agreed to work under my watchful gaze. They all have my heartfelt thanks. In particular, I would like to thank Dr Trebor Yema, Ms Cynthia Fish, Mr Tony Bolt and Dr Betty Mint. They not only opened up their offices to me, but they also took the time to help me develop my ideas about the use of virtual worlds in business. I have been lucky to be surrounded by many other intelligent and thoughtful people who were ready to read and challenge my argumentation and theories as I progressed through the study and my supportive social network on Twitter and Facebook for the invaluable sharing of resources and constant encouragement. Thank you to my father, Jim, always a knowledgeable role model, who taught me the importance of reading books and started my love for learning from an early age with weekly trips to the library and my mother, Rita, who would have been so proud had she lived to see me finish this thesis. Finally, heartfelt thanks and love to my partner, Rob, who was always ready to provide me with the benefit of his experience working as an IT Professional, as well as, willingness to make me regular cups of coffee and cook me his spaghetti Bolognese speciality for brain food.

## Author's Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

**Signature:**

**Printed name:** Katharine Jewitt

## Abbreviations

| | |
|---|---|
| 3D | Three Dimensional |
| AA | Alcoholics Anonymous |
| BERA | British Educational Research Association |
| BPS | British Psychological Society |
| CSCL | Computer-Supported Collaborative Learning |
| FE | Further Education |
| GDP | Gross Domestic Product |
| Gov | Government |
| HM | Her Majesty's |
| ibid | In the same source as the previous reference |
| IBM | International Business Machines Corporation |
| IoLT | Internet of Learning Things |

| | |
|---|---|
| MBA | Master of Business Administration |
| MEd | Master of Education |
| MRes | Master of Research |
| OECD | Organisation for Economic Co-operation and Development |
| PhD | Doctor of Philosophy |
| PLE | Personal Learning Environment |
| SL | Second Life® |
| SME | Small and Medium Enterprises |
| UK | United Kingdom |
| VINE | Virtual reality for Informal learning by Non-Educationalists |

# Chapter 1: Preface

## *1.1 Overview*

The aim of this chapter is to provide an overview of the Study including my personal interest in the subject and the research contexts of virtual worlds, such as Second Life ®; informal learning and work-based learning. This chapter discusses the conceptual framework and the specific methods by which the research and analysis were conducted. The main research questions are introduced and the structure of the thesis is set out.

The vision for learning using 3D virtual worlds[1] that I wish to develop through this project focuses on its use for informal learning[2] at work. This would embrace developing a three-way sustained engagement between employees and apprentices[3], employers and further education (FE)[4] learning providers for the development of skills and attributes for the workplace. The focus is on the use of virtual worlds delivering and supporting work-based learning[5], as well as, developing skills, enabling confidence, building identity and engaging and collaborating for informal learning and professional development.

This thesis, on the impact of using virtual worlds with small and medium enterprises (SMEs)[6], focuses on employees and apprentices and provides a variety of perspectives on the use of virtual worlds in the workplace. The

[1] Virtual worlds are three-dimensional computer-generated and multimedia simulated environments. They can be explored and interacted with, by being immersed within the virtual world.

[2] Informal learning includes situations where a person is taught by learning from someone else who is not formally assigned to teaching. It often happens where learning is not the main purpose and can happen anywhere (McGivney, 1999).

[3] An apprentice is someone participating in an *apprenticeship.* An apprenticeship combines study and practical training and work in a workplace job (Gov.UK, 2015a).

[4] Further Education (FE) is study, following secondary education that is not part of higher education where Study is part of a degree.

[5] Work-based learning takes place during work and is an ongoing process, rather than a one-off experience. The curriculum for work-based learning for students is designed to meet the needs of both the employer and learning provider. Students in vocational areas use the context of their work for a key component of their learning.

[6] SMEs are defined by the Organisation for Economic Co-operation and Development as "non-subsidiary, independent firms which employ fewer than a given number of employees" (OECD, 2005). This number varies between 200 and 500 depending on country.

research adds a new dimension to the debates on the impact of work-based learning by demonstrating the use of virtual reality for informal learning.

The research study takes place in Second Life® (SL) a freemium, computer-generated, online three-dimensional (3D), navigable, virtual world which was first launched in 2003 by Linden Lab. Virtual worlds are '...persistent, avatar-based social spaces that provide players or participants with the ability to engage in long-term, coordinated conjoined action' (Thomas and Brown, 2009, p. 37). Participants in virtual worlds adopt an avatar 'a graphical representation of a user within the environment which is under his or her control' (Allbeck and Badler, 2002, p.313).

This thesis explores connections between virtual 3D worlds and the real world. The study considers the connections between both employees' and apprentices' cognitive activities, informal and work-based learning and affective factors. It looks at how virtual worlds can help enhance real world experiences.

Specifically, this research explores how virtual environments allow SMEs to work in ways they cannot in real life in order to reveal whether virtual environments can be a useful analogue and/or substitution of the real world. The research aims to show how skills acquired in the virtual environment transfer into real-life. It draws on research about virtual worlds and cognitive activities, meta-cognitive activities, social learning and affective factors.

The study provides powerful and thought-provoking accounts of virtual worlds being used in the work place. It explores how virtual worlds might support learning in the workplace and allow SMEs to work in ways that would not otherwise be possible in the real world. The study seeks to highlight the everyday use of virtual worlds in SMEs and it is hoped the findings will provide a useful addition to the body of knowledge on learning cultures and educational identities and the influences on people's learning and professional development in the workplace. The study sets out to provide key messages on the need to support learning in the workplace and on the importance of appropriate support and pedagogy in meeting the learning requirements of groups of employees and apprentices working in SMEs.

This thesis will examine if the use of virtual worlds enables employees and apprentices in SMEs to acquire and develop skills required for their work and professional development. The many opportunities in the use of virtual worlds, related particularly to a three-way partnership in learning: co-ordination of off- and on-the-job learning; real-time oversight for employers of their employees' progress; use of virtual events at work to enrich learning, demonstrations of processes and development of learning communities will be researched. The use of virtual worlds will be researched to discover the extent to which they enhance work transitions both educationally and work related, as well as, socially in both formal and informal situations and how skills acquired in the virtual environment transfer into real-life.

Work-based learning and skills are critical for sustainable economic growth and the future prospects of SMEs and their employees and apprentices. The thesis explores new ways for apprentices and employees to learn, which can contribute to cost efficiencies and shared responsibility for lifelong learning in the workplace. The Government has set a target of 3 million apprenticeships in England by 2020 (Gov.UK, 2015a), which if achieved would significantly uplift the country's gross domestic product (GDP); a 1 per cent increase in vocational skills provides an additional £163 billion in ten years and a 10 per cent increase in vocational education enrolment by 16-18 year olds results in a 1.5 per cent reduction in youth unemployment (House of Commons Education Committee, 2015).

We are in a period of complex change which is affecting Further Education (FE) colleges and SMEs employing apprentices and individuals. The question of FE reform has been widely debated in the field of education (Bailey et al, 2015, Kelly, 2015) with Nick Boles, now former Skills Minster, questioning whether the general FE college model has a future (Evans, 2015) and The Centre for Vocational Education Research reporting "FE needs to be rethought and rebuilt" (Centre for Vocational Education Research, 2015). However, these arguments have not adequately addressed how SME Partners, providing apprenticeships, can work with young people in vocational settings in FE, using virtual world environments for training simulations and partnerships.

The research should make an important contribution to the field of work-based learning and challenge current assumptions about perspectives of learning in the workplace and in FE apprenticeships framed by the real-life experience of employees in SMEs and young apprentices. Long-standing concerns of FE may be addressed through the use of 3D virtual worlds: funding, the government's need to support the growth of apprenticeship, lifelong learning, digital skills development and the emergence of post-Fordist ideas opening up in educational settings (Amin 1994) including mass customisation (Pine and Gilmore, 2011) and flexible manufacturing; all synonymous with long-tail learning (Brown and Adler 2008; Brynjolfsson and Smith 2006). The research topic is relevant to the current interest in the impact of FE, apprenticeships and adult lifelong learning. In the UK, there is a renewed commitment in government plans for apprenticeships (HM Government, 2013 and gov.uk, 2015b) and it is hoped that this research will contribute to a deeper understanding of the use of virtual worlds in the work place to potentially help develop the skills, knowledge, competence and behaviours that SMEs need for their workforce.

This research study will be of interest to educators, managers, employers, education leaders, practitioners, students, technologists, Adult Learning and FE policy-makers who are interested in working to maximise learning and opportunities for skills improvement; promote digital literacy and the enjoyment of learning in the workplace, whilst maximising the positive impact of learning on wellbeing and career development. It is my hope that this research will help to inform the choices that education institutions, organisations and SMEs are making about technology to improve, support, or extend teaching, learning and creative inquiry in FE for apprentices and employees in the work place, across the globe.

## *1.2 Second Life in Context*

The use of digital technologies in the workplace has enabled employees to communicate and collaborate in different ways and engage socially in informal learning. The use of tablets and smart phone devices provides mobile learning any time and in any place. The introduction of gamification and virtual worlds, such as Second Life®, facilitates authentic learning and role play (Lally and Sclater, 2012; Wills et al., 2010).

The technology of mobile devices has significantly advanced since they emerged in the mid-1990s and have been used beyond the boundaries of classrooms for informal learning contexts (Kukulska-Hulme and Traxler, 2005). Game-based learning and gamification developed in the 2000s and research has recognized the value of gamers applying several hours of their time to develop skills that transfer into real life (Gee, 2007; McGonigal, 2011). At the core of game-based learning, Gee (2007) says there is the concept of 'situated learning' and 'embodied learning' where students are being taught problem-solving skills and developing skills in creativity, resilience and persistence.

The 2000s also saw the development of web 2.0, a term created by O'Reilly (2009) who noted a change from read only 'web 1.0' to a more dynamic, interactive web 2.0. Web 2.0 includes the rise of social and participatory media, social networking, online blogging, audio, video, user generated and edited content. The Open Educational Resource (OER) movement also launched by UNESCO (2001) with the aim of educational resources being freely available for all, which supported their philosophy that education is a fundamental human right.

Virtual worlds, such as Second Life ® to facilitate authentic role-based learning began to develop around 2005 with users creating an online avatar to move around and communicate in the virtual 3D space with other people represented as avatars in real time and interact with objects such as buildings and machinery. Research in virtual worlds has shown advantages of using the virtual space to augment with multimedia and show users what is happening at a molecular level, making use of the mediated environment for simulation, role-

play and physical representations of logical constructs (Lally and Sclater, 2012; Lee and Hoadley, 2007; Stets and Burke, 2014).

## *1.3 My Personal Interest in Educational Technology Research*

Since I first graduated from university with a BA Hons in History and Politics and an MA in Politics, I have worked with organisations to tackle complex strategic challenges and research has played a key role in shaping change. The reasons for this PhD study were first conceived during my time working in industry as a Director in Supply Chain Logistics. I developed a scheme to provide graduates with a range of professional development opportunities and I have always been interested in how young people starting in their career, developed their identity and motivated themselves to learn and develop.

Following completion of an MBA and MSc in Human Resource Management, I began working as an Associate Lecturer at The Open University and became interested in the way in which people learn and the development and effectiveness of learning communities. As a member of the team that first introduced work-based learning at The Open University, I developed an interest in learning informally at work. I have continued to be involved in work-based learning through both my academia role and within my management and consultancy roles in industry, working with apprenticeships. I was intrigued by how students would feedback on how a lot of their learning took place through social interactions online, happening around formal teaching and how the use of technology helped to break down barriers and enabled students to learn on an equal footing.

I wanted to learn more about how people learn and went on to study an MA in online and distance education, an MEd in Education and in preparation for doctorate study, a Master of Research (MRes) in research methods for educational technology. For my research project, I worked with local councils to explore the experiences of young people aged 14 – 16 excluded from school and using technology to learn at a distance. I recognised that I needed to offer the young people a varied menu of activities that would meet their different starting points and confidence levels concerning the use of learning technologies. I

wanted to resist the notion of them feeling they were being dictated to and instead build on the effective practice that already existed in pockets. The research explored what they identified as the positives and negatives involved in the use of digital technology for learning and show how the use of digital technology supported young people to navigate the challenges ahead. As part of the research, I worked on the development of an alternative education system for young people excluded from school which is being used by Lancashire County Council and supports young people to move into an apprenticeship.

The genesis of this thesis can be traced back to when my now PhD Supervisor Professor Vic Lally, was also my lecturer, when I was studying for my MEd at The Open University. At that time, Professor Lally was also leading the Inter-Life project, which was taking a detailed look at informal learning, virtual worlds and creativity. I became interested in virtual reality after reading the findings from the Inter-life study (Lally and Sclater, 2010; Lally and Sclater,2012) and saw the link with my own MRes research working with young people who had been excluded from formal education.

I wanted to embark on this PhD research study to explore the use of virtual reality in supporting employees, employers and institutions to navigate challenges in the work place and see how its innovative use could facilitate learning and help the building of communities of practice to transfer knowledge management and develop informal learning. My personal experience of seeing how educational technology enabled young people excluded from school to work in ways that they could not through formal education prompted me to want to explore how virtual worlds could allow apprentices in SMEs to work in ways they cannot in real life and determine whether they are a useful analogue and/or substitution for the real world. I am also interested in investigating how the use of virtual reality can support learning in the workplace, as this is an area of great interest to me, having worked in both Further and Higher Education and seen the decline in part time study, as a result of UK government funding cuts. It is also an area of government priority with their commitment to grow the number of apprenticeships.

The next section provides some context to the research within work-based learning.

## *1.4 Context for the study: work-based learning*

The literature review in the following chapter considers online learning and technologies to facilitate work-based learning which is the context for this research study. There are many related terms to describe workplace learning, including practice-based learning and work integrated learning. Malloch and Cairns (2013) relate the many broad terms that have emerged as reflecting the many influences from sociological theories, psychological, situated and post-modern thinking on how people learn through workplace activity.

Work-based learning developed from societal changes which bestowed a new kind of worker and workplace knowledge:

> "…advances in technology, the demise of manufacturing industries and the growth of service sector industries, changes in the meaning of the 'workplace' (for example, home-work…), 'flexible' working…. and the shift towards new, post-Fordist style workplace structures and practices."
>
> ***(Lee et al, 2004, p.2)***

Work-based learning is training for work. It can take place in the workplace and incorporates all learning that takes place outside the formal work place environment but is related to the workplace, for example, informal learning that might take place by chatting in the staff room or in a workshop. Work-based learning are learning programmes instigated by a workplace (Cooper et al, 2010).

Schön (1984) believes learning to be an individual process and stresses the importance of contribution of reflective practice by professional people, called reflection in action. His work is helpful for looking at moving beyond practical or systematic changes to consider more innovative reflection. He also discusses how

organizations may be intrinsically sabotaging strategies for change in order to retain 'dynamic conservatism' - this may be important for learners who are attempting to inject new ideas at work and running into brick walls.

There are two kinds of learning that go on in organisations, Schön's research (ibid) identified double-loop and single-loop. In double-loop learning, learners consider the problem and the resulting action and outcomes, in addition to reflecting upon the problem-solving process and how it influences the learner's own beliefs and actions. Double-loop learning occurs when learners "question and test one's personal values and assumptions as being central to enhancing learning how to learn" (Argyris and Schön, 1978).

Single-loop involves understanding the underlying system rather than dealing with incidents as if they were unconnected (in other words, single-loop thinking). In single-loop learning where this is a problem, it follows with actions and outcomes and the individual works to find a solution to the problem. In double-loop learning, assumptions underlying current views are questioned and hypotheses about behaviour tested. The end result of double-loop learning is increased effectiveness in decision making and better acceptance of failures and mistakes. In double-loop learning, the individual will go through the same process as single-loop learning but also considers how he or she learned and examines how this influences their beliefs and actions in a process of self-reflection. Reflection is not just about what they have learned but also the way in which they have developed new knowledge. A continuously reflective view of learning that Schön (1984) suggests is known as formative assessment. Most work-based courses use this to provide learners with regular feedback on their progress. Double-loop learning requires learners to be both psychologically and behaviorally engaged (Argyris and Schön,1978).

A radical rethink is taking place about the way we should learn. That is that most learning is informal, at work, under the guidance of non-educationalists and that this situation is universal in the government's priority area of apprenticeship (HM Treasury, 2015) and among most private providers. The challenge of this Study is to research the use of virtual reality to enhance

informal work-based learning in SMEs. The idea of informal learning forms the central core of the theoretical framework for this research.

Specifically, I aim to address the significant gap in research for work-based learning (Coffield 2008, Grollmann, 2008), which is detrimental to the UK government's drive to recruit 3 million apprentices by 2020 (Gov.UK, 2015a). The mission of this research Study is clear, it is to take up the challenge to enhance informal learning in work-based learning within SMEs, which supports the needs of apprentices and employees, alongside learning providers. It is therefore important that there is a partnership. The next section considers carefully elements of informal learning.

## *1.5 Context for the study: Informal learning*

The standard narrative about how the study of learning has developed over the course of the twentieth century is that it began with 'behaviourism' and the 'stimulus-response model'. Behaviourism focused on observable changes in behaviour as evidence for learning, and the 'stimulus-response model' was seen as a learning mechanism. Tolman (1922); Pavlov (1927) and Skinner (1969) are all prominent associates of the theory. Behaviourism is a close ally of social learning and initiated the development of the study of learning over the twentieth century. Behaviourism focuses on observable changes in behaviour as evidence of learning. The online interpretation of it is a relative newcomer. The linguist, Noam Chomsky (1959), however, largely discredited behaviourism. He put forward a widely-accepted theory that the ability to learn and use language – any language – is built into our brains. Language enables us to represent and manipulate abstract concepts in our heads – it is what enables us to think. He argued the rules for reasoning are 'hard-wired' into our brains. The evidence for this includes the way that almost every human being seems to accept the legitimacy of this way of reasoning.

Outside the formal workplace, people are engaging with personal technologies that forms a part of their informal learning, a well-known and extensive phenomenon since the 1970s (Tough, 1979; Livingstone, 1999 and Burbules, 2006). The research is interested in the possibilities of moving away from formal

training room structures. Coffield (1999) has written about the necessity of informal learning and learning beyond the classroom. Over the years, the definition of informal learning has been re-defined. Tough (1979) defined a learning project has a series of related episodes that added up to a minimum of seven hours.

Livingstone (1999, p.5) defined informal learning as "*any activity involving the pursuit of understanding, knowledge or skill which occurs outside the curricula of educational institutions, or the courses or workshops offered by educational or social agencies*", which is not too dissimilar to Tough's definition (1979). By 2006, Livingstone had refined the definition to include collaborative informal learning, recognising the collaborative learning taking place through mobile, connected and web 2.0[7] and 3.0[8] devices: "*all forms of intentional or tacit learning in which we engage either individually or collectively without direct reliance on a teacher or externally organized curriculum*" (Livingstone, 2006 p204).

McGivney (1999) defined 'informal learning' as:

(i) Learning that takes place outside a dedicated learning environment and which arises from the activities and interests of individuals and groups, but which may not be recognised as learning.

(ii) Non-work-based learning activities (which might include discussion, talks or presentations, information, advice and guidance) provided or facilitated in response to expressed interests and needs by people from a range of sectors and organizations (health, housing, social services, employment services, education and training services, guidance services).

[7] Web 2.0 was a term created by O'Reilly (2009) who noted a change from read only 'web 1.0' to a more dynamic, interactive web 2.0. Web 2.0 includes the rise of social networking, online blogging, audio, video, user generated and edited content.

[8] Web 3.0 is defined as an extension of web 2.0 (O'Reilly, cited in Shannon, 2006)

(iii) Planned and structured learning such as short courses organized in response to identified interests and needs but delivered in flexible and informal ways and in informal community settings.

Much of the learning that takes place in the workplace is informal rather than formal and often extempore. Eraut (2000) developed a typology of non-formal learning which consisted of three learning modes: implicit learning which is unintentional and could go unrecognised; explicit learning which is unplanned and deliberative learning where time is scheduled specifically for learning activity.

However, there are some theorists who argue against the distinction between 'formal' and 'informal' learning (Malloch and Cairns, 2013) because most learning is informal, at work, under the guidance of non-educationalists and that this situation is universal in the government's priority area of apprenticeship (HM Treasury, 2015) and among most private providers. Billet (2002) describes workplace learning as a result of engagement in goal-directed activities. He dislikes the interpretation that 'informal' can be taken to mean inferior and ad hoc. Billet (ibid) prefers the term 'participatory practices' which includes:

> "Engaging in work activities that are novel and thereby extending individuals' capacities, securing appropriate guidance from experienced co-workers, and being able to access practice in prized tasks"
>
> ***(Billet, 2002, p. 29)***

Vavoula (2004) created a typology that categorised learning according to learning processes and goals; and makes a distinction between informal and formal learning (see Figure 1.1). It incorporates tacit and unintentional learning into the framework and divides two areas of control: tools and methods used to learn and expected learning outcomes if there are any.

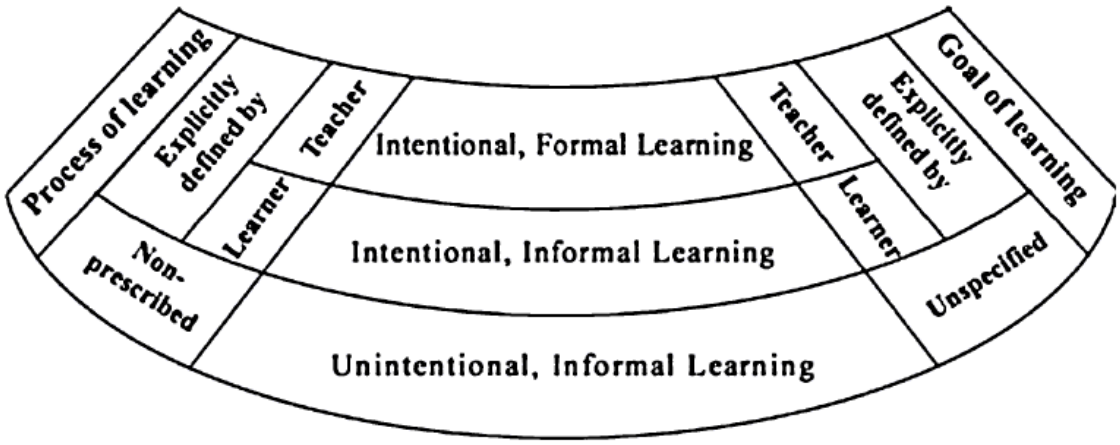



***Figure 1.1: Typology of Informal Learning (Vavoula, 2004, p.5)***

The typology does not include any learning collaboration or engagement and how various learning tools can be deployed. Tough's research (1979) shows that in the absence of any formal learning framework, informal learning is carried out through whatever techniques, resources and tools are available and suit best the personal needs of the learner. Adult participants in the research reported 500 hours per year on informal learning in a wide variety of subjects and an average of eight informal learning projects per year. Projects ranged from cookery courses to learning how to use a computer, researching online and developing Do-It-Yourself and home maintenance skills.

Researching informal learning is not without difficulty. The learner is in control of when and where and for how long they take part in informal learning, making it difficult for researchers to capture the relevant data. The extent of informal learning activities was further researched by Livingstone (1999) in a telephone survey of 1562 Canadian adults. Participants were asked to record their informal learning activities in a diary, which discovered they spent on average, 15 hours a week on informal learning.

I will next outline the conceptual framework which informs my research.

## *1.6 Conceptual Framework*

A conceptual framework is "a tool to scaffold research and, therefore, to assist a researcher to make meaning of subsequent findings" and the framework "forms part of the agenda for negotiation to be scrutinised and tested, reviewed and reformed as a result of investigation" Smyth (2004). A conceptual framework was developed for this thesis study to organise themes and concepts and structure the questions to be asked. The framework provided a plan for reviewing literature to inform the study and helped present graphically, the main themes to be studied (Miles and Huberman, 1994). The geometry and colour are purely synthetic to visually present VINE in a diagrammatic form.

The framework is organised around work-based learning activities in virtual worlds, for gathering data and carrying out the subsequent analysis. The research is located within a framework of four immense, contested concepts: whether a 3D world can be an analogue of the real world, how virtual worlds can develop identity and agency, professional development and learning in a 3D world, and can virtual worlds be used to build communities of practice.

Figure 1.2 presents this research focus in a diagrammatic form. I have called this "**V**irtual reality for **I**nformal learning by **N**on-**E**ducationalists Framework" or VINE for short. An initial review of literature led to a provisional framework represented by the inner quadrants of VINE. The initial framework was developed in parallel with the literature review including key themes encountered to create clear areas of focus for the research questions. As is often the case with conceptual frameworks, it started off doing one thing, to provide a basis to interpret and organize the literature but evolved as a result of the research to articulate research findings and provide a way for other researchers to look across the work and understand the key findings of the research and provides a foundation to build upon for further development and research studies. The empirical work was the opportunity to test, refine and validate VINE as a conceptual map.

The centre circle of VINE (Fig.1.2) shows where the intersection of communities of practice, identity, professional development and the 3D virtual world

potentially create interesting conditions for informal learning. While these concepts have imprecise definitions and remain controversial, they were helpful in analysing the interactions taking place in the virtual world. Surrounding all of this framework are the cross-cutting themes of support, engagement, practice and adaptability in using a 3D world, which are present in all the four segments.

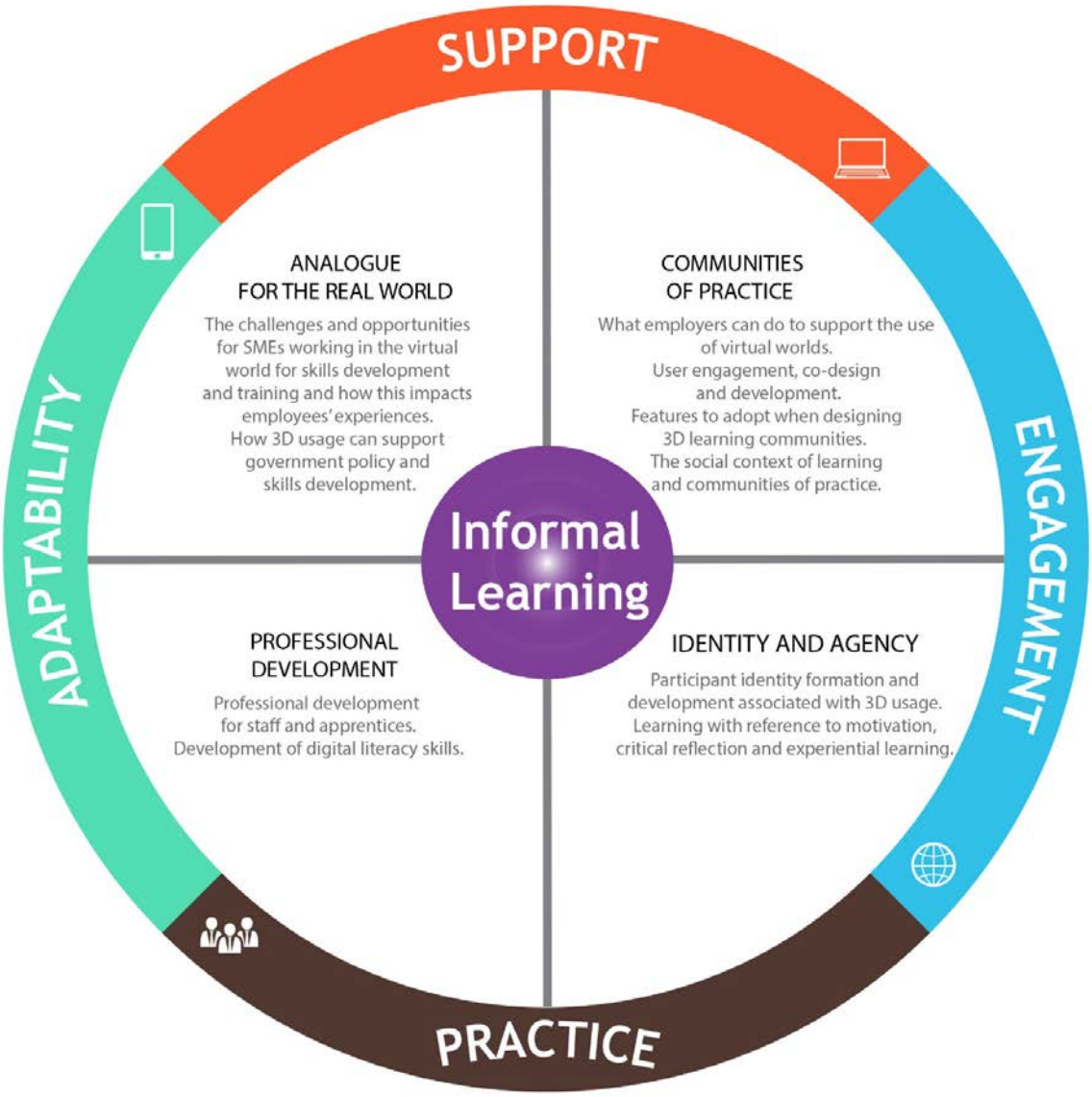



***Figure 1.2 – Virtual reality for Informal learning by Non-Educationalists Framework (VINE Framework)***

When carrying out the qualitative research, I drew on existing literature to define my concepts and ideas. Concepts are important because, through them, it

can help to make sense of the area being researched. I used knowledge already available on the subject to develop ideas and meanings.

The conceptual framework provided a structure to combine the elements of exploring the use of virtual reality for informal learning in SMEs. The outer ring of VINE derived as a result of the studies themselves, not from the literature. The framework was used as a way to aid me in organising the literature and make sense of it. It provided a way to identify gaps and focus on the research questions and analyse the findings. As the research progressed, concepts developed and recurred, informed by the data collected and as part of the research process and supported the research goals. The recurring concepts in my research are: learning, identity and agency, communities of practice, professional development and how virtual worlds are an analogue for the real world. These key ideas and concepts form a robust framework, a clarity of purpose and a coherence for the research questions and data to be analysed. The conceptual framework provides the capability to research the use of virtual reality to enhance informal learning in SMEs; enabling me to properly identify key data to analyse and to assess the suitability, scalability and sustainability of findings.

## *1.7 Introduction to the Research*

The research summarised in this thesis draws on three case studies (Hodkinson and Hodkinson, 2001) carried out for doctoral research in three SMEs in the UK. Using a mobile and three-dimensional (3D) virtual learning community, the research study explored the training that took place in the virtual learning environment. The project offered the opportunity for adult learners to work together, to transfer motivation and knowledge management within the SME through a virtual world and create learning experiences.

The multi-user and inter-user communications that can occur in Virtual Worlds mean that user-controlled avatars can work together in a very wide range of 'realistic' business activities. Studying how employees learn in conventional face-to-face classroom training gives only a limited insight into learning for the digital age and so this study makes a useful contribution to existing knowledge.

This research started from the stance that employees are the experts in their own technology-enhanced learning experiences. Learning happens in a non-linear format and individuals can choose in which direction they want to go. In their research on active learning, Blaschke et al (2010) showed how over 70% of postgraduate students identified experiential learning (learning from experiences) as their preferred method for learning, the learning style they exhibit in their personal lives. Research has shown how learning best takes place by actively participating and carrying out real tasks in practice (Dewey, 1938; Kolb, 1984). Rather than teaching theory, skills can be developed and acquired through teaching cognitive processes. The four-stage experiential learning cycle (Kolb, 1984) also suggests an iterative process of learning, whereby ideas are applied and tested and loop round again and again as relevant feedback is discovered to make improvements. Learning, however, doesn't follow such a rigid structure (Jarvis, 1995) and the stages outlined by Kolb, could be taking place in parallel or not taking place at all. This study explores the use of virtual reality in supporting the power of active learning for participatory and experiential learning, enabling students to be placed in a virtual space to carry out real tasks.

Young apprentices who enter the workplace often lack in a broader range of personal, professional and technical expertise. They have knowledge, but lack experience and transferrable professional skills and personal qualities such as good communication skills and lacked confidence. In other words, they need to develop a T Shaped Skillset (see Figure 1.3) (Guest, 1991 and Brown, 2010), a metaphor for the depth and breadth that an individual demonstrates attributes valued in the 21st Century work place.

The then Chancellor, George Osborne[9] in his productivity plan (HM Treasury, 2015) talked of boosting the quality and quantity of apprenticeships and in turn, workforce productivity. Businesses have a key role in achieving the plan through the recruitment of 3 million apprentices by 2020.

[9] George Osborne was The Chancellor of the Exchequer, the chief financial minster for the UK Conservative government, in office 11 May 2010 – 13 July 2016.

The Confederation of British Industry (CBI)[10] supported by Pearson[11] carried out a survey which revealed that the most important qualities for organisations recruiting apprentices are attitudes (85%) and aptitudes (58%), higher than qualifications and businesses are concerned about competency levels in customer awareness and business (66%) and self-management (61%).

**Working Across Boundaries with Transferable, Professional Skills and Personal Qualities**

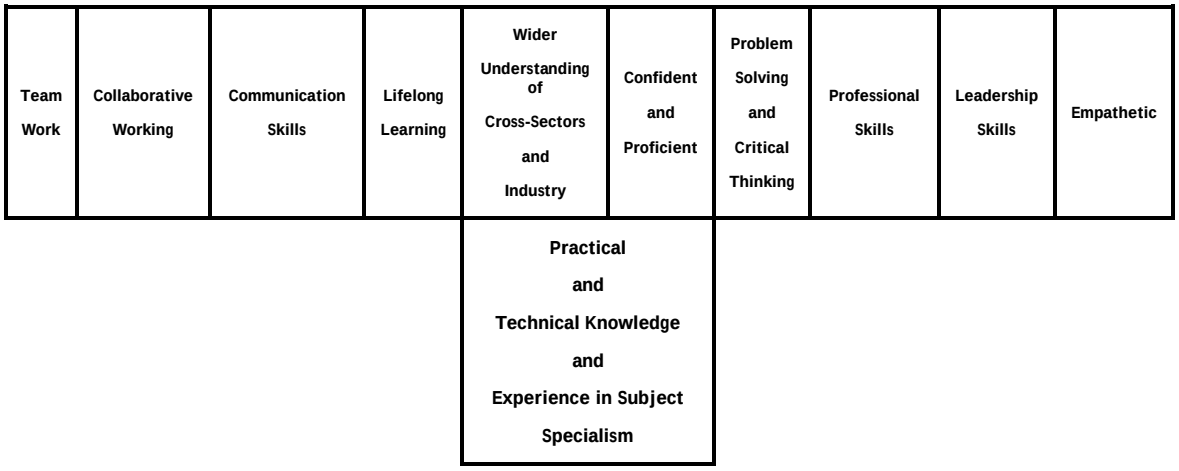



***Figure 1.3: The T-Shaped Employee (Based on Brown, 2010)***

Three SMEs based in different sectors have been used as foci for this study. Immersive 3D worlds were used as an alternative to face-to-face training to enable authentic training and simulate scenarios that would otherwise be difficult to create elsewhere. International Business Machines Corporation (IBM) has been using virtual worlds as a daily business tool long before it was recognised by the general population as anything more than a game (IBM 2010). For IBM employees, Second Life® allowed them to connect with one another, despite geographic differences.

The research studies show how skills acquired in the virtual environment may transfer into real-life contexts. Study 1 (see Table 1.2) presents 38 apprentices,

[10] The Confederation of British Industry (CBI) founded in 1965, is a UK independent employers' lobbying organisation. It represents companies of all sizes including SMEs and in all sectors.

[11] Pearson is a worldwide education company.

38 employees and their manager using Second Life® to carry out doorstep driver training for 20 minutes, daily at the start of their shift for five weeks. In Study 2 (See Table 1.3), 8 managers and staff members, plus 14 apprentices use Second Life® for disciplinary and absence management training. Finally, Study 3 (see Table 1.4) focuses on the use of Second Life® for sales training and meetings with 17 Managers and Staff members.

Through questionnaires, observation and interviews, the research provides an exciting opportunity to advance our knowledge of training and learning experiences and their effect on identity, perspectives on learning and the impact of learning cultures. This research aims to offer some important insights into user engagement and identity, in order to show experiential learning and the social context of learning in 3D communities.

The research participants evaluated what they had learned and experienced, and provided accounts of its impact, reflected on its value in enriching their work and opening up opportunities to them; in some cases, outstripping the benefits of face-to-face provision. In summary, this research offers policy makers, practitioners and researchers access to important aspects of engaging apprentices and employees in work-based learning. By opening up this topic, the research brings new information to the current discussions about the impact of apprenticeships and work-based learning.

## *1.8 Introduction to the Methodology*

The research methodology chosen meets the challenges of carrying out research in a virtual world by using a range of methods and taking a holistic approach to the way that the technology is used in SMEs. The methods captured employees' and apprentices' interactions within the virtual world during their days of work. By using a variety of research methods, it enabled research participants to use their own words to communicate how they learned in the virtual world. Elicitation techniques (Boggs and Eyberg, 1990, Rich, 1968) were adopted to help the research participants remember, analyse and reflect on their experiences in the virtual world through diary logs and card story-boards (Roth, 1985). I completed three case studies in Second Life ® and developed the

research methodology alongside the research process: each study had distinctive characteristics and differences, but themes of community, identity, learning and professional development were common to all. I present the accounts of participants in their own words.

The following tables 1.1, 1.2, 1.3 and 1.4 illustrate the case studies undertaken for this thesis. The series of studies gathered detailed descriptions of how employees and apprentices used virtual worlds in the workplace. Each study adopted a mixed method approach, employing a variety of data collection techniques, in order, to engage employees and apprentices in productive dialogue. The studies successfully integrated both qualitative and quantitative data to achieve depth and breadth in findings.

**Table 1.1: Year 1 Pilot Study Timeline**

<table>
<tr><td>Research Design</td><td colspan="2">Organisation</td></tr>
<tr><td>Pilot Study</td><td colspan="2">Langdel</td></tr>
<tr><td>Activity</td><td colspan="2">Participants</td></tr>
<tr><td>Customer Service Training</td><td colspan="2">8 Managers and Staff<br>14 Apprentices</td></tr>
<tr><td colspan="3">October 2012</td></tr>
<tr><td>Duration in Virtual World</td><td>Focus and Aims</td><td>Method</td></tr>
<tr><td>2 Hours</td><td>To evaluate the effects of current face-to-face training without any connection to technology so that a comparison can be made with training in virtual worlds.</td><td>• Questionnaire<br>• Focus Group transcribed</td></tr>
<tr><td colspan="3">Links with other studies</td></tr>
<tr><td colspan="3">Study 1, 2 and 3 take account of the pilot work and indicative findings carried out in this pilot.</td></tr>
<tr><td colspan="3">January 2013</td></tr>
<tr><td>Duration in Virtual World</td><td>Focus and Aims</td><td>Method</td></tr>
<tr><td>2 Hours</td><td>• An initial study to explore the features of virtual worlds that employees see as positive and negative.<br>• To inform the methodology for the main study and refine the relevance and scope of the research.</td><td>• Questionnaire<br>• Live Text Chat Analysis<br>• Focus Group transcribed</td></tr>
<tr><td colspan="3">Links with other studies</td></tr>
<tr><td colspan="3">Study 1, 2 and 3 take account of the pilot work and indicative findings carried out in this pilot.</td></tr>
</table>

**Table 1.2: Year 2 Study 1 Timeline**

| **Research Design** | **Organisation** | |
|---|---|---|
| Study 1 | Samedel | |
| **Activity** | **Participants** | |
| Doorstep Driver Training | • 1 Manager<br>• 38 Staff and 38 Apprentices | |
| **When** | **Duration in Virtual World** | **Focus and Aims** |
| March - May 2013 | 20 minutes of daily training for five weeks, totally 8 hours | To explore how virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world. |
| **Methods** | **Resources Created** | **Links with other studies** |
| • Questionnaire<br>• Focus Group transcribed<br>• Card Storyboards | Card Storyboards | Links with Study 2 and 3 because Study 1 findings about virtual worlds inform all studies.<br><br>Study 1 includes data about how these participants see the virtual world as an alternative to the real world. |

**Table 1.3: Year 2 Study 2 Timeline**

<table>
<tr><td colspan="2">Research Design</td><td colspan="2">Organisation</td></tr>
<tr><td colspan="2">Study 2</td><td colspan="2">Langdel</td></tr>
<tr><td colspan="2">Activity</td><td colspan="2">Participants</td></tr>
<tr><td colspan="2">Disciplinary and Absence Management Training</td><td colspan="2">• 8 Managers and Staff<br>• 14 Apprentices</td></tr>
<tr><td>When</td><td>Duration in Virtual World</td><td colspan="2">Focus and Aims</td></tr>
<tr><td>June – Sept. 2013</td><td>8 Hours</td><td colspan="2">To see whether working in virtual worlds engenders identity, motivation and professional development.</td></tr>
<tr><td>Methods</td><td>Resources Created</td><td colspan="2">Links with other studies</td></tr>
<tr><td>• Questionnaire<br>• Live Text Chat Analysis<br>• Focus Group transcribed<br>• Card Storyboards<br>• Mini Essays -content analysis</td><td>Mini Essays</td><td colspan="2">Links with Study 1 as a development of virtual world analogues with the real world.<br><br>Links with Study 3 for the comparison of the learning dimension.</td></tr>
</table>

**Table 1.4: Year 3 Study 3 Timeline**

| **Research Design** | | **Organisation** |
|---|---|---|
| Study 3 | | Qiadel |
| **Activity** | | **Participants** |
| Sales Training and Daily Morning Meeting | | 17 Managers and Staff |
| **When** | **Duration in Virtual World** | **Focus and Aims** |
| March – June 2014 | 20 Hours | To evaluate the effects of working in virtual worlds for work activity. In particular, it looked for evidence of the ways that virtual worlds might build communities of practice and trigger informal learning. |
| **Method** | **Resources Created** | **Links with other studies** |
| • Questionnaire<br>• Live Text Chat Analysis<br>• Focus Group transcribed<br>• Card Storyboards<br>• A day in the life of | A Day in the life of | Links with Study 1 and Study 2, through similar characteristics of learning experiences, identity and community. |

## *1.9 Research Questions*

I set out to explore four main issues:

1. The gap between education and industry in developing a modern workforce for the continuation of learning across formal and informal settings.
2. How to support informal learning at work under the guidance of non-educationalists, as this situation is universal in the government's priority area of apprenticeship (HM Treasury, 2015).
3. Explore potential improvements for work transitions both educationally and work related with special attention to apprentices.
4. Make a contribution to the significant gap in research for UK vocational education (Coffield 2008, Grollmann, 2008)

In particular, I sought to understand the potential of virtual reality in terms of:

- User engagement and development
- Participant identity formation and development associated with 3D usage
- Professional development of apprentices working in 3D communities
- Explore learning with reference to motivation, critical reflection, experiential learning, the social context of learning and communities of practice

The intention of the study was to extend the understanding of the ways that virtual reality might be used to support informal learning in work-based learning contexts. The range of case studies across different SMEs suggests many potential ways in which virtual reality might be utilised to support informal learning. The thesis aims to uncover whether this potential can be realised in SMEs. The aim of the research is to:

1. To try to ascertain if virtual worlds allow SMEs to work in ways they cannot in real life.

2. To portray the different ways in which virtual reality is a useful analogue and/or substitution of the real world.

3. To try to understand how virtual worlds develop identity, motivation and professional development.

4. To develop an understanding of the use of virtual worlds during work-based learning.

5. To explore employees' individual experiences in order to identify if virtual reality can build communities of practice for informal learning.

The research analyses the research participants' experiences in the virtual world in a variety of work-based learning activities, in order, to answer the following three research questions, which were developed as a result of gaps identified in the literature reviewed in chapter 2:

**Research Question 1:** *How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world?*

**Research Question 2:** *To what extent do virtual worlds develop identity, motivation and professional development?*

**Research Question 3:** *In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning?*

## *1.10 Structure*

The thesis is divided into nine chapters, concluding with appendices, abbreviations, a list of references and an index. The research studies are linked through methodology and explore whether 3D virtual worlds can be a useful analogue for the real world and explores relationships between identity and agency, professional development, informal learning and communities of practice. This research investigates the activity carried out by employees, including FE apprentices, in SMEs. The key themes recur throughout the studies, accumulating the evidence base for the research findings. The first Study informs the second and third studies and the links are important in reaching a clear understanding of how learning occurs in virtual worlds.

**Chapter 1** sets out the scope of the thesis by outlining the main areas that the research covers and listing the research questions, together with the conceptual framework.

**Chapter 2** includes a literature review and places the research in the context of previous studies about learning in virtual worlds, both in formal and informal settings. The debates surrounding the definitions of collaborative learning, online learning, social learning, informal learning, lifelong learning and learning communities are discussed. It identifies the gaps in the literature that the thesis seeks to address, deriving three research questions.

**Chapter 3** discusses the ethics, methodology and research design used to collect the data in the main study.

**Chapter 4** reports on the pilot study conducted which shaped the scope of the research and defined the research questions.

**Chapter 5** uses responses from the questionnaires and additional data collection, to explore user engagement and how skills and resources acquired in the virtual environment transfer into real-life contexts in order to answer **Research Question 1**: *How might virtual worlds allow SMEs to work in ways they*

*cannot in real life and are they a useful analogue and/or substitution of the real world?*

**Chapter 6** describes findings from research study 2 using data collected from 8 hours of training activity in Second Life ® drawing on data from participants' narratives, questionnaire results and other data collection, in order to answer **Research Question 2**: *To what extent do virtual worlds develop identity, motivation and professional development?*

**Chapter 7** presents the analysis from research study 3, evaluating the effects of working in virtual worlds for work activity and answers **Research Question 3**: In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning?

**Chapter 8** discusses the key findings from this research, in relation to the research questions, providing an evaluation of the study together with a general discussion, suggestions for future work and limitations of this study.

**Chapter 9** evaluates the research and its contribution to current discussions on work-based learning. Policy-makers, researchers, SME and education managers may find the thesis thought-provoking and challenging.

## *1.11 Conclusion*

The benefits and challenges that are detailed in this thesis can inform policy, leadership and practice at all levels impacting colleges, universities and SMEs. This research aims to help management leaders, governing bodies and colleges to strategically approach the further evolution of teaching and learning. Each study has been carefully researched and framed in the context of its potential impact on learning, professional development and knowledge sharing.

By closely examining the use of virtual worlds in SMEs, this project aims to shed new light on incorporating the use of 3D virtual worlds for the continuation of learning across formal and informal settings (Vavoula et al, 2007). The possibilities for the use of virtual reality are extensive and hugely enriching,

allowing learning to be much more opportunistic within the virtual world and through elements that arise from the genuine partnership with industry.

The real opportunity for three-dimensional (3D) virtual learning lies in the observing and talking to learners and receiving their feedback on how they conceptualize and use the tools and technology available. With this information, trainers and organisations can create contexts for the use of technology that enhances work learning and enriches working lives.

In conclusion, this thesis explores how the use of virtual worlds may create meaningful employer engagement where Small and Medium Enterprises (SMEs) are involved in the planning and contributing to learning. This chapter has provided an introduction to the aims and objectives of the research study. I have emphasised the need to put research in a wider context. My original contribution to knowledge is the use of computer generated, three-dimensional (3D) virtual worlds using Second Life® as a three-way sustained engagement and a mechanism for a genuinely productive dialogue between FE colleges, employers, employees and apprentices. The next chapter locates this research study within the existing literature, reviewing previous theoretical literature and history of online learning on which it is based.

# Chapter 2: Literature Review

This literature review includes a brief history of online learning, its approaches and development. How technologies enable learning is reviewed and consideration given to the challenges for online learning in the UK. The literature review demonstrates how online learning at its best is based on a sociocultural understanding of learning. Collaborative learning and communities of practice are discussed, as well as, identity of learners. Motivation of learning is considered and the role of affect. Appendix A provides a map to the literature reviewed, explaining the topic areas being discussed and my rationale for their choice. Topics are clustered and mapped against the research questions.

The first research question of this study asks how might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and / or substitution of the real world? It is important to develop a sense of the literature and techniques used, in order, to seek to establish new approaches and knowledge for SMEs working within virtual reality.

In this chapter, online learning and distance education; collaborative and sociocultural learning are reviewed to support answering the first research question.

## 2.1 Online learning and its development

Online learning first developed in the United States, Australia, Canada and Scandinavia, out of the practicalities of being unable to travel to schools for those living in remote parts of the country. Australia is a leader in online distance education and has developed a successful virtual schooling system (Davis and Niederhauser, 2005). Online learning developed from a need of those who are unable to attend traditional face-to-face tuition (Beldarrain, 2006). Learner support is vital for effective pedagogy online and two key themes in the literature are around cognitive activities – learning and meta-cognitive activities, for example, how people manage their learning (Bonk and Dennen, 1999 and Finlay and Finnie, 2002). According to Rheingold, "*Virtual communities are social aggregations that emerge from the Net when enough people carry on*

*those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace*" (Rheingold, 2000 p.xx).

The industrial model of education (Peters, 1994) continued through distance education and the perception when it first developed was that it provided limited opportunities for peer to peer interaction and between student and teacher (Howe and Mercer, 2007). The lack of interaction was addressed by applying behaviourist techniques (Thorpe 1995) where the instructor breaks down the complex concepts of the unit to be studied into smaller achievable parts (Skinner, 1968). Garrison and Anderson (2003) discuss how learning is demonstrated by students through the completion and demonstration of learning objectives. Social interaction is not pivotal to this pedagogy, although some interaction may take place between student and instructor, for example, through the design of material, which asks for a discussion.

Keegan (2003, p.47) provides a description of distance education: "The separation of the learner from the teacher"; "The separation of the learner from the learning group" and Technology being used as a media to communicate with the tutor or learning provider. Although Keegan's description does not imply interaction is absent from distance education, he portrays that interaction is limited and generally restricted to the teaching materials.

Moore (1973, 1993) called for interactions and emotions of learners to be taken into account and argued for learners to be able to take control of their own learning and have the responsibility of sharing collaborative learning. He criticised the model for distance learning saying that learners were unable to learn effectively. It could result in learners misunderstanding their learning because of what he termed 'transactional distance', where learners and instructors were separated through time and space.

## 2.2 Online learning approaches

Much can be learned from the higher education sector, where online learning has been used for a longer period of time and experienced much growth and success, particularly since the late eighties with the emergence of rich multimedia (Ingraham, 2000). This is an indication that there is significant potential for its use in organisations and an important area to consider within this research study. The New Media Consortium (2014) narrated in its annual Horizon report that online, hybrid, social and collaborative learning were all key pedagogical and technological trends over the next five years.

The Open University was established in 1969 developing a new kind of distance education with 'multi-media distance teaching' (Nipper, 1989, p.63) with interaction taking place between learners and tutors through tutorials, forums, residential schools and correspondence tuition (Hawkridge, 1996).

Since today sees the development of web 2.0 and computer supported cooperative learning (CSCL) which polarises two models of traditional versus collaborative learning and social interaction (Gokhale, 1995; Dillenbourg, 1999). Gokhale, (1995 p.23) defined collaborative learning as "*An instruction method in which students work in groups toward a common academic goal*". Research into how to support online learning mainly focuses on formal learning and adopting a broad definition of collaborative learning as "*a situation in which two or more people learn or attempt to learn something together*" (Dillenbourg, 1999 p.2). Studies have been carried out into how best to support collaboration online (Kollock, 1998 and Kreijns et al, 2003) and how to develop a community amongst distributed learners, but tend to assume learning goals are in existence (Gokhale, 1995 and Hiltz, 1998), which doesn't account for the informal learning that may take place collaboratively through a community of distributed learners.

Fischer and Scharff (1998 p.5) argue *"New technologies and learning theories must together serve as catalysts for fundamentally rethinking what learning, working, and collaborating can be and should be in the next century"*. There continues to be a lack of empirical data on the implications of Web 2.0 (Rollett et al., 2007) for education and training, for example, on the impact they are

having on the practices of online communities and whether the development of technology can play a role in collaborative learning through knowledge creating and sharing of learning. This thesis seeks to bridge the gap by looking at 3D virtual worlds in the form of Second Life® and how this has developed for SMEs to interact synchronously.

Web 2.0 concepts are much more than *"a set of 'cool' and new technologies and services, important though some of these are."* (Anderson, 2007 p.2). They are "changing the way some people interact" (ibid), and have the potential to transform the way learning and knowledge creation takes place.

## 2.3 Technologies enabling online learning

Collaborative technologies can help form the backbone of Learning 2.0, synonymous with long-tail learning. Brown and Adler (2008) discuss how 80% of sales in a bookstore come from 20% of the titles. That's the fat part of the "tail." The bookshops: Amazon, Chapters, and Borders turned that around by offering a huge selection, so large that the majority of their sales actually comes from the "long tail" of the sales curve. In education, content delivery is the fat part of the "tail" but the "long tail" comes from people's interactions with learning and knowledge. So, in "long-tail learning", Brown and Adler (2008) say that learning is a social activity and that understanding is socially constructed through conversations and interaction. They call this collaborative working and in dialogue with others "social learning" (discussed further in section 2.5). This fits in nicely with Weinberger's ideas about social knowing (2007):

> "What you learn isn't pre-filtered and approved, sitting on a shelf, waiting to be consumed…Now we can see for ourselves that knowledge isn't in our heads: It is between us. It emerges from public and social thought and it stays there, because social knowing, like the global conversations that give rise to it, is never finished."
>
> ***(Weinberger, 2007, pp.146-147)***

Asynchronous interactivity and online collaboration are supported through a range of technologies. The word ‘blog’ is an abbreviation of web log, which is usually written 'weblog'. A blog is a web-based publication consisting primarily of periodic articles (called ‘posts’ or ‘postings’). Usually posts are published in reverse chronological order (latest at the top), and contain a mixture of text written by the blog author, quotations from other blogs or websites and links. Vlogs are the video equivalent of blogs and there are a number of tools for micro-blogging, with the perhaps best known of all being Twitter. Micro-blogging are very short updates, usually a sentence or two and often limited to 140 characters to record thoughts, movements and share links.

Like blogs, forums also offer a vehicle for sharing experience and expertise and learning (Wenger, 2008). Forum members can exchange ideas and set up self-help networks (Armstrong and Hagel III, 1998, Gray, 2003). 3D virtual worlds, such as Second Life® enable users to be represented through a 3D avatar and interact with each other synchronously using synchronous text and audio for communication.

Web 2.0 tools are utilised in teaching to provide a learning environment from lectures delivered via podcast (Ashraf, 2006) to debates through blogs and collaboration through 3D worlds (Boulos et al, 2006). The implications for education (Anderson, 2007) are not fully known and understood.

Rheingold (2000) discusses how computer mediated communication technologies supports a ‘level of person-to-person interaction where relationships, friendships and communities happen’ (Rheingold, 2000, p.xxvii). Computer supported cooperative learning (CSCL) aims to offer the empowered learner educational openness (intellectual openness, freedom of access, equality and choice in the lifelong learning experience) by becoming part of a learning community. The learner is engaged socially and psychologically in the learning community (McConnell 2002). Intellectual openness through group work encourages intellectual receptivity and interchange, a deep approach to learning and a meta-perspective of learning. Learner empowerment comes at a price though - shifting power balances impacts on inter-personal relationships and institutional control. Effective group dynamics come at a price too – learners and tutors need

training and personal development to fulfil their key roles in the learning community (McConnell 2002). Thus CSCL educational openness has clear educational gains for the learner at the cost of some institutional control, shifted power relations and resource (financial; time) investment. An advantage is the useful deconstruction of roles in the learning community (neither helping self (education) nor helping others (therapy) but a fusion of both (development) (McConnell 2002 p. 116). A disadvantage of what McConnell discusses is the vulnerable to oppressive collectivism when minority interests and people are marginalized (McConnell 2002 p. 117).

Every few years, there is a new technology that is developed. Over the last ten years, we've seen mobile and smart devices, tablets, e-books, WIFI and Bluetooth, gaming technologies, wearable technology, augmented reality, 3D virtual world and social networking. Christensen (1997) coined the term 'disruptive technology', which he describes as something that fundamentally challenges the status quo and changes the way we've always done things. He categorised them as disruptive because they challenge existing systems and models. Christensen discusses how large companies will often dismiss the value of a disruptive technology because it is not something they know and see it as conflicting to their business goals, only to discover later that they missed out on the market share.

> "A disruptive innovation is an innovation that helps create a new market and value network, and eventually disrupts an existing market and value network (over a few years or decades), displacing an earlier technology. The term is used in business and technology literature to describe innovations that improve a product or service in ways that the market does not expect, typically first by designing for a different set of consumers in a new market and later by lowering prices in the existing market."
>
> ***(Christensen, 1997, p.xviii)***

For some people, the new world of technology enhanced learning is a time of great uncertainty and loss. It means something new and unexpected, it results in

change and new practices. Mindsets and attitudes have to be changed as a result to provide students with a unique, value-added learning experience.

The concept of disruptive education can be looked at from the emergence of learning environments. Virtual learning environments first developed where tools were provided by the educational institutions and teachers chose which to use for their courses. Personal learning environments (PLEs) have developed where learners create their own learning space. There is a pick and mix of cloud based tools with institutional tools. More recently, building on PLEs is the emergence of 'The Internet of Things' (IoT), the networked connection of people, process, data and things, which is the basis for the Internet of Learning Things (IoLT) (Edutech Associates, 2013). It allows for seamless learning across different devices and in a variety of contexts.

With gaming technology, learning can be ten times faster and almost anything can be learned in a game and the science can be applied in the workplace too. In a two-year test run on Spanish language vocabulary with over 2,000 teachers and 80,000 students, they claim to have increased learning speeds between 8 and 10 times traditional learning (Rivero, 2013). Bushall says by repeating games you can ensure you retain 100% of what you learn for the rest of your life and never forget. The brain science indicates we should be able to do this. It is a breath-taking thought and there's a huge amount of research to support this (Marcus, 2009). The concept of repeating is useful to carry out through role play in virtual worlds.

There is an increasing demand for SMEs to provide for an increasing number of apprentices with a greater diversity than ever before. This is the first generation to live and breathe technology and they are not afraid of it and the use of virtual worlds can make knowledge sharing accessible to significant numbers. As Tapscott (2009) discusses in his book 'Grown Up Digital', technology is 'like the air to them' and there is an emphasis on academic institutions and organisations to equip our generation of learners with the digital literacy skills required to survive and prosper in an ever changing and complex society in the 21st Century (Jenkins 2009).

Content is everywhere and readily available. There's a new emphasis now on the development of skills rather than simply knowledge recall. Technology can get employees passionate and excited about learning. Emotional interaction increases motivation and learning. Playing a game makes people interact more emotionally within an environment they are learning and these games can adapt and adjust to improve the level of learners.

The focus is no longer on passing on old knowledge, but equipping our future generations with agility and smartness to deal with what none of us can predict the future will hold. The task for organisations of the future is how to use the immense power of technology and transform its workforce into higher performers. It is about learning by doing and developing the power of active learning (Blaschke et al, 2010). A growth mindset must be nurtured "based on the belief that your basic qualities are things you can cultivate through your efforts…everyone can change and grow through application and experience" (Dweck, 2006, p.7).

What is important is that employers do not fear what technology might do, but to take developments seriously and to make more informed decisions about pedagogical design to deliver quality assurance and an enhanced, personalised learner experience for lifelong learning and professional development in the workplace.

The real value of these disruptive developments for SMEs is that they are promoting social inclusion, interaction and prompting questions about how they can provide professional development and learning for their employees and how they support informal learning and interaction. DeWitt (2015) identifies ways we can support growth mindsets through more feedback, less instructors talking and more flexible grouping and deeper questions.

Linden Lab, the creators of Second Life ® celebrated its thirteenth year in 2016 of its virtual world and in the same year, launched a new next-generation virtual life called Project Sansar. There are no plans for Second Life ® to discontinue and it will continue to be improved (Altberg, 2015). This new world appeals to a wider audience and enables the new wave of head-mounted viewers to be used

in conjunction with the virtual world. Head-mounted viewers such as Oculus Rift acquired by Facebook (Zuckerberg, 2014) and Samsung Gear VR allow the wearers to be immersed in a 3D experience with more realistic sound, lighting and motion.

> "After games, we're going to make Oculus a platform for many other experiences. Imagine enjoying a court side seat at a game, studying in a classroom of students and teachers all over the world or consulting with a doctor face-to-face -- just by putting on goggles in your home.
>
> This is really a new communication platform. By feeling truly present, you can share unbounded spaces and experiences with the people in your life. Imagine sharing not just moments with your friends online, but entire experiences and adventures. These are just some of the potential uses."
>
> ***(Zuckerberg, 2014, [Online])***

Altberg (2015) reported that 'Second Life ® is the most successful user-created virtual world ever with 1 million users at its height and currently, approximately 900,000 monthly active users. Project Sansar, he reported, is expected to be far bigger and be instrumental to the success of virtual reality. The next section discusses some challenges facing UK providers.

## 2.4 Challenges for online learning in the UK for providers

Developments in educational technology will continue to revolutionise the way we learn and continue to impact our working life (Heppell, 2011). Understanding online and distance education is vitally important if we are to research the use of virtual reality within SMEs, in terms of how to prepare employees for an ever-changing future. Preparing our workforce with skills for jobs they do not know exist yet and enabling them to change careers throughout their life, is critical to the competitiveness of increasingly technology driven and global industries and a world of work.

For decades, Britain has underinvested and undervalued higher level professional technical education and as a consequence the UK is 16th of 20 OECD countries for the percentage of the workforce who hold sub degree higher vocational qualifications (OECD, 2016). In a global economy, driven by technological innovation, skills are critical to competitiveness and productivity. UK demand for higher level skills will increase in the coming years driven by business expansion and by people retiring or leaving the workforce. The problem of an ageing workforce is acute in some sectors, for example, the Royal Academy of Engineering has forecasted a need for 830,000 professional and technical positions and a further 90,000 technical rail engineers by 2017 (Harrison,2012).

A new partnership between educational institutions and business is fundamental in sharing the investment in and the benefits of excellent skills training. Adaptability, support, engagement and practice are all key concepts in analysing the interactions in work-based learning within SMEs and are all-encompassing in the conceptual framework (see Fig.1.2).

Technological change and advancement is rapid and a challenge for organisations is how to keep pace and find new ways to engage and inspire their employees. Employers have to ask themselves how they can use technology to stimulate learning in the workplace and offer opportunities that will support and enhance their employees' learning. Tolmie (2001) argues that the use of technology is part of the context of learning but that, though it may affect learning, it is not part of the learning itself: pre-existing activity will still shape both use and outcome.

There are important learnings from the research of online and distance education which are worth reflecting on for this PhD study on using virtual reality for informal learning, for example, in terms of widening participation; enhancing teaching and learning; enabling engagement, collaboration, interaction and communication. There are many advantages of online and distance education, which this study will build upon, for example, building skills, adapting for a range of pedagogical approaches, encouraging thinking skills and nurturing an environment for innovative and creative working. The next section considers constructivism and heutagogy as useful frameworks for considering

lifelong learning and how online learning at its best is based on sociocultural understandings of learning.

## 2.5 How online learning at its best is based on sociocultural understandings of learning

The sociocultural understanding of learning is primarily social in nature and co-constructed by learners with the help of knowledge building tools and activities (Sharples et. al., 2009; Vavoula et al., 2007), such as interaction and communication. Wells and Claxton (2002) argues the use of knowledge building tools is influenced by feelings, relationships, trust and goals of the collaborators they are working alongside. Vygotsky (1978) named them meaning-making tools. Socio-affective factors and the way collaborators use knowledge building tools, evolves with time.

> *"It is particularly by learning to use these semiotic tools in discourse with others that humans appropriate the culture's dominant ways of thinking, reasoning and valuing. And in making them their own and in bringing them to bear on new problems and new situations, they may transform them in ways that add to and potentially improve the culture's shared toolkit of meaning-making resources"*
>
> ***(Wells and Claxton, 2002, p4)***

Cole (1996) writes of tools being a subset of artefacts which are described as 'an aspect of the material world that has been modified over the history of its incorporation into goal-directed human action' (Cole, 1996, p117). Skills are built on, passed forward and developed through collaborative working, interaction and social modes of thinking. 'The human actor operates in a cultural, social, material and technological setting, which poses problems but also offers tools and resources to create solutions' (Gipps, 2002, p73).

Sociocultural research is interested in the situated nature of learning and considers the importance of tools and how they are utilised in different settings by groups of people, in order to, learn together. The focus is on social activity

(how learners talk to each other to understand how people make sense of experiences), cultural activity (how cultures shape pedagogy and educational goals at different times) and psychological activity (how social and cultural activities affect learning and cognitive development in individuals within the group), in order, to study situated learning (Mercer and Littleton, 2007). Carey (1992) and Biesta (1994) describe culture as communication with interaction and transmission.

This perspective sees knowledge building in groups through shared actions, learning and discourse (Edwards and Mercer, 1989). Crucial for collaboration is the group coordinating shared meanings (Crook, 1999), continually sharing a common goal of the problems they are solving (Lipponen, 2002) and a continued negotiation of knowledge and understanding (Littleton and Häkkinen, 1999). For group knowledge building to be successful, learners within the group must 'understand the conditions for collaboration and rules for coordinating the collaborative effort at the same time as solving the learning tasks' (Häkkinen, 2004).

There is a danger in accepting one theoretical position with regard to what is the best approach to learning as Illeris (2002) illustrates using the metaphor of tension, in this case between its cognitive, emotional and social aspects. The concept of lifelong learning provides a robust and potentially insightful tool for deconstructing the different dimensions of learning. By better understanding a broad spectrum of factors that shape the process in different contexts, it is possible to reassess prevailing patterns of constraints and opportunities.

Illeris (2002) defined six stages of social interaction between the learner and the learning environment (see Table 2.1). Each stage is constructed from the last and requires more initiative and action from the learner than the previous.

| Stage | Description |
|---|---|
| **1** | The first stage involves didactic teaching involving perception. The learner passively notes information through listening or observing. |
| **2** | The second stage is transmission. Learning is more active through active listening and note taking. |
| **3** | The third stage is experience, where the learner gains experience from performing tasks under the observation of the instructor. |
| **4** | Imitation is the fourth stage where the learner mimics and repeats the actions of the instructor. |
| **5** | Activity is the fifth stage where the learn works independently but has an instructor to hand for guidance, if required. |
| **6** | The final stage is participation where the learner is autonomously working and often as part of a team with other work colleagues. |

***Table 2.1: Six Stages of Social Interaction created from Illeris (2002)***

New technologies can support learner-centred design and activities, as well as, learner exploration, creativity, reflection, collaboration and networking (McLoughlin and Lee, 2007; Sharpe et al, 2010).

Sociocultural theory is rooted in the work of Wertsch (1991, 1998) and Vygotsky (1978), the Soviet Psychologist who believed social and cognitive development, work together; their work has since been expanded upon by many researchers, for example, Engestrom (1987); Kuutti (1996) and Nardi (1996). Kublin et al (1989, p.287) succinctly state that "Vygotsky described learning as being embedded within social events and occurring as a child interacts with people, objects, and events in the environment". According to Tharp and Gallimore (1988, pp.6-7) "This view [the sociocultural perspective] has profound implications for teaching, schooling, and education. A key feature of this

emergent view of human development is that higher order functions develop out of social interaction. Vygotsky argues that a child's development cannot be understood by a study of the individual. We must also examine the external social world in which that individual life has developed...Through participation in activities that require cognitive and communicative functions, children are drawn into the use of these functions in ways that nurture and 'scaffold' them".

The origin of the word 'Knowledge' has a history of being both a noun and a verb. It was formed from the verb 'to know', a verb which 'now covers the ground formerly occupied by several verbs and still answers to two verbs in other Teutonic and Romanic languages' (OED, 1989). Vygotsky said of knowledge as a noun that 'we utilize concepts to acquire knowledge about facts… we utilize facts to acquire knowledge about concepts' (Vygotsky, 1997, p.251).

Vygotsky (1978) emphasises the significant role that language plays in the development of abstract thought. He recognises the importance of the labelling process in the formulation of concepts. He believed that language was social in origin because it arose in social interaction. Vygotsky's (ibid) theory on 'the zone of proximal development' is described as the gap between what a child can do alone and what they can do with the help of another child or adult. Vygotsky argues that the capacity to learn through instruction was a fundamental feature of human intelligence. He argues learning is about the existing understanding coupled with an ability to learn with help. Vygotsky emphasises the importance of communities in the social context for learning. He believes in a social constructivist view of imagination and play being important to development and learning; and recognises the importance of social components of learning.

Vygotsky's (1978) theory helps us understand how we learn from others who are more skilled and knowledgeable than ourselves. The Vygotskian approach stresses the communication basis of learning and development, for an understanding of learning and the generation of new knowledge premised on its social, cultural and contextually specific origins. Much of the theory underpinning the design of virtual learning environments having developed from the application of principles that have developed from situated cognition and the work of Vygotsky (ibid) for his emphasis on the way in which people's

cultural and social context influences their development. Vygotsky was an architect of social constructivism and he was influential in a social constructivist view of imagination and play being important to development and learning; and recognised the importance of social components of learning and how learning and understanding comes from participatory involvement and activity. He showed how knowledge and learning is constructed through human interaction and through imitating a more competent person.

Piaget was a classic constructivist who wrote about the art of reflection emerging as a psychological development during adolescence. Reflection is innate to the thinking process of humans.

> "Reflection is the act by which we unify our various thoughts, tendencies and beliefs in the same way as conversation and social intercourse can unify the opinions of individuals, namely by giving due weight to each and extracting an average opinion from the group. Logical reasoning is an argument which we have with ourselves, and which reproduces internally the features of real social argument"
>
> ***(Piaget, 1995, p.204)***

Every act of personal comprehension relies on implications (connections asserting themselves from a sort of internal necessity), in the case of actual research all tentative hypotheses are directed or framed by implications (ibid p348). Presumably these implications are within the body of knowledge, emotional framework or cognitive structures that one already possesses.

Reflection allows us to classify new information and experience into the cognitive structures we already possess. If the structures cannot account for the information then they need to be modified / rebuilt which entails much deeper thought and learning. Children do not have the ability to reflect and build theories. Adolescence is when human thoughts can 'escape' the concrete present to the realm of the abstract and the possible (ibid, *p*p. 437-438). A move towards knowledge being actively constructed and developed (Sfard, 1998) rather than knowledge being thinking that is passed on person to person. Sfard

(1998, p.5) talks of a kind of ecological learning where learning takes place through participation.

The internet can now be used to support learners working in isolation (Jones et al, 2007). Distance education can take advantage of a greater interactivity, as a result of technology (Garrison and Anderson, 2003) and place a greater emphasis on social learning and building interaction between learners and instructors, as well as, building knowledge as a group.

A constructivist approach was adopted by Jonassen et al (2003) in their research examining the use of technology in school activities, identifying 'technologies as learning tools that students learn with not from' (Jonassen, 2003, p.11). They defined meaningful learning as students active in making meaning and the most meaningful demonstrating five 'interrelated, interactive and interdependent' attributes (Jonassen et al, 2003, p.9: Active (manipulative and observant); Constructive (reflective and regulatory); Cooperative (collaborative and conservational); Intentional (reflective and regulatory) and Authentic (complex and contextualised). These categories are used in this thesis to classify informal learning as employees participate in activities within Second Life®. Both interaction and the social nature of learning have important implications for work-based learning.

Studies in the UK and USA (Grunwald Associated, 2007) highlight the increasing use of participatory digital technologies in the everyday lives of people and when examining work place learning, it must be considered how much of a part these technologies already play in the lives of employees. A key theme is around social learning. Clark et al (2009) term the tension with technology, being used for learning, as 'digital dissonance' and argue that more needs to be done to understand how the use of technology in informal learning can be transferred to formal learning. This thesis does this by analysing how virtual worlds might allow SMEs to work in ways they cannot in real life and examining if they are a useful analogue and/or substitution of the real world (research question 1).

Social learning theory focuses on learning that takes place within a social context and encompasses motivation, memory and attention through

observation, imitation and modelling or observational learning. Learning from others is an important aspect of work-based learning and apprenticeships. Bandura (1977) explored how people learn by interacting with others:

> *"Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behaviour is learned observationally through modelling: from observing others one forms an idea of how new behaviours are performed, and on later occasions this coded information serves as a guide for action"*
>
> ***(Bandura, 1977, p.22)***

Modelling is achieved through the amount of attention being paid to an activity; being able to remember and motivated to repeat what has been observed (Bandura, 1977). The social learning theory proposed by Bandura, amongst others, has become an influential theory of learning. A key educational implication of social learning is the development of a sense of self-efficacy for learners. There has to be a belief present that they are capable of accomplishment through the building of confidence, experiencing success and seeing others successful. A key part of learning in the work place is the social aspect of learning where more skilled staff members in a learning community can help other less experienced employees through guidance and observation (Jaarsma et al, 2011).

Heutagogy is a learning theory developed by Hase and Kenyon (2007) and has its roots in earlier learning theories and concepts, such as, constructivism (Vygotsky, 1978), reflective practice (Schön, 1984) and double-loop learning (Argyris and Schön, 1978). It is the study of "self-determined learning and applies a holistic approach to developing learner capabilities with the learner serving as the major agent in their own learning which occurs, as a result of personal experience" (Hase and Kenyon, 2007, p.112). With learner-centered and learner-determined learning, instructors and organisations / institutions become guides and a resource as required for facilitating learning, whilst the individual learner defines their own learning path. The role of organisations and

learning providers in a heutagogical approach is to provide learning platforms and support and to help those learning make connections. The individual matures into a self-motivated and autonomous learner (Canning, 2010), requiring less instructor direction and is responsible for determining and directing what they will learn and how they will assess their learning. The use of virtual reality can be a useful conduit for this approach to learning.

Within heutagogy, it is essential that critical reflection occurs in a holistic way. This translates to the learner reflecting not only on what she or he has learned, but also the way in which it has been learned and understanding how the individual learned to learn (meta-cognitive skills) and through double-loop learning, how it impacts the learner's values. The learner matures from relying on instructor guidance and course scaffolding (Canning and Callen, 2010; Kenyon and Hase, 2010). This maturity needs to be supported by cognitive development (Mezirow, 1997).

More than a hundred hospitals across West Yorkshire have received free WI-FI connectivity, in order, to support medical students in their learning and development whilst at university and when working on placements in hospitals (Jisc, 2015). This initiative is to support capability development, competency and self-efficacy. Competency can be understood as proven ability in acquiring knowledge and skills, whilst capability is characterised by learner confidence in his or her competency and, as a result, the ability "to take appropriate and effective action to formulate and solve problems in both familiar and changing settings" (Gardner et al, 2008, p.252).

Canning and Callan (2010); Ashton and Elliott (2007) and Ashton and Newman (2006) have identified many benefits of the heutagogical approach:

- Improves critical thinking and reflection
- Increases learner engagement and motivation
- Gives learners more control over learning (learner-centered)

- Improves ability of learners to investigate and question ideas – and apply knowledge in practical situations
- Supports development of independent ideas and self-confidence
- Makes learners more capable and able to adapt to new environments
- Better prepares them for the complexities of the workforce

A heutagogical learning environment has the following key elements with the learner in the centre (Blaschke and Hase, 2015, pp.31-37):

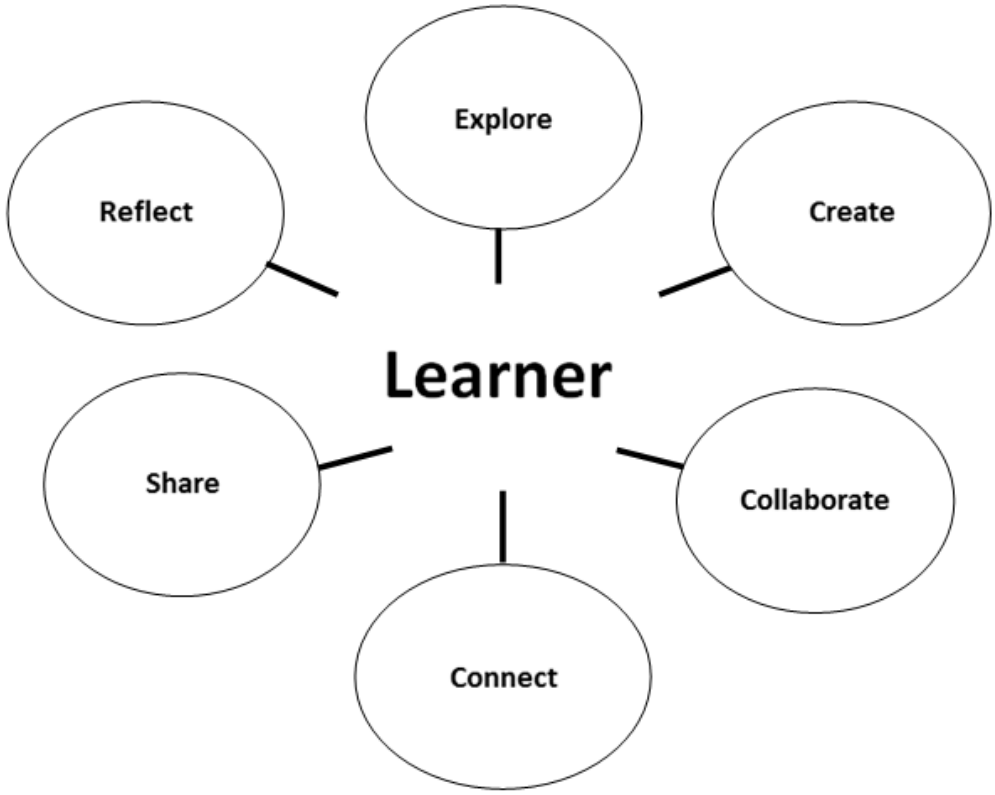



***Figure 2.1 Key Elements of Heutagogical Design from Blaschke and Hase, 2015, p.31***

*Explore*: Learners must be given the freedom and opportunity to explore a variety of paths and sources of knowledge on their journey. They need to be able to develop and test hypotheses, and ask and answer questions – all of which arise during the process of exploring.

*Create*: Learners must be allowed the freedom to create through a variety of learning approaches, for example, designing, drawing, writing. It is important that the learner is actively involved.

Collaborate: When collaborating, learners are able to solve problems together and reinforce their knowledge by sharing information and experiences and learn from each other. Learners can help each other and continuously practice, experimenting by trial and error.

*Connect*: Through networks and connections, learning can be created and these connections can be made easier to make through the use of technology, which enables a network across the world. As Brandt (2013, p.110) relates: "Virtual connections, made through the internet, can provide opportunities for real-time input from experts in the field of study".

*Share:* When learners connect with each other, they also share with each other.

*Reflect*: When learners have the time to reflect and consolidate, there is potential for a deeper level of learner to occur. It is important to reflect on learning experiences and how this has influenced value systems and beliefs. Reflection provides an opportunity to ascend to higher levels of cognitive activity such as analysis and synthesis. Repetition helps information move from short-to long-term memory.

In summary, constructivism and heutagogy provide a valuable framework for considering lifelong learning which will be discussed in the next section.

## *2.6 Lifelong Learning*

In the Commission of the European Communities' (CEC) (2000) *A Memorandum on Lifelong Learning,* it talks of transforming the concept of lifelong learning and makes a clear link between community and individual agendas:

> *"..mobilisation of all 'players' involved in ascertaining learning needs, opening up learning opportunities for people of all ages, ensuring the quality of education and training provision, and making*

*sure that people are given credit for their knowledge, skills and competences, wherever and however these may have been acquired."* ***(CEC, 2000, p.3)***

Current policy in Organisation for Economic Co-operation and Development (OECD) countries emphasises lifelong learning for employability prospects (OECD, 2016). The economic and financial benefits to SMEs is preeminent in driving work-based learning. Other purposes of work-based learning include: contributing to the development of the individual by building competency and confidence; achieving certifications and qualifications to gain or improve employment and perform specific jobs; and acquiring skills and knowledge through socialisation.

There is a lack of clarity about the purposes and meaning of work-based learning and education encompassing lifelong adult learning (Biesta, 2006 and Field, 2002). The meaning of the concept 'lifelong learning' and related policy change is explored; based on a definition from the Commission of the European Communities' (CEC) (2000) *A Memorandum on Lifelong Learning:*

"Lifelong learning is no longer just one aspect of education and training; it must become the guiding principle for provision and participation across the full continuum of learning contexts."

***(CEC, 2000, p. 3)***

Lifelong learning has been researched by Feinstein et al (2003) whose research presented evidence that participation in lifelong learning results in beneficial outcomes. The quoted statement from the Memorandum on Lifelong Learning (CEC, 2000) was considered by many observers to be 'the most advanced in its articulation of the principles, dimensions and issues of the debate on lifelong learning' (UNESCO, 2001, p.5), calling for change and adaptation. This statement was a radical change from the old-fashioned view that learning is only achieved through formal education in school and university; to a concept that saw learning emerging in a variety of contexts, for example, work-based learning, hobbies and individual interests (Tuijnman, 2002, p.11). At a similar

time; the Blair government was focusing on its well-publicised mantra of 'Education, Education, Education' (Blair, 2010, p.103). The vision depicted here, supports the views of Parson (1990) who says lifelong learning is how people learn throughout their lives and Wain (1991) explains lifelong learning to be a moral duty, that is, part of one's responsibilities as an active citizen.

In policy terms, lifelong learning, can be thought of as a strategy to enhance economic productivity and competitiveness; promote social inclusion and quality; support personal development and enrich the culture of a nation or region. Lifelong learning encompasses learning from cradle to grave; post-school education, as well as, non-formal and formal learning. All learning activity undertaken throughout life, with the aim of improving knowledge, skills and competencies within a personal, civic, social or employment related context. Policy makers are developing a broad consensus (Hyde and Phillipson, 2014) on the importance of lifelong learning in today's global economy.

The following quote illustrates the claims that policy makers in Western Europe are now making for lifelong learning:

> *"The challenge we face to equip individuals, employers and the country to meet the demands of the 21st century is immense and immediate. In the information and knowledge based economy, investment in human capital - in the intellect and creativity of people - is replacing past patterns of investment in plant, machinery and physical labour. To continue to compete, we must equip ourselves for this new world with new and better skills.... For our companies to succeed on the world stage, they will need to be learning, innovative businesses. The notion of 'leaving education at 16' must pass into history. For our people to prosper, they will need access to learning throughout their working lives so as to keep their qualifications up to date and, where necessary, to train for new or changing roles"*
>
> ***(Department for Education and Employment (DfEE), 1999, p.12)***

Tuijnman (2002) discusses how these prominent reports are setting growing expectations for policy makers to create an all-encompassing lifelong learning society. Statements about lifelong learning tend to be positive and have grown out of key documents proposed several decades ago, such as the OECD publications in the 1970s (cited in Tuijnmnan, 2002, p.7). Lifelong learning could just be seen as a rebranding of what we have always had - industrial training, vocational and professional education and human resource development. The role of government is perhaps utilising the popularity of lifelong learning to shift from its responsibility of formal education institutions to individual responsibility, work-based learning or employer-led learning.

The European Commission White Paper (1995) identifies challenges of the impact of the information society, globalisation and technology and the need to up-skill in response. The White Paper suggested in response that focus should be placed on building employability and knowledge of the information society. Also, five actions were advised: encourage the development of knowledge learning, encourage schools and businesses to collaborate, combat exclusion, aim for proficiency in three community languages and treat equally training and capital investment. Field (2002) argues formulations of lifelong learning have failed to produce enough in the way of practical policies of implementation.

The Memorandum on Lifelong Learning (CEC, 2000) is based on the beliefs that everyone is motivated and able to learn and that this should be encouraged in a variety of ways; but this excludes a great many of society and social exclusion was an issue highlighted in the European Commission White Paper (1995). Schuller and Field (2002) explore and contrast the concepts of human capital and social capital based on key ideas that a nation's competitiveness depends on the skills of the labour force; governments are being forced to expand its policies on lifelong learning as education in its current form needs to be modernised and become more efficient to deal with globalisation and emphasis is placed on the individual to take responsibility for their own learning. Coffield (1999) criticises many of these beliefs. He argues that the concentration on human capital ignores the relevance of other forms of capital including social capital and that the economic models of change informing lifelong learning strategies are crude and questionable. Coffield (1999) also argues that lifelong

learning policy deflects attention from more difficult issues such as inequality and states policy development is a form of social control because of the way in which it emphasises the need for individuals to change. Black, Balatti and Falk (2006) used social capital as an analytical tool and recommended that for some learners, a change in mindset is sometimes required for more conventional gains in learning to be initiated. Changes in identity and agency in learners can improve perspectives for learning.

Tuijnman (2002, p. 11) argues that the current concept of lifelong learning has entailed a shift away from the provision of lifelong education and formal institutions to informal and non-formal learning at home, at work or in the community. This shift, as Field (2002) maintains, creates difficulties for policy makers and governments. It may be more accurate to think of lifelong learning as a strategy rather than as a set of policies and that the role of the government is to create the conditions for a learning society.

In a research project called 'Learning Lives', Biesta et al (2011) provided insights into our understanding of lifelong learning. The project conducted over 500 in-depth interviews with a cohort of about 120 adults who were followed for three years to understand what learning means and does in the lives of adults. Insights included that learning permeates human life and is variable in its meaning and value; that people learn from their lives through their narratives; and that following learners over a period of time highlights new aspects of participation. The project showed that learning means much more in people's lives than is often acknowledged by current education policy and politics.

Policy formulation for lifelong learning is fraught with difficulties. The economic agenda and social concerns are not mutually exclusive and it is common for conflict to arise when issues focus on economic benefit and social inclusion and equality. There is concern that lifelong learning excludes lower socio-economic groups. In a world of technological change, investments in human capital can often become obsolete (Field, 2002).

Arguably, the future of lifelong learning could be compromised if effort is not devoted to building consensual domains in which people from different

backgrounds are able to build a great appreciation of each other's point of view. This is hard work and takes time to get to know the way in which other people think, act and learn. Confronting the uncertainties associated with trying to become an insider in an unfamiliar context requires sustained commitment and might be less appealing than pursuing more predictable learning in familiar surroundings. Without such efforts though, we could remain largely unaware of the nature and significance of diversity.

## *2.7 Collaborative learning and communities of practice*

There are many advantages in collaborative learning, which are of value for this study. Its ethos is in harmony with a deep approach to learning, linked to achievement (Boud, 1988) and it empowers individuals to have choice about their methods, pace, time of learning and it is open in access. Learners' and teachers' relationships are encouraged to develop intellectual openness, receptivity and interchange. The community is a functional, social and psychological resource.

The key issues in collaborative learning are noted by McConnell (2002), in order to work effectively as a group, learners must encourage, challenge and provide feedback to each other. This needs to be undertaken within a supportive and trusting culture so that the conditions are such that individuals feel comfortable about participating within the group. If this environment is not achieved individuals may feel isolated, fearful of contributing and may avoid group work altogether. There is the challenge that the institution relinquishes some control to the empowered learner and it is skill intensive for all partners involved. This study will seek to build on the positives and overcome the issues identified.

In collaborative learning, learners have a major role in choosing what they work on. They also have an important part to play in assessing their own and other learners work which provides support to the learning process. Again, the criteria and methods of assessment are decided through negotiation between learners and tutor.

Criticism has been noted (Falchikov and Boud, 1989) that students are not able to effectively assess themselves or each other but this has been dispelled through a survey that demonstrates consistency between marks given by teachers and students in peer assessment situations (Boud, 1986).

Boud (ibid) also reports that graduates rate the ability to evaluate their work highly as an important life skill and that institutions should do more to develop these skills. It will be useful to extend on the literature which focuses on formal learning, to consider how virtual reality might be used to support informal learning in SMEs.

The importance of communities in the social context for learning is emphasised by Lave and Wenger's (2002) sociocultural views that learning takes place through participation in cultural practices. They focus on learning processes within 'communities of practice' – in other words, groups of professionals who learn together, thus highlighting the social aspect of learning. Their emphasis is on participation and the significance and rich value of social processes in learning situations. They argue it is not so clear cut that learning only takes place in formal settings; instead the acquisition of knowledge involves informal and formal learning processes and encompasses engagement in a community. Lave and Wenger talk of communities of interest within professions, trades etc, such as artists, tailors, butchers and midwives. Initially the communities of practice are face-to-face and are often theme-based. Members are practitioners and learn from one another. Their studies showed that 'learners inevitably participate in communities of practitioners and […] mastery of knowledge and skill requires newcomers to move towards full participation in the sociocultural practices of a community' (Lave and Wenger, 1991, p29), however, communities do take time to form and feel established (Jelfs et al, 2007).

Sfard (1998) discusses how learning is interlinked within the context in which it takes place. She describes these two representations of knowledge as the 'acquisition metaphor' and the 'participation metaphor' which she presents learning as 'a process of becoming a member of a certain community' (Sfard, 1998, p6). She writes:

> "Since the time of Piaget and Vygotsky, the growth of knowledge in the process of learning has been analysed in terms of concept development. Concepts are to be understood as basic units of knowledge that can be accumulated, gradually refined, and combined to form ever richer cognitive structures."
>
> ***(Sfard, 1998, p5)***

Lave and Wenger (2002) define a community of practice as one within which a set of individuals are united both in action and in the meaning that the action has, both for themselves and for the larger collective. If a shared common practice is not present, then communities of practice fall down (Beenen et al, 2004). It is this commonality that motivates people to work together because learning has a real context (Ardichvili et al, 2003; Sharratt and Usoro, 2003). These communities are omnipresent – from Alcoholics Anonymous (AA), an apprenticeship scheme to quartermasters – they can be found in and out of work. This 'place of knowledge' generates ideas and meanings, shared understandings, a sense of belonging and offers learners a specific identity they can relate to.

Situated learning considers the idea of social learning in more detail. Learning is influenced by context, such as where we are and who we are with. Lave and Wenger (2002) sit firmly within the school of thought that is 'situated learning'. They suggest we need to pay more attention to learning in social situations and the social processes involved, instead of simply formal pedagogy; for example, a midwife being trained in midwifery practice will make connections in informal learning which will be vital information on aspects of health centre politics as well as issues in cost management.

There is no offering of a learning theory by Lave and Wenger, no acquisition of knowledge; the emphasis is on participation and the significance and rich value of social processes in learning situations. Identity is important and the meaning attached to that, in the example of the AA, the process of becoming in learning is clear in the way members learn how to talk the same speech, for example, statements are prefixed with 'I'm a recovering alcoholic'.

Gray (2003) followed Wenger's (2001) framework to establish whether a community of practice could support work-based learning in geographically dispersed, Alberta Community Adult Learning Councils.

> *"The purpose of this study was to understand to what extent participants' experiences in an online environment constituted a community of practice. The study also sought to understand the nature of the informal learning that occurred, motivations for participation, and the role played by the moderator in the community."*
>
> **(Gray, 2003 p21)**

The study concluded that an online environment did constitute a community of practice. Gray's research portrayed how the community helped new staff settle into the culture of the learning councils and developed a knowledge sharing organisation. Informal learning existed and helped to improve the skills of employees. The work of Bourdieu (1986) uses the term 'culture' to refer to the community's outlook on the world, the community's way of life, it's code of conduct, interests and preferences. Freeman (1993) views collective and individual memories as significant in shaping aspects of culture.

Faris (2006) also discusses communities of practice as one of a number of groups, that are self-managing their own learning. Figure 2.2 shows learning environments discussed by Faris (2006), which he says are ever-increasing. This supports Lave and Wenger's (2002) research that learning occurs in the absence of teaching and is an integral aspect of social interaction.

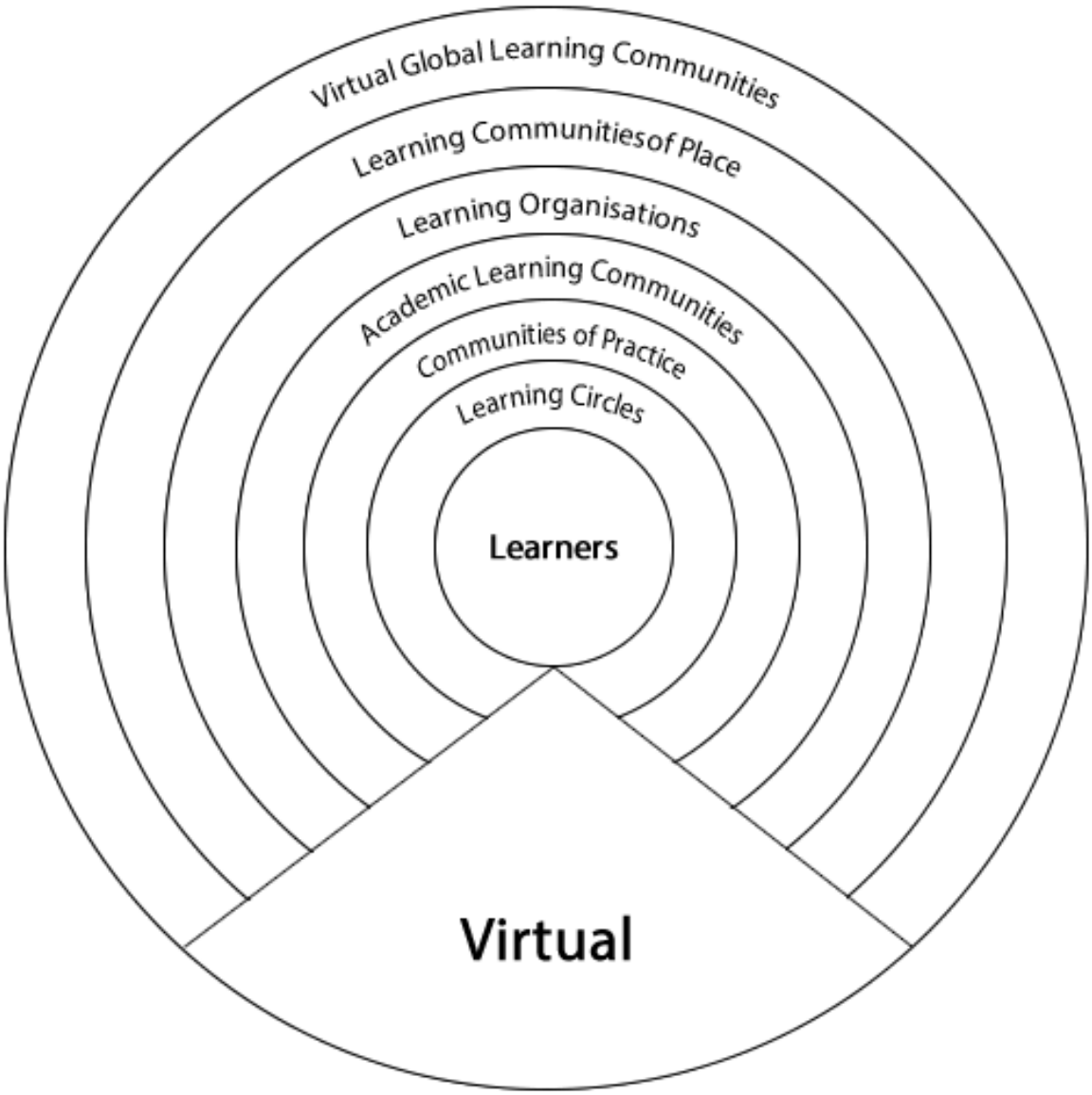



***Figure 2.2: Learning communities: A nested concept of expanding scale and cascade of social learning environments (Faris,2006)***

Lave and Wenger's (2002) communities of practice, generates a shared pool of communal resources that can be used to develop future practice. These shared resources can be labelled information and tacit knowledge. Lave and Wenger's (2002) research showed how the tacit dimension can become highly aligned as practitioners come to share a similar way of interpreting and responding to information. This was clear in the example of the AA. Polanyi explains the concept of 'tacit knowledge' to mean 'we can know more than we can tell' (Polanyi, 1983 p.4). It is in the heads of owners. Kidd (2002) provides a new analysis of empirical data, discussing Nonaka and Takeuchi's (1995) model of the knowledge creating company. Nonaka and Takeuchi's (*ibid*) interpretation of

tacit knowledge is something that is waiting to be translated into explicit knowledge (Kidd, 2002). In contrast, Tsoukas (2001) does not believe that Polanyi has a robust argument. Tsoukas uses a case study from Nonaka and Takeuchi (1995) to highlight that tacit knowledge cannot be converted or translated into explicit knowledge; and that the distinction between individual knowledge and knowledge that is held in common by a group is mis-represented.

In contrast to Lave and Wenger's (2002) concept of learning being a part of social participation; Hung and Chen (2002) disagree that an online community can be a community of practice, arguing *"participants are primarily involved in discourse about knowledge rather than learning to be"* (Hung and Chen, 2002 p26). Nichani and Hung (2002) also argue communities of practice cannot exist online and that face-to-face contact is required. Blanchard and Horan also write that *"virtual communities may be stronger where there can be both computer-mediated and face-to-face communication"* (Blanchard and Horan, 1998 p.298).

Online communities often incorporate some form of face-to-face contact which sometimes develop as a regular practice, termed 'blended community' (Jones and Preece, 2006). Rheingold (2000) identified how members of the WELL community gathered for picnics, however, these face-to-face meetings were not critical to the operation of the online community.

Researching the active, web forum users in the French, Cyberian newsgroup, posting on average 200 messages a day, Beaudouin and Velkovska (1999) defined an online community to be a co-operative, shared space. It was a group of people who followed online etiquette and shared personal relationships and values. They identified that online communities have a sense of belonging, developed group rituals and shared knowledge. However, their research also identifies gaps in their research: "…connection of virtual and physical social lives also needs to be investigated, since social motivations in the first might come from the latter" (*Beaudouin and Velkovska, 1999. P.109).* The idea of communities of practice forms a quadrant within the conceptual framework (See Fig.1.2).

There is no doubt that phenomenal changes are occurring in FE, apprenticeships and the world of work. Technology is starting to radically change the way we learn and significant research is required to understand the relationship between virtual world communities and information learning in the workplace. Education is having to compete with leisure technology and the use of readily available devices such as tablets and smart phones. Faster internet speeds, cheaper computing devices and greater scientific advances in the understanding of how our brain works and how we learn is opening up new opportunities for making effective use of technologies in education and expanding online offerings. This study will extend understanding to the SME context. Having discussed online environments, the next section focusses on online forms of community or affiliation.

In contrast to communities, Gee (2007) introduces the idea of affinity groups where people are associated with a semiotic domain. In summary, a domain is where people use a particular language to interact and communicate. A given SME, for example, will have its own vocabulary and, in that context, use language in a particular way, even if others use it differently in another context. They may not even realise they are using their own semiotics.

This is similar to Gamers and their communities who will have their own semiotics and constitute a semiotic domain. Gee (2007) says the issue lies in groups being labelled and thus people being labelled as being in or out the group caused because:

- Community implies belonging, which may not always be the case, especially in classrooms and workspaces.

- Community brings the idea of people being members, related to belonging, but also to shared goals or a collective purpose that may not be in force.

- Community of practice has been applied to all manner of things, possibly "missing the trees for the forest".

Gee argues for 'spaces' rather than community, saying "In affinity spaces people 'bond' first and foremost to an endeavour or interest and secondarily, if at all, to each other." (Gee, 2007, p.98). Spaces, Gee says have design and interactional content where people play and organise their belief systems, behaviour and values.

Spaces have the following features:

- Content, both design content and interactional content, i.e. how people play and how they organize their behaviours, beliefs, values and actions around the content. Design content is created by content generators.

- Organization of content and interactions: content organization arises from the design of a game. Interactional organization comes from interactions on and with the space and the people in it.

- Portals, which are entrances into the space, e.g. a website to discuss a game, the game disc itself, blogs, etc. Some of these become content generators in their own right.

Second Life® provides examples of a community of practice in many cases, because of shared goals, joint enterprise, and mutual engagement. White (2007) poses the question, how long does it take for a community to form? One of the problems with adapting the community practices in Second Life® to SMEs is that they do take some time to evolve, especially if they involve people who were previously unknown to each other. This is perhaps where Gee's idea of affinity spaces comes into play. Affinity spaces, Gee says, have the following eleven characteristics (Gee, 2007, pp.98-101):

1. Common endeavour, not race, class, gender, or disability, is primary.

2. Newbies and masters and everyone else share common space.

3. Some portals are strong generators.

4. Content organization is transformed by interactional organization.

5. Encourages intensive and extensive knowledge.
6. Encourages individual and distributed knowledge.
7. Encourages dispersed knowledge.
8. Uses and honours tacit knowledge.
9. Many different forms and routes to participation.
10. Lots of different routes to status.
11. Leadership is porous and leaders are resources.

A space can be more or less of an affinity space and can possess degrees of the characteristics. It is not a binary, prescriptive list. The theory then is that if we incorporate these ideas into business environments, we can help forge more cohesiveness, autonomy, and, in the end learning. Many of these characteristics are also shared by communities of practice and foster digital literacies. Those are the characteristics of dispersed and distributed knowledge, which may be generated by SMEs.

Gee (2007) discusses how role playing games involve three identities: you, the real-world person, who is playing a roleplayed character; the roleplayed character, a virtual identity played by you; and a projective identity, the interface between you and the virtual identity, where you project your values onto the virtual character and see the virtual character as a personal project under your control. This is Gee's notion of the tripartite identity.

The projective identity involves meta-reflection. You consider what kind of "person" you want your roleplayed character to be. Gee (2007, p. 51) comments that "A good roleplaying video game makes me think new thoughts about what I value and what I do not." The virtual character's history and future is all part of the projective identity. "[you] feel responsible to and for the character." (Gee, 2007, p. 53)

“When you have chosen a video game well, the virtual world it allows you to live in is quite compelling.” (Gee 2007, p. 59) Gee asserts that if the virtual world and the player’s virtual identity are not compelling then little deep learning will occur, because the player is not invested in mastering the domain. That is, they see little point or reward to investing effort, time, or practice required for domain mastery. What makes the realm compelling varies from player to player and even at different times.

Role playing in virtual worlds may be part of a process for users to test out identities, as part of an exploration of a participant’s concept of self (Lee and Hoadley, 2007).

> The ease of creating and modifying virtual identities encourages players to think of themselves as "fluid, emergent, decentralized, multiplicitous, flexible and ever in process"
>
> ***(Turkle, 1995, pp.263-264)***

Stets and Burke (2014) discuss how identity develops from the various social groups one belongs too and meanings between the different roles enacted. Identity meanings are constructed through group and social interaction in the roles one adopts.

> “This self is not a static entity but an entity that is dynamic and can change, it is important to examine how these different identities change over time and come to shape a new self-concept”
>
> ***(Stets and Burke, 2014, p.145)***

Cheng et al (2002, p.95) discuss how in virtual worlds maintaining their self enables “participants the opportunity to retain a persistent identity (which) will encourage them to invest more in their online representation”. Jakobsson (2002) discusses the importance of maintaining an identity, in order, to build relations and be recognised amongst social connections in the virtual world.

> "We are held responsible for our actions. All societies, physical or virtual, demand that we contribute something in order to benefit from being part of it, and, to keep tabs on our contributions, there have to be identifiers, and without an identifier, and identity, there will be no payback"
>
> ***(Jakobsson, 2002, p.74)***

Wenger (2008, p.13) describes identity as the "social formation of the person, the cultural interpretation of the body, and the creation and use of markers of membership such as rites of passage and social categories".

> *In general, the self-concept is the set of meanings based on our observations of ourselves, our inferences about who we are, based on how others act toward us, our wishes and desires, and our evaluations of ourselves.*
>
> ***(Stets and Burke, 2014, p.130)***

The notion of the situated experience of practice (Wenger, 2001), relates to the notion of telepresence (Minsky, 1980) in virtual worlds and the illusion of existing in a virtual world, i.e. the feeling of embodiment and the illusion of telepresence. Steuer (1995, pp.35-36) defines telepresence to be the "experience of one's physical environment" and "the mediated perception of an environment. This environment can be either a temporally or spatially distant 'real' environment (for instance, a distant space viewed through a video camera) or an animated but nonexistent virtual world synthesized by a computer". Sheridan (1992) distinguishes between telepresence and virtual presence as telepresence being the sense of being present at a remote site and virtual presence as the sense of being present with visual, auditory or force displays generated by a computer.

"Mediated environments" originates from Steuer (1995, p.37) and defines communication technology in which "information is not transmitted from sender to receiver; rather mediated environments are created and then experienced". This is as opposed to communication directly taking place between people either

face to face or through a telephone or video conference. Figure 2.3. depicts traditional communication where people are talking directly. In this thesis, the virtual world in Second Life ® is where participants interact with each other within the shared virtual world environment rather than directly (Zhao, 2003, p.445). Figure 2.4 depicts the mediated environment, where communication is taking place through a shared environment, not directly with each other.

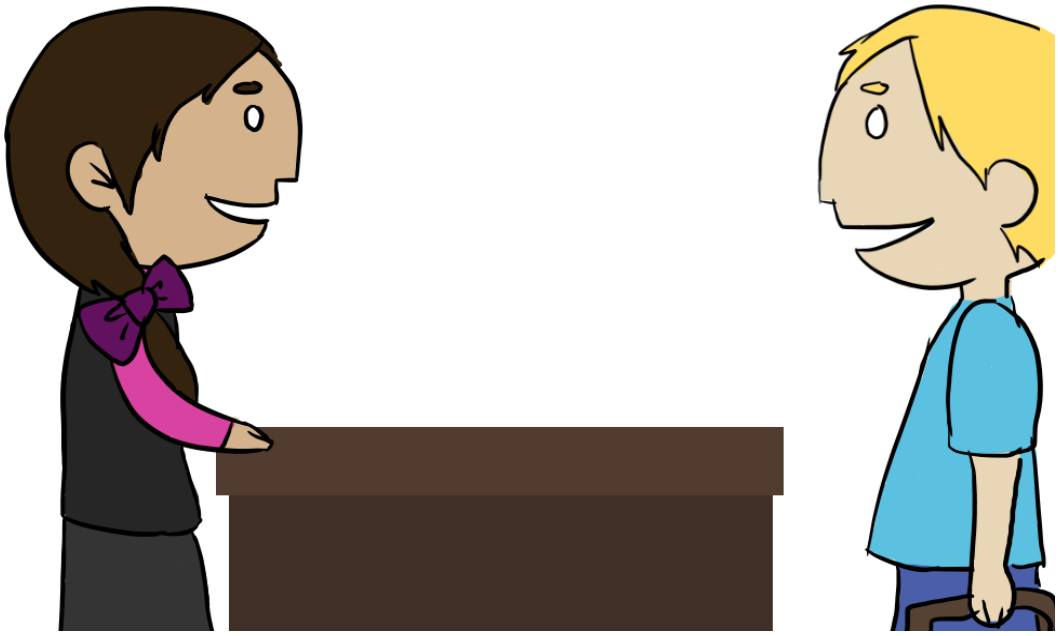


***Figure 2.3 Non-Mediated Communication***

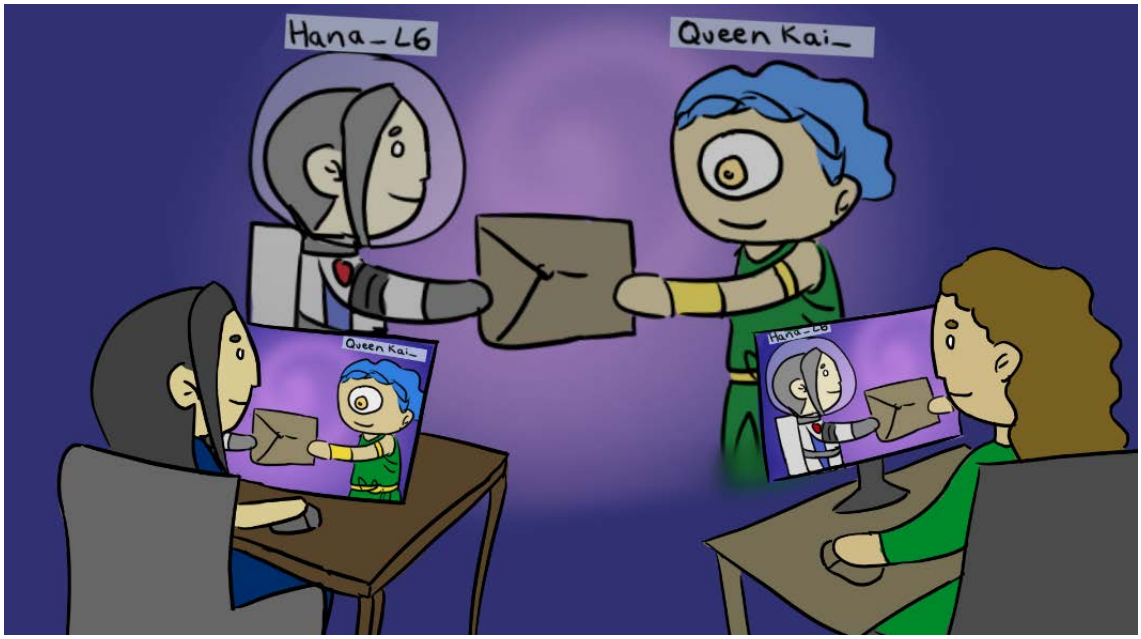



***Figure 2.4 Communication in a Mediated Environment***

In North et al's (2002) study, they reported of their participants' presence:

> "The subjective measures of sense of presence in the VE (virtual environment) increased gradually during each session. The subjective measures of sense of presence of the physical environment while attending the VE decreased gradually within and between sessions … This supports the theory that the total sense of presence is constant, and subjects have to divide their overall sense of presence between the virtual and real worlds"
>
> "The sense of presence in virtual and physical environments is constant and subjects have to give up the sense of presence in one environment (e.g. physical environment) to achieve a stronger sense of presence in the other one (e.g. virtual world)"
>
> ***(North et al, 2002, p.1075).***

Identity is formed from the various communities and social groups we participate in and the various roles we carry out and encounter. "The overall self is organized into multiple parts (identities), each of which is tied to aspects of the social structure." (Stets and Burke, 2014, p.131) and "The values, attitudes, and behavioral intentions of the social group to which they aspire to belong" (Cabiria, 2008, p.3). Identity impacts on the experience participants feel in mediated environments. "In general, individuals tend to express more aspects of their true selves when they interact with others on the Internet than when they interact in person" (McKenna et al, 2001, p. 304). Avatars can often reflect a truer self in the virtual world, than one can express in real life, as a real human being.

> "In this (digital) form, users suggest that the corporeal can no longer "corrupt" the truth about who they are and people often say it was through their avatars that they found a "better" version of themselves, one that felt even more right than their offline body."
>
> ***(Taylor, 2002, pp.54-55)***

McKenna et al (2001, p.304) describe the true self to be:

> "comprised of those attributes an individual feels he or she possesses and would like for others to perceive but, for whatever reason is generally unable to express and have acknowledged …"

Similarly, the notion of immersion and engagement are mutually dependent and considered important in gaming, as defined by Carr (2006, pp.53-54) who writes psychological immersion to be the 'mental absorption into the world' and perceptual immersion is 'the degree to which a technology or experience monopolises the senses of a user'. A game is most enjoyable, compelling and productive when a player is feeling the optimal experience, constantly switching between the two states and experiencing 'flow' (Järvinen et al, 2002, p.20) where the player's attention is heightened because their environment, goals and actions are all aligned and working towards the same target.

There are lessons to be adopted from gaming for work-based learning in virtual worlds. Järvinen et al (2002, p.21) refer to the work of Csíkszentmihályi (1991), identifying the key elements to achieve flow and interaction in gaming: 1) a challenging activity that requires skills, 2) the merging of action and awareness, 3) clear goals and feedback, 4) concentration on the task at hand, 5) the paradox of control, 6) the loss of self-consciousness and 7) the transformation of time.

The 'challenging activity that requires skills', is a balancing act for game designers to achieve (Järvinen et al, 2002, p.22). It has to be pitched so that the players are able to achieve the task, just within their skills range. If it is too demanding, then the feeling changes to frustration. Järvinen et al (2002) identify a number of factors to achieve flow, which are equally relevant to gamers as they are to virtual world participants. Users must be able to concentrate on the given task and not be disrupted by: usability issues with the technology, an imbalance of risks and rewards, poor camera control and inconsistencies in the game world. Important prerequisites to achieving flow are enjoyable social interaction and aesthetics of the game, such as imagery and sounds and the pace and structure of the game.

Järvinen et al (2002, p.26) cite Csikszentmihalyi, (1991, pp.190-1991) that flow parameters "apply to communal practices as well…especially the communicative and collaborative rituals that emerge within the user cultures of a multi-user environment".

Hagel and Brown (2009) have devised eight "lessons" from gaming. These lessons are helpful for businesses, to encourage their employees to collaborate, create, and innovate and relevant to apply in Second Life® work-based learning activities:

**(1) Reduce barriers to entry and to advance in initial stages**

Second Life® is open source and free for anyone to join. Novices can quickly learn to improvise and innovate in getting around the virtual world.

**(2) Provide rich performance metrics**

Just as operating in two-dimensional requires a new skill set and practice, Second Life® requires 3D skills and understanding in order to use it. Although signing up is easy, Linden Lab are fully aware of the learning curve. There are free tutorials and classes offered on Second Life® which raises performance.

As employees become familiar and more confident users, they begin to recognize performance benefits, such as the experiencing fun, interesting and novel experiences in the guise of their avatar whilst conducting collaborative, business activity. Experience efficiency benefits such as being able to multi-task, avoid commuting and being able to attend training in a safe virtual environment.

**(3) Keep raising the bar**

It is fairly easy to start in Second Life®. You begin with free access but you soon meet with a series of opportunities to explore and meet other avatars —the bar is constantly rising. Because Second Life® is free and open source, it is what reducing barriers to entry means. People do not need to invest much to get started. It's low-risk and high reward, which helps get people interested and

keeps them interested. Those who develop the right skills to benefit from Second Life® are raising the bar.

**(4) Remember to account for and use intrinsic motivations**

The designers of Second Life® have focused on intrinsic motivations and examining them in reflection. Avatars can gain widespread recognition as they master new skills. As time progresses, avatars learn to collaborate and participate in teams who work together to innovate in their virtual life and achieve the next level of performance. As relationships and trust develop within these teams, everyone is motivated to innovate by the desire not to let the team down.

**(5) Provide opportunities to develop shared knowledge not easily shared but don't forget broader knowledge exchange**

Second Life® fosters relationships and trust required to generate new tacit knowledge—the kind of knowledge that cannot be easily expressed and develops through shared practice. This is where most of the innovation in Second Life® occurs. At the same time, Second Life® has generated a rich ecology of online forums where users can share experiences, post requests for help in addressing new challenges, and learn from each other. These forums provide a "pull" platform where users encountering unanticipated needs can quickly reach out and assemble helpful resources. In contrast to knowledge management initiatives in more conventional corporate environments, a significant part of a user's recognition and status accrues from participation in the virtual worlds and in virtual chat and informal sharing.

**(6) Create opportunities for teams to self-organize around challenging goals**

Participation in Second Life® is not mandated from the CEO. Players naturally coalesce into teams as they quickly realize they cannot accomplish tasks and make progress without collaborating with others with complementary skills. Teams have become important organizational units within companies, but how many of these teams are self-organized? By giving teams the autonomy to recruit

new participants in Second Life® and—equally importantly—expel participants who are not carrying their weight, companies can significantly increase the accountability and motivation of teams.

### (7) Encourage frequent performance feedback

Second Life® provides a collaborative work platform for real time interaction in a virtual world environment and regular after-action reviews where all the participants can come together and review how they performed as individuals and as a team. The key focus is on reflection and how they can do better. This is a catalyst to innovation and creativity as participants can see performance gaps that are holding back the progress of the team and think about business in entirely new ways. Unlike the 360-degree reviews that have begun to crop up in a corporate setting, the reviews are based on objective, quantified performance metrics and visible to all participants. In this environment, poor performers at all levels have a strong incentive to address performance gaps in order to avoid being sidelined in future initiatives.

### (8) Create an environment that rewards new dispositions

Second Life® not only encourages participants to develop new skills; it fosters a new disposition. Second Life® is a compelling environment that naturally attracts participants because it is interesting and fun.

Rather than viewing the unanticipated as a threat, participants learn to welcome unexpected events as an opportunity to innovate, tinker, experiment, and, in the process, learn even more. Working virtually in 3D can bolster camaraderie as participants operate through an avatar. Second Life® can strengthen relationships with the sense of presence it creates, that conference calls and video conferencing cannot. Participants are there with others from their company in a new dimension that closes gaps and focuses on collaboration and relationship building. As Albon (2006) relates, whenever possible, individuals should be encouraged to connect with others within their specialism using media available. Albon (*ibid*) recommends empowering learners to collaborate and

create and incorporate group exercises and collaborative reviews and assessment.

Brown and Thomas (2008) describe the characteristics of people in online roleplaying games as being bottom-line oriented, thriving on change, understanding the power of diversity, believing learning is fun and "marinating on the edge". This last characteristic describes those playing online as ones who try out other strategies in order to find a better solution, even though they already know a working solution. They are not afraid to experiment or to try something completely new.

Participants in Second Life® learn to welcome collaboration as an opportunity to learn faster by focusing on a set of individual strengths while being exposed to the diverse perspectives and experiences of those with complementary strengths. At the end of the day, this is the most powerful contribution of Second Life®. This disposition creates an amplifying effect throughout the virtual world. Participants seek out other avatars who share this point of view, and they end up performing better than participants who bring more conventional ideas to the virtual world.

Companies seeking to thrive in a world of increasing uncertainty and accelerating change will need to foster this disposition among their own executive team and employees. They would be well advised to take a closer look at Second Life®, both in terms of the approach taken to foster this disposition and as a potential recruiting ground for employees who can bring this attitude and approach into the company.

Hagel and Brown's (2009) eight lessons could be applied to foster creativity and motivation, promote innovation and professional development and build identity for informal learning opportunities in virtual worlds. These lessons are just as applicable in fostering informal learning in SMEs, using virtual reality and useful when considering Research Question 2: *To what extent do virtual worlds develop identity, motivation and professional development?*

In communities of practice, (Wenger, 2008) defines the characteristics of identity and how it is informed by one's relationship to community members. There is a learning trajectory as people become a member of a community. Wenger discusses how local ways of being part of the community have to be learned and negotiated. He discusses how identity is formed through negotiated experiences in a community and how our various identities, from being part of several communities need to be brought together.

This research on virtual worlds in SMEs explores learning cultures in communities of practice and brings forward new information, which associates experiences in the virtual world with its impact on the real world and on the identities of apprentices and adult learners.

There are many benefits and issues to build upon from collaborative learning for the use of virtual worlds to potentially resolve. The conception of collaborative learning is advantageous for this Study in researching the use of virtual reality to enhance informal learning. This thesis seeks to address the gap by asking Research Question 3: *In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning?* The next section of the literature review discusses research on motivation and the role of affect to examine how this study can explore further the subject at an informal and individual level within SMEs and how the use of virtual reality may encourage the open exchange of ideas and open up mindsets.

## 2.8 Motivation in learning and the role of affect

A theme emerged from the literature review, which is around feelings, emotions and how employees work and feel during an activity which impacts positive and negative experiences for those using three-dimensional (3D) virtual learning. Affective refers to:

> "…anything pertaining to the emotions. This, in effect, means anything that is not cognitive (in essence, affective is the opposite to intellectual). Examples of affective factors include motivation, attitudes and perceptions."
>
> ***(Issroff, 1995, p5)***

Vygotsky (1978) argued that no process can be considered without some affective factors coming into play such as personal attitudes, feelings, inclinations, interests and motives (Rieber and Carton, 1987). Research into 3D virtual learning and collaboration show that success depends on a variety of affective concerns (Jones and Issroff, 2005; Murphy, 2004). Focusing on affective and social factors are important to consider when evaluating the impact of learning technologies in practice, however, the literature highlights the complexity and methodological issues (Jones and Issroff, 2005). Research by Mahn and John-Steiner (2002) illustrates how the role of the Trainer has an impact on mitigating negative affective factors to enable effective learning, for example, reducing anxiety and fear and also demonstrates how relationship building is a factor in positive feelings around 3D virtual learning.

I decided to focus on the role of identity in the participants' experience in the virtual world and explore motivation and professional development. The study explores the participants' perceptions of their motivation and development. Research increasingly suggests that when learners are engaged in shaping and leading strategy, they develop a greater sense of ownership over their learning (Healey et al, 2014). The second research question became: Research Question 2: *To what extent do virtual worlds develop identity, motivation and professional development?*

Developments in technology lead to change and it is inevitable that this will impact the approach and attitudes to learning. The journey, one travels on to use technology, is a process of internalisation called appropriation (Littleton et al, 2007) where you become experienced in its use and gain skills. Tapscott (2009) talks of a 'net generation' of children born after 1983 whose use of technology leads to an evolution of the way children learn and that this will lead to a learner centred approach, rather the traditional teacher-centred approach.

White (2010) refers to "Tourists" who only use technology for specific objectives when there is a specific need and "Residents" who use technology for longer periods, including to socialise. This has significant implications for the difference between whether and how these two groups use particular technologies and their ideology of education. The process of acquiring experience in using technology can be seen as a process of becoming informed or skilled, but an alternative view is that there is a process of internalisation of one's relationship with that tool. This has been referred to as appropriation; of making something one's own (Littleton et al, 2007)

Naturalisation takes a different approach to polarising users into whether they know the technology or not, to categorising according to the depth to which the use of technology has become a normal part of life (Schroeder, 2002). Users need to learn the social conventions of the virtual world (Becker and Mark, 2002).

> "Instead of money, you need props; instead of a high-status job; you need computer skills; and instead of looking good physically, you need to look good on the screen"
>
> ***(Jakobsson, 2002, p.73)***

Cheng et al (2002) found that other ways to be recognised leaders in virtual worlds are:

> "a) hours online (more advanced skills); b) friends online (having popular friends); c) formal club membership …; d) artistic talent (displayed via avatar creation); e) exploration of the environment (discovering secret places in the 3D spaces)"
>
> ***(Cheng et al, 2002, p. 104)***

It is hoped that by working together in the virtual world, participants will get to know each other and be able to support each other in an "affective" sense, encouraging commitment and motivation (Tait, 2000, p. 289). Affective activities, such as, feelings, emotions, how staff work and feel during their work in the virtual world, will be analysed in this research study. Throughout the study, affective factors will be examined, for example, recognising if group dynamics, confidence and motivation increase.

## 2.9 Conclusion

The research covered in this thesis builds upon studies that established the development of learning communities (Wenger, 2008) and the prevalence of informal learning (Tough, 1979, Livingstone, 1999) by asking in the first research question, *How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world?* This study looks at the use of Second Life® in SMEs.

Another important aspect of work-based learning is learning transfer where workers learn something in one context and it can then be applied to another situation (Perkins and Salomon, 1989). Perkins (1993) applies the concept to school leavers, but it is equally relevant to adult learners and apprentices and applicable in the workplace:

> "Research shows that very often pupils do not carry over the facts, principles and skills they acquire in one context to other contexts. Knowledge tends to get glued to the narrow circumstances of its initial acquisition. If we want pupils to transfer their learning we need to teach explicitly for transfer, helping pupils to make the connections they otherwise might not make and helping them to cultivate the mental habits of making links and connections".
>
> ***(Perkins, 1993, p.8)***

As part of the research journey, there are a number of challenges to be considered. It is important for the research construction to be carefully framed to accumulate evidence gradually, collecting data through a series of interlinked studies and to interpret the data, in order, to understand the dialogue and multiple perspectives being presented by the participants in developing their work-based learning.

The main challenges of this research are the same as many of the challenges facing education today. The workforce of SMEs needs lifelong learning and lifelong learning employees. These employees need to learn how to learn and develop their skills as employers cannot teach them everything. Learner-centred learning (Tapscott, 2009) aligns well with the affordances of today's technology, such as, the use of virtual reality.

Graduates, employees, apprentices need to be productive at the start of their employment with little or no ramp up time and they must adapt quickly to new and disruptive innovations. This study will be examining if working in a virtual world can help SMEs to continuously acquire new skills.

> "*…the complexities of the workforce in the 21st century require that employees have a wide range of cognitive and meta-cognitive skills, such as creativity, self-directedness, innovativeness, and knowledge of how they learn".*
>
> ***(Gros et al, 2015, p.29)***

The New Media Consortium Horizon Report (New Media Consortium, 2015) identifies the increasing importance of student-centeredness in educational approaches and a need to rethink how learning spaces should be configured for teaching complex thinking and for personalised learning. The challenge of this research is that the SMEs are being given a blank space to work within in a virtual world, but there is no funding available to build or develop this space. It is for the staff to design and create their own personal learning environment with the technology there to support the process.

The literature reviewed shares similarities and links to my research, however, this thesis study looks at the perspective of a range of under-researched groups in virtual worlds, by studying employees and FE apprentices in their use of virtual worlds in the workplace.

It aims to bridge the gap in literature by addressing how virtual worlds might allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world? Interest in online learning is increasing as a means of meeting the needs of disparate people, where institutional-based learning presents difficulties (Farrell, 1999). This is an indication that there is significant potential for the use of virtual reality in the workplace and advantageous for those who are unable to attend classroom training (Bates, 2000), such as, apprentices.

There is little research on whether and how the growth of virtual reality has impacted the way and where informal learning takes place. The majority of literature focuses on formal learning. The second research question will address *To what extent do virtual worlds develop identity, motivation and professional development?*

Finally, the research asks "*In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning?".* The UK government's drive to recruit 3 million apprentices by 2020 (Gov.UK, 2015a) takes education into a modern work setting, where employers lead on shaping the way their workforce learns and develops skills. UK demand for higher level skills will increase in coming years driven by business expansion

and the problem of an ageing workforce (Harrison, 2012). If the UK is to meet these needs, then fundamental reform of the way people learn within the workplace, is needed.

The next chapter describes how the ethical and methodological implications have been incorporated into the design of the research study.

## Chapter 3: Methodology, Research Design and Ethics

Chapter 2 set the research in the context of previous studies about learning in virtual worlds, both in formal and informal settings, and discussed the debates surrounding the definitions of collaborative learning; online learning; social learning; informal learning; lifelong learning and learning communities. This chapter provides a brief overview of the two main ontological assumptions, positivism and interpretivism. I discuss my justification for my choice of case studies as the methodological approach to researching work-based learning in virtual worlds and address the research questions. The chapter then discusses the research design, providing information on the methods for data collection and data analysis. I will also discuss ethics and provide a brief overview of the pilot study and the case studies that follow.

My research journey started with the consideration of challenges that I would be faced with, in a virtual world. I researched the experiences of participants through the development of elicitation techniques suitable for the situation and research participants. My plans for the construction of the study (see Tables 1.1 – 1.4) were framed to accumulate evidence gradually, collecting data through a series of interlinked studies. I will explain the research processes and the task of managing, analysing and interpreting the data I gathered. I intended to adopt a methodology through which to explore the learning that took place through virtual worlds, in the work place with employees and apprentices. The idea of gathering and considering the views of people using Second Life ® and devising and implementing an effective methodology was complex. The main challenge I faced when I began the research was how to define the 'problem' so that I could share it with others. I then had to devise a plan to carry out an investigation of the virtual world community. The purpose and dimensions of the research were included in the research questions I planned to answer. These questions helped direct me to relevant areas of knowledge, including learning cultures and research that studies digital technology for education (Crook and Harrison, 2008; Sharples et. al., 2009; Vavoula et al., 2007). Their research portrays unique ethical issues – for example, participants may be carrying out mobile learning activities that they haven't provided consent for (Traxler and Bridges, 2004), the

protection of privacy and identity (Holland et al, 2008), the attachment people gain to technology used within research (Anastopoulou et al, 2008).

There are a variety of research methods that have been used to carry out educational research, for example, narrative enquiry; grounded theory; ethnography; experimental; survey; case study and action research (Bell, 2005, pp.8-24). There is, however, limited research on the most appropriate method for researching 3D technology and no methodological blueprint for how to investigate learning in virtual worlds. I had a 'problem': how to document a community of work-based learners in a virtual world. I carried out three studies in the virtual world and successfully identified recurring themes of learning experiences and perspectives of learning in a virtual world and how this transcends into the real world. It was possible to accrue evidence about experiences in the virtual world across several studies and to compare data between studies. This chapter discusses the methodological context and approach for my study.

## *3.1 Ontological Assumptions*

Research methods are underpinned with accompanying epistemological and ontological assumptions relating different theoretical perspectives and paradigms (Crotty, 1998; Scotland, 2012; Guba and Lincoln, 1994).

It has been argued that paradigms and associated issues need to be identified to ensure research is dependable (Taber, 2007), however, there's another view that researchers should choose the method best suited to answer their research questions and that paradigms denote untrue idiosyncrasies (Symonds and Gorard, 2010). Gage (2007) describes paradigm wars between conflicting perspectives, the main two being positivist and interpretivist.

Table 3.1 shows the relationships between ontological, epistemological and methodological stances.

**Increasing objectivity, reality is external**

| *Item* | *Positivism* | *Post-positivism* | *Critical Theory* | *Constructivism* |
|---|---|---|---|---|
| Ontology | naïve realism – "real" reality but apprehendable | critical realism – "real" reality but only imperfectly and probabilistically apprehendable | historical realism – virtual reality shaped by social, political, cultural, economic, ethnic, and gender values; crystallised over time | relativism – local and specific constructed realities |
| Epistemology | Dualist / objectivist; findings true | modified dualist / objectivist; critical tradition / community; findings probably true | transactional / subjectivist; value mediated findings | transactional / subjectivist; created findings |
| Methodology | experimental / manipulative; verification of hypotheses; chiefly quantitative methods | Modified experimental / manipulative; critical multiplism; hypotheses; may include qualitative methods | | |

**Increasing subjectivity, reality is internal**

***Table 3.1: Theoretical perspectives in relation to ontological, epistemological and methodological perspectives (adapted from Guba and Lincoln (1994).***

### 3.1.1 Positivism

The positive view of ontology is concerned about the nature of reality and social entities and whether 'things' that exist are objective and have a reality external to social actors or whether they are social constructions formed by the insights and actions of social actors (Blaikie, 2009; Grix, 2002). By examining the philosophical underpinnings of the research questions, theoretical perspectives can be reviewed and links made between the philosophy and how the study should be conducted, "informing the methodology and thus providing a context for the process and grounding its logic and criteria" (Crotty, 1998, p.3).

The ontological view of positivism is that reality is independent of the research and within the post-positivist belief, reality may not be entirely obtainable (Pring, 2000).

Epistemology is the process of knowing and is the branch of philosophy that deals with the nature, origin and scope of knowledge (Cohen, Mannion and Morrison, 2007). We are constrained by the way we come to know reality by the way we define it. The view of reality by the researcher determines the chosen methodology (Guba and Lincoln, 1994), for example, positivist researchers employ experimentation methods, along with non-experimental methods including surveys and questionnaires (Gage, 2007) to reach a general view about a particular phenomenon studied (Cohen, Mannion and Morrison, 2007). These methods are useful for others to replicate the same study and techniques (*Ibid*). However, there is a risk with a positivist approach that human beings are seen as objects (Cohen et al, 2007; Stahl, 2007) or that claims are made based on poor quality quantitative research (Gorard et al, 2004).

### 3.1.2 Interpretivism

The main alternative to positivism is the 'interpretivist' view of behaviour, which is based on the view that because humans are self-interpreting (we attach meanings to what we do), they should not be studied in the same way as other natural phenomena (Gage, 2007). Interpretivism aims to understand situations, rather than measure behavior. It is not possible to engage in objective research

because individuals cannot be divorced from reality. There are as many realities, as there are people, concludes Pring (2000), however, some generalization is possible to some extent and may be discovered through common beliefs and behaviours (*Ibid*), for example, language. It is the role of the interpretivist researcher to understand the different points and construct a shared meaning.

Qualitative methods are usually adopted in an interpretivist approach; quantitative methods can also be utilized (Pring, 2000). Methods adopted may include case studies, longitudinal, comparative or retrospective studies, biographies and grounded theory.

There are risks associated with an interpretivist approach, for example, the subjectivity of both the researcher and the research participants. A triangulation of methods can be adopted to reduce the impact of subjectivity (Fay, 1996). As with both positivist and interpretivist approaches, there is always a risk of some subjectivity which can result in biased results. The difference is that interpretivists are transparent in showing their subjectivity. This is not always the case with positivists (Weber, 2004).

### 3.1.3 Case Studies and Mixed Methods

Case studies are my choice of methodology for this research study, which are a "specific instance that is frequently designed to illustrate a more general principle" (Nisbet and Watt, 1984, p.72) and will be utilised to reveal, as much as is possible, about using virtual reality for informal learning within the research study's parameters. There are three case studies for the method of inquiry i.e. "investigates a contemporary phenomenon within its real-life context" (Yin, 2003, p.13) and comparisons were made between them. A multiple case study framework was adopted with a single training activity or a sequence of work activities taking place in the virtual world (Yin, 200) undertaken by the research participants. Case studies are useful in naturalistic surroundings and in an environment which the researcher does not control (Hitchcock and Hughes,1995).

The case studies utilise multiple methods, which are discussed in section 3.2, in order, to richly comprehend real life situations of using virtual reality for informal learning (Robson, 2003). The generation of a variety of perspectives strengthens triangulation of evidence and the case studies' use of different instruments for data collection combine both subjective and objective descriptions (Dyer, 1995). The case studies are used in three ways: descriptive, interpretative and evaluative (Merriam, 1988). They have been used in an exploratory way to understand how virtual worlds might be used for informal learning, they've been used descriptively to provide an account of the situations occurring within the virtual world and exploratory, in order, to draw findings into the ways virtual worlds can be used to build communities of practice (Yin, 2003).

A mixed methods approach (Bryman, 2004) utilising both quantitative and qualitative methods has been applied to this study, which generates a rich understanding of the use of virtual reality in SMEs for informal learning. These are discussed in the next section of this chapter.

## *3.2 Data Collection Methods*

By using a variety of research methods, it enabled research participants to use their own words to communicate how they learned in the virtual world. Elicitation techniques (Boggs and Eyberg, 1990, Rich, 1968) were adopted to help the research participants remember, analyse and reflect on their experiences in the virtual world. Data collection methods were designed to best suit the research participants and their working environments.

Table 3.2 provides an overview of the methods used in relation to the research questions and conceptual framework before being discussed in detail.

## Research Questions and Methods

| Research Question 1 | Methods | Aims |
|---|---|---|
| How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world? | • Questionnaire<br>• Focus Groups<br>• Card Storyboards<br>• Transcripts of chat and spoken interactions in Second Life ® | • To try to ascertain if virtual worlds allow SMEs to work in ways they cannot in real life.<br>• To portray the different ways in which virtual reality is a useful analogue and/or substitution of the real world. |

**How this relates to the theoretical framework**

The central concept in the VINE framework is informal learning and a core segment in the framework is an analogue for the real world. The concepts of adaptability and support will also be used to analyse the data.

**Reasons for the Methods Chosen**

- A combination of questionnaires, focus groups and card storyboards strengthened the validity of the study through triangulation (Merriam, 1998). The same methods were used across all the case studies to enhance the reliability of the data findings.
- Questionnaires were individual and empowered participants to share their views on working in virtual worlds.
- Talking with participants through focus groups was a good way to receive information and follow up on their answers from the questionnaire.
- The card story-boards method helped participants who may find it difficult to articulate their understanding and acted as a useful memory trigger to recall their experiences and acted as a conversation prompt.

| Research Question 2 | Methods | Aims |
|---|---|---|
| To what extent do virtual worlds develop identity, motivation and professional development? | • Questionnaire<br>• Focus Groups<br>• Card Storyboard<br>• Mini Essays<br>• Transcripts of chat and spoken interactions in Second Life ® | • To try to understand how virtual worlds develop identity, motivation and professional development.<br>• To develop an understanding of the use of virtual worlds during work-based learning. |

| How this relates to the theoretical framework | | |
|---|---|---|
| Within the VINE framework, the concepts of informal learning, professional development, identity and agency will be drawn upon to help answer the research question, also examining the overarching concepts of adaptability, practice and engagement. | | |
| **Reasons for the Methods Chosen** | | |
| The benefit of using the additional method of mini essays helped to answer research question 2 by enabling participants to reflect and share their perceptions in more detail and provide context to their use of virtual worlds. | | |
| **Research Question 3** | **Methods** | **Aims** |
| In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning? | • Questionnaire<br>• Focus Groups<br>• Card Storyboards<br>• A Day in the life of<br>• Transcripts of chat and spoken interactions in Second Life ® | To explore employees' individual experiences in order to identify if virtual reality can build for informal learning. |
| **How this relates to the theoretical framework** | | |
| The use of Wenger's learning community framework helped to identify linkages between working in the virtual world and informal learning. The concepts of communities of practice, engagement and support were used to support the analysis. | | |
| **Reasons for the Methods Chosen** | | |
| The 'day in the life of' diary logs were chosen as a way to capture participants' experiences as they used the virtual world over time. It enabled the participants to express their feelings and provided an outlet for them to be able to reflect on their own views and attitudes towards working in the virtual world. | | |

***Table 3.2: An overview of the methods used in relation to the research questions and conceptual framework***

### 3.2.1 Questionnaires

A questionnaire (see Appendix E) was used as a main instrument of the project and used for all three studies, following the pilot. All questionnaires were hosted online using the Survey Monkey service (www.surveymonkey.com). The survey was configured so that the participant could not proceed without completing answers to compulsory questions. A questionnaire was deemed to be a most appropriate data collection method because it was individual and empowered people to share their views. Questionnaires were appropriate as an effective way of quantifying the sampling group of training delegates and testing their preferences. It also aided the reliability of the data by comparing the same set of questions across all the case studies. The results provide a directional method of measuring intensity towards the people's thoughts on the use of virtual worlds. It was seen to be the least disruptive for the delegates who were embarking on the use of Second Life® for the first time. Questionnaires allowed the delegates to complete in their own time and allow for reflection.

The questionnaire was designed to measure the reaction of delegates, exploring what they thought and felt about the training; exploring learning and the resulting increase in knowledge or capability; examining the extent of behaviour and capability improvements and the effects of the training on the business resulting from the trainees' performances. The questionnaire contained both closed and open questions. Open questions were used to elicit views of the positive and negatives features of learning in a virtual world. Closed questions were asked, in order, to describe the data set, for example age and gender, so that some analysis could be carried out on this basis. A four tick-box option was utilised, rather than three. Three options enable a middle answer which gives no indication either way. Four options encourage respondents to give a clear positive or negative indication.

Open questions such as 'What are the benefits of learning in this format?' were included to provide a richer dataset and open up new themes to explore. Open questions allowed the participants to answer in their own words, which provided relevant themes to be identified.

Questionnaires were completed by all 116 research participants at the end of their activity in the virtual world. Questionnaires were a useful method to use across all the studies because they allowed for a large amount of data to be collected in a short time and gain access to all the research participants, which would not have been possible by the employers through individual interviews. It also allowed for comparisons to be made of participants' behaviour over time from before they participated in virtual worlds to the end.

The pilot provided a useful check on the wording of questions and to ensure they were clear and unambiguous. Following the advice of Bell (2005), a check was completed with the pilot participants on how long completion took. The participants were asked if any questions needed to be added, amended or omitted.

However, the pilot revealed that on a downside, the questionnaire limits the range and scope of questioning. I was unable to probe people further on the answers they provided but did foresee this as a weakness and addressed this potential problem through the inclusion of free-text questions to allow for some detail in the people's answers to be provided. The questionnaire findings were also followed up with other data collection methods, including focus groups. Talking with participants and using focus groups was a good way to receive information and follow up on their answers from the questionnaire. All the data was entered and analysed in Microsoft Excel.

### 3.2.2 Focus Group Interviewing

This study used questionnaires in conjunction with focus group interviews and other research methods. Questionnaires were useful to extract background data, together with questions that helped focus on the research questions. Focus groups (group interviews) were used in the research studies to clarify contexts and questions. The focus groups supported findings elicited from questionnaires. Focus groups provided a lot of data in a relatively short time, which was useful for the context of working in SMEs, where staff's time is limited and so less inhibiting than several individual interviews. The focus groups were useful in

obtaining a range of opinions from people, even if those opinions differed. All 116 research participants took part in the focus groups.

The groups were kept fairly small with around 12 participants. I had prepared questions to set the stage, based around the research questions and encouraged responses, with the goal to elicit perceptions, feelings, attitudes and ideas about using virtual worlds in work-based learning. The groups were recorded and their transcripts analysed.

Talking with participants is a good way to receive information and the focus groups support the questionnaire data. Focus groups were a good way to receive in-depth and comprehensive information. Hosted focus groups were utilised to explore people's ideas, attitudes and concerns and test the new approach of working in a virtual world.

I used Nuance Dragon voice recognition software for transcription of the focus groups. I played back the recordings in headphones and repeated into the microphone. Nuance Dragon software then transcribed the content into Microsoft Word. This reduced the amount of typing required. All the data was then entered and analysed in Microsoft Excel.

### 3.2.3 Card Story-Boards

In Study 1, there were 77 courier drivers taking part in the research. They all work to tight deadlines and had limited and small windows of time in which to take part in any research discussion. I adopted a card sorting activity from the technique called 'card story-boards', attributed by Roth (1985), which allowed me to focus on ideas generated on particular topics associated with the research. I took the data from the pilot study to formulate a simple set of header cards each with a column of ideas cards below it. I used coloured index cards and asked the drivers to sort the cards into order of their priority from their experiences of using virtual worlds in the workplace. This enabled me to collate a rich set of data in a very short time, whilst not inhibiting on their operational work. The cards helped the staff to understand how they used virtual worlds and focused their attention in a short time slot. It allowed the

drivers to be in control of their data. Blank story boards were also provided so that the participants could create their own if required. The data collection method proved useful and was interesting for participants and focused their attention. I went on to adopt the card story boards with all 116 research participants. Research participants were divided into groups of 3 or 4 to carry out the card story-board activity.

The card story-boards method allowed participants to recollect more through the card prompts and add their own which gave them control and used the participants' voice to create the content. This method helped participants who may find it difficult to articulate their understanding and acted as a useful memory trigger to recall their experiences and acted as a conversation prompt.

All the data from the card story boards was entered and analysed in Microsoft Excel both quantitatively and qualitatively.

### 3.2.4 Mini Essays

I asked the participants at Langdel to write a short essay about their experiences and thoughts about working in virtual worlds. The benefit of the text, is its permanence, which allowed me to read and analyse, identifying key themes and material relevant to the research questions. The advantage of this method was that the participants are the experts in their experiences of the virtual world and this provided an opportunity for them to reflect and share their perceptions and context of use.

All the data from the mini essays was entered, coded and analysed in Microsoft Excel.

### 3.2.5 Diary Logs

Qiadel staff were using the virtual world over a longer period of time and in a variety of different ways and therefore, it was felt that a diary log would be an appropriate data collection method for this set of research participants to produce 'a day in the life of..'. Staff captured their daily experiences through a

diary log, which provided a rich data set about how virtual worlds were being used and how staff felt about virtual activities close to the time that they happened. This data method suited the staff at Qiadel because it was quick and easy to log their time with a few supporting notes, if appropriate.

Narrative research was also utilised because it allowed the Research Participants to develop their own story or narrative. Narration, Foucault (1972) argues, is the quintessential form of customary knowledge. Storytelling is one form of narrative knowledge. As Arthur (2002) notes, the most striking aspect of doing this kind of in-depth study relates to feelings that can be expressed by the research participants themselves. Often, it is only through this method that participants become aware of their own experiences, views and attitudes.

I approached narrative research and analysis with the understanding that it was open-ended and that in using it, I could not predict the outcomes of the research. Use of this approach added to the value and authenticity of the study of how participants were experiencing working in the virtual world and making sense of the environment. It is a useful way to gain a person's perceptions, culture and context.

All the data from the diary logs was entered, coded and analysed in Microsoft Excel.

## *3.3 Data Analysis Methods*

Each of the four studies produced a large amount of rich data for analysis as described in sections 3.2.1-3.2.5 above, combined with the data collated from Second Life ® through text transcripts and verbal interactions which were typed verbatim, by the researcher during the studies, outlined in tables 1.1-1.4. Only the researcher had access to the text transcript data and the collated typed audio transcripts

All the data collated from each study was entered and analysed in Microsoft Excel. I used Nuance Dragon voice recognition software for transcription. I played back the recordings in headphones and repeated into the microphone.

Nuance Dragon software then transcribed the content into Microsoft Word. This reduced the amount of typing required.

During the studies in Second Life ® I also took screen shots of activity to visually capture interactions taking place during the studies that took place (detailed in tables 1.1 – 1.4.

Data analysis was carried out by reading and taking the data apart in as many different ways as possible to see what meanings appeared within the text and layers of subject topics that were present that could help to identify themes and patterns of meaning. Comparisons were then made.

Concepts emerged from the data and from theory. These two approaches were used to generate a list of themes and sub-themes. Participants' discussion on themes were grouped together and placed under topic headings. Where they overlapped, they were placed under each of the themes that were relevant. Themes began to emerge more prominently and carried more weight, the more frequently they were discussed by the research participants. I wrote descriptions about each of the themes and sub-themes by drawing on the data and linking to key themes and concepts that emerged from the data.

The analysis of data provided openings to explore how the research participants operated within the virtual world and whether this allowed them to work in ways they cannot in real life and juxtapose this against the real world. In summary, data was drawn upon to reveal patterns of behaviour and learning.

Text was analysed to form themes and the content was analysed and clustered around emerging themes and sub-themes. In doing this, it was possible to describe the data, make connections and make apparent the reasons why the data has been interpreted the way it has to answer the research questions and form conclusions, however, it is acknowledged, that in combining the coding of all the data collected by the various methods together, as outlined in table 3.2 for each phase of the study may cause potential weaknesses as utterances made by participants in Second Life ® were categorized and quantified, as well as, the utterances about those utterances. Giving all the utterances, an equal weighting

could cause a multiplier effect. Comparisons were made between the start and end of each study, but the data analysis could have lost some sense of the progression due to the combined quantification and so the results do need to be interpreted with some caution.

In addition, participants continued to work, collaborate and communicate within the virtual world beyond the scope of the research study contact hours outlined in tables 1.1 – 1.4. The amount of additional time was not tracked and when participants responded to the data method collections, for example, in response to questionnaire questions or discussion in the focus groups, the scope of their answers may be taking into consideration their whole time of using the virtual world and not just during the study times. Whilst additional use of working in the virtual worlds by the participants is encouraging, it will affect the claims about its use, purely from within the set study time, as the data generated may be incorporated a wider viewpoint from additional use.

### 3.3.1 Content Analysis

A content analysis approach was employed to the data transcripts from questionnaires, focus group transcriptions, mini essays and diary logs. This seemed a useful method as it would identify the research participants' focus over a changing timescale and is a useful method for applying to a large data set. Mehanna (2004) used content analysis for five million words of online interaction. Content analysis is a procedure for analysing written or verbal communications in a systematic way, often with the aim of making them amenable to numerical or statistical analysis. Content analysis "emphasizes the criteria of reliability and validity and the counting of instances within a predefined set of mutually exclusive and jointly exhaustive categories" (Pidgeon,1996, p78). Although this can be legitimately dismissed, particularly by qualitative researchers who recognise that transcripts can 'afford multiple interpretations' (Krippendorff, 2004, p.87). Content analysis of online interactions has frequently been criticised because of 'the failure of researchers to adhere to the principles that make quantitative research valid' (Rourke, et al., 2003, 148) and 'coherent and empirically validated content analysis instruments are still lacking' (de Wever, et al., 2006, p25).

To overcome any potential weaknesses in reliability and validity (highlighted in a review of 19 studies by Rourke et al, 2003 and a review of 15 content analysis instruments in de Wever et al 2006), essential to quantitative content analysis, the pilot study coding scheme was tested (see Appendix J).

## *3.4 Research Construction*

Through my knowledge of the industry, I contacted organisations who I thought may find working in virtual worlds of interest and who also employed a number of FE apprentices. I contacted the organisations direct through post, email and telephone (See Appendix B for a copy of the letter issued).

It was not possible to work with some organisations, because they had requests of the software that could not be met as part of the research, for example, requesting particular development within the virtual world, but did not have the funds to match the work required. Other SMEs wanted to do real life simulations with engineering equipment or modelling, which again required funds for this to be created within the virtual world and this was not available as part of the PhD study.

After a number of consultative meetings, agreement was reached with three SMEs who accepted the invitation, following acknowledgement that both the criteria for the research and the SMEs' objectives were both met. The three SMEs had specific work-based situations that they wanted to explore within the virtual world and would not require additional development work in the virtual work. Face to face meetings were then arranged to progress the study. An overview of each study was produced with each of the employers (see tables 4.1, 5.1, 6.1 and 7.1).

There were then follow-up focus groups to review progress and this allowed a continuous check on the ethical implications of the research project and for all stakeholders involved within the organisations to come together as a whole. At the initial meetings, it was discussed with all the gatekeepers about how they might like to use the virtual world and problems were identified that working in the virtual world may support and the purposes and designs for role play were

mapped out. The activities and roleplays within each study emerged through consultation with staff and assessors involved with the apprentices.

I attended a meeting at all three organisations at the start to give a brief talk on the project. All participants for the study were nominated by their Managers with relation to their business needs on who they wanted to have involved, but all staff were free to decline the invitation if they so wished. All Staff were issued with a letter and consent form (see Appendix C) inviting them to take part in the research study and had the option to withdraw at any time. They were also informed by their managers that if they did not take part that it was in no way a bad reflection upon them.

I began with a pilot study with 22 participants from Langdel, a UK food manufacturer, which compared customer service training carried out face-to-face in a training room setting with follow up training carried out three months later in the virtual world. The initial study explored the features of virtual worlds that employees see as positive and negative. The pilot study made me aware of the importance of shaping the methodology appropriately. It informed the methodology for the main study. Studies 1, 2 and 3 took account of the pilot work and indicative findings carried out in the pilot study.

The primary aim of the pilot was to inform the main study by trialling the research method and approach. As a result of the pilot, data collection and method were developed. The questionnaire and focus groups remained, but further collection methods were developed to suit the circumstances of the staff, their roles and the organisation.

The pilot study and Study 2 took place with 14 Apprentices and 8 Managers and Staff from Langdel, one of the largest fruit and vegetable growers in the UK, supplying many major supermarkets. They also have a site in Spain. The organisation employs a large number of apprentices, as well as, seasonal workers. There are a mix of roles amongst staff and management, including sales teams, customer service teams, office staff, alongside, staff working on the land with farm machinery. The aim of Study 2 was to see whether working in virtual worlds engenders identity, motivation and professional development.

Study 2 links with Study 1 as a development of virtual world analogues with the real world and links Study 3, comparing the learning dimension in virtual worlds.

Study 1 took place with 39 Staff and 38 Apprentices from a nationwide courier company. They operate from truck yards around the UK, working out of a portable building with a small office and meeting room. Study 1's focus was on exploring how virtual worlds may allow SMEs to work in ways they cannot in real life and to discover if they are a useful analogue or in some cases, a substitution of the real world. Study 1 linked with Study 2 and Study 3 because Study 1 findings about virtual worlds informed all the studies.

Study 3 took place with 17 Managers and Staff from Qiadel, a life sciences and pharma company, based in Manchester in the UK. Qiadel also has sister sites in Germany and the United States of America. The study evaluated the effects of working in virtual worlds for work activity. In particular, it looked for evidence of the ways that virtual worlds might build communities of practice and trigger informal learning. Study 3 links with Study 1 and Study 2 through similar characteristics of learning experiences, identity and community.

Tables 3.3, 3.4 and 3.5 show the research participants' profiles from the questionnaire results.

**Section A: Information about you**

| **What is your age?** | | |
|---|---|---|
| Population | 116 | |
| Minimum | 18 | |
| Maximum | 55 | |
| Range | 37 | |
| Mode | 18 | |
| Mean | 27.5 | |
| Median | 26 | |
| Lower Quartile | 19 | |
| Upper Quartile | 34 | |
| Standard Deviation | 9.48 | |
| **What is your gender?** | | |
| Male | 90 | 77.6% |
| Female | 26 | 22.4% |
| **Total** | **116** | **100%** |
| **Is English your 1st Language** | | |
| Yes | 113 | 97.4% |
| No | 3 | 2.6% |
| **Total** | **116** | **100%** |
| **Do you have any disabilities?** | | |
| No | 107 | 92.2% |
| Yes | 9 | 7.8% |
| **Total** | **116** | **100%** |
| ***Summary of disabilities*** | | |
| Learning difficulty | 6 | 5.2% |
| Autistic Spectrum Disorder / Asperger Syndrome | 0 | 0.0% |
| Blind or partially sighted | 0 | 0.0% |
| Deaf or hard of hearing | 1 | 0.9% |
| Wheelchair user or mobility difficulties | 0 | 0.0% |
| Mental health difficulties | 2 | 1.7% |
| Other | 0 | 0.0% |

***Table 3.3 Research Participants' Profiles for all three studies.***

## Section B: Information about your technology use at work

| | | |
|---|---|---|
| **How often do you use a computer?** | | |
| Everyday | 33 | 28.4% |
| A few times a week | 83 | 71.6% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **116** | **100%** |
| **Do you have access to a computer connected to the internet?** | | |
| Yes | 116 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **116** | **100%** |
| **How often do you use the internet?** | | |
| Everyday | 33 | 28.4% |
| A few times a week | 83 | 71.6% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **116** | **100%** |
| **Do you have access to mobile devices with internet access?** | | |
| Yes | 116 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **116** | **100%** |
| **In what ways do you use computers for learning?** | | |
| Research | 78 | 67.2% |
| Collaborative work | 6 | 5.2% |
| Meetings | 8 | 6.9% |
| Online training | 6 | 5.2% |
| Communication | 116 | 100.0% |
| Networking | 4 | 3.4% |
| Sharing ideas | 40 | 34.5% |
| Other | 77 | 66.4% |
| **How do you normally take part in Training?** | | |
| Distance Learning | 8 | 6.9% |
| Face to Face Training | 116 | 100.0% |
| Placement | 12 | 10.3% |
| Workplace - On the Job | 116 | 100.0% |
| Self Study | 5 | 4.3% |
| Social Networking / Virtual Worlds | 0 | 0.0% |
| Other | 0 | 0.0% |

***Table 3.4 Research Participants' Profiles on Technology use at work for all three studies.***

**Section C: Using Second Life ® for work-based learning**

| Have you used second life before? | | |
|---|---|---|
| Yes | 5 | 4.3% |
| No | 111 | 95.7% |
| **Total** | **116** | **100%** |

***Table 3.5 Research Participants' Use of Second Life ® prior to the research study from all three studies.***

Language utterances are one key element to the data gathering. Signifiers of cognitive learning are to be explored, as the foundation of learning interventions. Data collected across all the case studies, including the pilot study has been coded using the Veldhuis-Diermanse Schema for Learning Processes Coding (Veldhuis-Diermanse, 2002) – see Appendix J. This schematic analysis appeared particularly appropriate for this study of virtual worlds because the literature showed that it had been extensively used for the analysis of virtual world studies such as Lally and Sclater's work (2010). It was therefore selected for use in the pilot study because it appeared to be an effective, robust and comprehensive method of identifying the focus of participants from one session to the next (Noroozi et al, 2012). A second point to note is that it is very difficult to look across work and understand issues raised, if all researchers choose a different coding system. This study does not claim that the Veldhuis-Diermanse Schema for Learning Process Coding is the only system to use; other schemas and methods might be useful, including discourse analysis, social network analysis and ethnography. Other methods have been used to analyse similar data, but appeared less suited to the study of informal learning in virtual reality in the context of this relatively small-sized research.

The Veldhuise-Diermanse coding schema (2002) categorises four activities: cognitive, meta-cognitive, affective and miscellaneous.

Cognitive activities are coded into three subcategories: (1) debating, (2) using external information and experiences and (3) linking or repeating internal

information. These codes on cognitive activities identify when the staff are thinking and absorbing learning to achieve work-based learning goals.

Meta-cognitive activities are coded into three subcategories: (1) Planning, (2) Keeping clarity and (3) Monitoring. These codes on meta-cognitive activities identify when staff are managing their learning, knowledge and skills. It identifies when they are problem-solving, applying cognitive skills to achieve successful learning. It refers to the extent to which staff are managing and regulating cognitive activities for their development of successful learning.

Codes for affective learning activities identify coping with feelings and emotions occurring during the work-based learning and training. These identify the state of minds of the research participants during the activities which influences their learning positively, negatively or neutrally (Issroff, 1995).

The final code for rest activities was used for anything that could not be coded using the above three coding.

## *3.5 Methodology implications from the pilot study*

The participants often took a lot of probing before being able to articulate their experiences in the virtual world. The focus groups were time consuming and far more effective when more people were involved because participants were able to bounce ideas off each other. It was felt that some discussion prompts would be useful to focus discussion and initiate conversation starters for the main study. These would be created from the data analysis of the pilot study.

Second Life® worked well for the most part, as issues had been resolved during pre-study setup. Any technology failures were usually minor. The main issue was that the software often crashed, which was a deep cause of frustration amongst participants.

The pilot revealed that on a downside, the questionnaire limits the range and scope of questioning. I was unable to probe people further on the answers they provided but did foresee this as a weakness and addressed this potential

problem through the inclusion of free-text questions to allow for some detail in the answers to be provided. The questionnaire findings were also followed up with other data collection methods, including focus groups. Talking with participants and using focus groups was a good way to receive information and follow up on their answers from the questionnaire.

The pilot study made me aware of the importance of shaping the methodology appropriately. It informed the methodology for the main study. As a result of the pilot, the data collection and method were developed further. The questionnaire and focus groups remained in the main study, but further collection methods were developed to suit the circumstances of the staff, their roles and the organisation. A mix of methods also provided variety to suit people's different preferences.

All the data was entered and analysed in Microsoft Excel. The quantitative data gathered from the questionnaires is shown in Appendix H.

The questionnaire also included free-text questions to allow for some detail in people's answers to be provided. The research questionnaires were supplemented with focus groups, in order, to probe people further on the answers.

The utilisation of the virtual world within this research always followed settled and agreed purpose from the SME and not the other way around. These were mapped out in advance and helped provide each study with clear focus (as shown in tables 4.1, 5.1, 6.1 and 7.1).

## *3.6 Ethics*

This section on ethics has been included so that it is not taken as read that online virtual worlds are assumed public areas where data can simply be taken for research without any adherence to ethical research norms.

The research has been subject to rigorous ethical procedures and has been scrutinised and approved by two members of the School of Education's Research

Ethics Committee within University of Glasgow's College of Social Sciences (see Appendix D). Furthermore, the research also conforms to the British Educational Research Association Ethical Guidelines (BERA, 2011) and adhered to the British Psychological Society Code of Ethics and Conduct (BPS, 2009).

In addition, to the detailed ethical guidelines issued by the University of Glasgow, specific ethical consideration was also undertaken due to the research studies being carried out in virtual worlds, as summarised by Sharf (1999, p.245): "issues of privacy, confidentiality, informed consent and appropriation of others' personal stories". Actions in virtual worlds can be just as harmful as in the real world. The human subjects research model (Waskull and Douglass, 1996) always places the human subject's rights as the priority under all circumstances and the research aims are always secondary.

The ethical stance adopted in this research could be described as employees as willing, active participants. All the research studies ensured that the participants gave informed consent to their participation. All research participants were provided with an outline of the project, which detailed the context of the research and the anticipated range of outputs. It was also important to explain the relevance of the study to themselves and others.

Pasquinelli (2010) writes that there is a risk for participants in virtual worlds to feel deceived because of the deceptive illusionary environment of the virtual world. The research participants are being exposed to the illusion of existing in a virtual world, i.e. the feeling of embodiment and the illusion of telepresence (Steuer, 1995). An ethical consideration for participants is their 'psychological importance and emotional attachment to virtual objects' (Grimes et al, 2010, p.79), which may form. Participants may feel they have developed an identity built around their avatar and virtual appearance and experiences in the virtual world. Participants were advised that they could continue using their avatar after the study was over, as long as Second Life ® continues to exist and host the virtual world.

No participants were embarrassed, shamed or endangered during the research. Research that studies digital technology for education (Crook and Harrison,

2008; Sharples et. al., 2009; Vavoula et al., 2007), presents unique ethical issues – for example, the protection of privacy and identity (Holland et al, 2008); however, there is an incentive to conduct research in this area, as it may lead to contributing to innovations in educational and business policy and practice. All frameworks stress the importance of personal integrity in solving ethical issues and for all issues to remain open questions that are revisited as new understandings emerge. All data was stored securely on a password-protected computer.

The information sheets and consent forms were provided (see Appendix C). Consent processes were conducted within a framework of general requirements which dictate that consent must be competent, voluntary and informed. I obtained written consent from all participants. The research approach was respectful and fair to participants and throughout I remained alert and responsive to potential risks.

All research participants received and understood all the relevant information about the research study before they gave their consent. To ensure this, I explained the important details of the study so that each participant was able to judge whether he or she was comfortable in participating. I verbally communicated in the initial face-to-face meeting with the participants before they provided consent, about the purpose of the study and what their participation would entail. I discussed the likely time involved and who to contact if they had questions or concerns. I talked about how taking part may benefit them personally and as an organisation and discussed potential problems and risks that might result from being involved. Those contacted were asked whether their data could be archived and if they agreed to take part in focus groups and other methods for data gathering. I detailed all this in written communication (see Appendix C).

Participation was entirely voluntary and no pressure was placed upon individuals to participate and participants could withdraw at any time. Participants were free to leave at any point during the research study and their comments only recorded with their agreement.

Participants were advised that they could also leave any of the research activities at any time and advised that activities were being recorded, in order, to be transcribed for analysis later.

Protecting confidentiality in the context of research is a matter of respecting the right to anonymity and privacy at all stages of the research, including after the findings have been published. The information gathered was subject to data protection regulations as it constitutes personal data. This legislation confers obligations about how the data is stored and who might have access to it. Under the Data Protection Act, the data collected was classed as personal data i.e. information about an identifiable living individual. To ensure confidentiality the information was pseudonymized i.e. codes were added to personal information. Data from each individual was combined with that of others, so participants could not be identified as a specific individual. No personally identifiable data, such as real names, phone numbers, character names, or IP addresses, were required or stored with the survey except an optional e-mail address for follow-up questions or future surveys. Due to studies taking place across multiple sessions in Second Life® and repeated observations will be collected over long periods of time from the same participants, participants were asked to complete an identifier token. In order to not compromise anonymity or rights to privacy, participants were asked to identify themselves using a combination of a specific letter from their month of birth and digits from their telephone number. This was called an identifier token and will ensure the desired anonymity is maintained as participants take part in repeated observations.

The data collected will only be used for research studies and for publishing the results and research studies. All data on the questionnaire form was stored on Survey Monkey's computers until shortly after the survey closed. Data collected may be published, but individual privacy will be completely maintained. If an individual is referred to, it will be only by the identifier token. All organisations taking part were also given a pseudonymised name.

### 3.6.1 Bias

The notion of bias is an important aspect to consider. Bias can lead to errors which can arise if values and expectations colour the way the research is conducted. I remained self-critical and scrutinised assumptions and ways of presenting findings. I was only linked to the delegates through the research for The University of Glasgow and did not have any former knowledge of the stakeholders involved. Bias also arises as a result of the way subject populations are chosen.

### 3.6.2 Validity and Reliability

Validity is the extent to which the instrument is measuring what it claims to be measuring (Neuendorf, 2002). Validity is asking does the data mean what we think it means? And how do we know? What reassurances do we have? The issue of validity is the extent to which we view humans as capable of independent, creative action, that is not simply the result of what we absorb or experience.

#### *3.6.2.1 Internal validity*

I adopted a critical frame of mind in planning and carrying out the research investigation. I adopted an attitude of scepticism and reasonable doubt towards knowledge (Wallace and Poulson, 2003). I questioned the quality of my own claims, as well as, those of the research participants. Strengthening the internal validity through the use of the VINE framework (see Fig.1.2), provided a systematic and logical method to organising and analysing the literature and data. However, Smyth (2004) has found that the use of the conceptual framework is self-fulfilling because it results in data automatically being rejected that doesn't fit and that which is easily recognised fitting into the framework.

The research data in this study comes from the participants themselves and their perceptions of the real-life experiences taking place in the virtual worlds and so the findings are reliant on the participants being able to accurately, articulate their experiences. To aid the process, a variety of data collection methods were

used. Further validity was achieved by conducting both qualitative and quantitative research and this mixed methods approach, provided triangulation on the experiences of learning in the virtual worlds (Merriam, 1998, p.204).

#### 3.6.2.2 Reliability

Reliability was verified through replication of methods and processes (Yin, 2003, p.46) through the series of case studies, following the pilot study. Reliability was also achieved through a range of organisations taking part in the research studies, which generated different results in the data.

The research was carried out in ways inclusive of participants and following ethical guidelines. The methods adopted, allowed research participants the opportunity to comment and make choices at several stages of the research. As Bassey (1999) points out, in taking data from people, I did so in a way that recognised the research participants' initial ownership of the data and I respected them as fellow human beings who are entitled to dignity and privacy. Firstly, participants had full control on what they shared and secondly were able to check and comment on transcripts. Thirdly, all research participants were able to check all content to prevent any distress. I applied all three protocols in my research. For some research participants, their involvement extended beyond these protocols because they made additional contributions to the data and wrote about their learning journey through Second Life ®. Research Participants, therefore, had the opportunity to develop the nature of their involvement in the research and contributed participant data to the study. Their narratives indicate their belief that, their activity in Second Life ® had been transformative and the experience of work-based learning was enriching.

Having direct access to the research participants enabled me to study systematically, the research themes and interactions in a virtual world. This provided valid and valuable insights within the SMEs' organisational settings, which could be evaluated against other data and conclusions from the literature. To avoid any threat to the validity of the study, I kept assessing interpretations, biases and prejudices that may impact on the data collection, to ensure that the data collection measured what it was supposed to and answered the research

questions. Human activity is not entirely rule-governed and therefore activities can be reduced, ultimately, only to sets of predicable behaviours (Chomsky, 1959 and D'Agostino, 1984). Comparisons have been made within the study with other related research to ensure the interpretation of the data is a close reliable interpretation of the data. Both open and closed questions were asked to help with validity and empirical adequacy.

The claims in this thesis study are supported with logical arguments and a reasonable degree of evidence and therefore, the conclusions formed are deemed to be valid. Although reliability can have links with bias, sampling and validity, it is considered that if this thesis study was repeated by another researcher that very similar conclusions would be drawn. More case studies are required and more data needs to be collected and analysed to provide greater validity.

## *3.7 Second Life ® Orientation and Anonymity*

All research participants at the time of being briefed about the research project and following signing of their informed consent, took part in an orientation session of the virtual world (see Figure 3.1). Each participant was issued with a quick-start guide (see Appendix F) and were given an orientation tour of the island. Demonstrations were provided on how to navigate the virtual world, how to fly, walk, sit and how to communicate with others through the chat facilities. Participants were shown how to teleport to destinations, view and search for locations and how to customise their appearance.

***Figure 3.1: Research Participants attending an orientation session in Second Life®***

Participants were shown how to look up support if they needed help and provided with the opportunity to spend time working through the orientation guide. All participants followed along, whilst the Researcher demonstrated the orientation and this was overlaid with audio through Skype. They then spent time becoming familiar with the controls and movements and navigating around the island.

Virtual worlds provide collaborative spaces for learners to meet without real-life limitations. They lend themselves well as a place to role-play, because learners can engage anonymously through the adoption of an avatar (their virtual presence) and learn from their peers through observation, discussion and peer-assessment. Virtual worlds provide an opportunity for participants to adopt a new form of identity through their avatar. This could be machinery such as a car, an animal or a human or alien avatar of any sex or race. The adoption of an avatar enabled participants to be anonymous, although some chose to be themselves in avatar name and/or in appearance. The pilot study showed participants felt a confidence through their avatar which they did not feel in

face-to-face training. Virtual reality provides a tool to offer engaging modes of interaction and help provide valuable timely and just-in-time feedback.

As the research developed and the avatars worked together, those who had concealed their identity became known to others either as their confidence built or as a result of being recognised. This naturally occurred through the forming of relationships with other participants. This is not unusual when working in Second Life ® and has been noted in other research studies (Lally and Sclater, 2010). This was evident across all the studies in this research, but in particular for study 1, as the study captured activity taking place in Second Life ® over a longer period, daily for 8 weeks. Section 5.4 discusses a variety of evidence to demonstrate this, including social order developing and the use of support networks and staff benefitting from shared experiences within the virtual world.

## *3.8 Conclusion*

This chapter has explained how I carried out the research: who was involved, the processes used, the data collection methods and data analysis and how it forms part of the methodology. The research was based on apprentices and employees using virtual worlds in SMEs. The interrelationships between studies and the phased accumulation of an evidence base to demonstrate the strength of the research and a distinctive methodology. The next chapter describes the pilot study.

# Chapter 4: From Classroom Training to Virtual World at Langdel

## *4.1 Introduction*

Following on from the initial review of the literature, I began my account of the research with a pilot study. The purpose of this pilot was to begin to explore the use of virtual worlds in comparison to real world training taking place within a classroom. The pilot study challenges current working methods for learning and provides significant findings, which are framed by the real-life experiences of staff, apprentices, managers and learning provider working together in the virtual world. This chapter describes the pilot study carried out, following the review of literature and its relevance to the main case studies. An overview of the pilot study is provided in Table 4.1.

The importance of the pilot is to inform the methodology for the main study and refine the relevance and scope of the research. Section 4.2 discusses the rationale for the pilot study and outlines the research methodologies and ethical considerations for the main study. The pilot study was important to trial questions and expose ambiguity and establish clarity of purpose and a systematic approach to methods. A pilot study would usually only be used to test and refine the methodology, but I decided to present the pilot study as a mini case study in itself because the data that resulted was valid when taken together with the larger study. Section 4.3 describes the pilot study with Langdel, analysing the data collected and describes the data results and relevance.

Section 4.4 discusses the key findings that emerged from the pilot study and implications for the main study are discussed and some initial findings are drawn on what employees see as positive and negative in working in virtual worlds. The results provide a directional method of measuring intensity towards people's thoughts on Second Life®.

Section 4.5 summarises the chapter with some conclusions.

**Pilot Study: Langdel – Customer Service Training**

**Description**

Langdel want to improve learning for apprentices by creating a platform for peer to peer, self-regulated learning to take place. They wanted to build an ecosystem where stakeholders can interact seamlessly with apprentices and use this to implement independent learning in the organisation. Langdel wanted a place that was activity and real task oriented for apprentices to develop competences. They wanted a place that was always available to them, particularly when conversing across time zones. The aim was to enable the opportunity for interactions to take place for customisable learning and for learners to share results.

**What it solves**

- Helps prepare apprentices for a digital future by helping them keep up to date with developments in ICT and digital technology, which is vital to the success of their learning and for the world of work.
- In the current environment with continued budget cuts, increased development of online training is recommended.
- Raises awareness of the benefits and opportunities of the use of technology for collaborative and peer-to-peer learning which includes demonstrations and hands-on activities and provides tangible information on appropriate solutions for issues staff may be experiencing.

**Who**

- 8 Managers and Staff
- 14 Apprentices

**Benefits?**

- Provides opportunities to improve the skills and knowledge of apprentices and staff.
- Provides a practical way through the technology to inform and support the delivery of apprenticeship and traineeship programmes.

**Issues?**

Langdel needs to change to meet the strategic challenges of developing learning and using digital technology to support staff in building their confidence and skills, in order, to deliver in the workplace. The organisation needs to prepare apprentices through stimulating learning opportunities and take advantage of technology so that it can collaborate effectively between the two sites in the UK and Spain.

**Scenario**

**Who**

Sales Staff Apprentices working at Langdel. The Sales Team sell fruit and vegetables to supermarkets all over the world.

**Problem**

Sales staff apprentices lack confidence and need ideas for different approaches according to different country's customs.

**Situation**

The apprentices are working across two sites in Spain and the UK and would benefit from sharing their experiences as they learn and share and practice sales techniques, as well as, what is appropriate for different countries.

**Virtual World Activity**

In Second life®, the apprentices find it fun, disguised by avatars it gives them confidence.
They practice a lot because they like the fun environment. Second life is visited often to share ideas, practice sales techniques and chat and learn.

**Result**

Langdel report that increased sales are anticipated from their pipeline database, as a result of better skilled and knowledgeable apprentices through the use of working in the virtual world though these claims cannot be substantiated, as part of the study.

***Table 4.1: Overview of Year 1 Pilot Study***

## *4.2 Conduct of Research*

The primary aim of the pilot was to identify initial findings into the use of virtual worlds, in order, to identify effective strategies for informing the main study, by trialling the research method and approach. There is risk of imposing a potentially inappropriate or irrelevant method on the organisations being researched and the pilot study helps to resolve any issues that may arise and enables flexibility before embarking on the main studies.

### 4.2.1 Research Participants

The pilot study and Study 2 took place with 14 Apprentices and 8 Managers and Staff (see Table 4.2 for demographic and profile information about the participants, collected from questionnaire data), from Langdel, one of the largest fruit and vegetable growers in the UK, supplying many major supermarkets around the world. They also have a site in Spain. The organisation employs a large number of apprentices, as well as, seasonal workers. There are a mix of roles amongst staff and management, including sales teams, customer service teams, office staff, alongside, staff working on the land with farm machinery.

In addition, access to the virtual world was also provided to assessors from the FE college to be able to review and monitor progress in the background. They also made valuable contributions by providing feedback and making recommendations on what the apprentices needed to focus on. It also provided a boost of confidence for the apprentices who were receiving much more feedback from a range of people.

68.2% of the research participants use a computer every day and 31.8% a few times a week. Only 1 person from the research participants had used Second Life ® previously to the research study.

| What is your age? | | |
|---|---|---|
| Population | 22 | |
| Minimum | 18 | |
| Maximum | 55 | |
| Range | 37 | |
| Mode(s) | 18, 19 | |
| Mean | 27.4 | |
| Median | 20 | |
| Lower Quartile | 18 | |
| Upper Quartile | 37 | |
| Standard Deviation | 12.1 | |
| **What is your gender?** | | |
| Male | 13 | 59.1% |
| Female | 9 | 40.9% |
| **Total** | **22** | **100%** |
| **Is English your 1st Language** | | |
| Yes | 21 | 95.5% |
| No | 1 | 4.5% |
| **Total** | **22** | **100%** |
| **Do you have any disabilities?** | | |
| No | 21 | 95.5% |
| Yes | 1 | 4.5% |
| **Total** | **22** | **100%** |
| ***Summary of disabilities*** | | |
| Learning difficulty | 1 | 4.5% |
| Autistic Spectrum Disorder / Asperger Syndrome | 0 | 0.0% |
| Blind or partially sighted | 0 | 0.0% |
| Deaf or hard of hearing | 0 | 0.0% |
| Wheelchair user or mobility difficulties | 0 | 0.0% |
| Mental health difficulties | 0 | 0.0% |
| Other | 0 | 0.0% |

| How often do you use a computer? | | |
|---|---|---|
| Everyday | 15 | 68.2% |
| A few times a week | 7 | 31.8% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **22** | **100%** |

| Do you have access to a computer connected to the internet? | | |
|---|---|---|
| Yes | 22 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **22** | **100%** |

| How often do you use the internet? | | |
|---|---|---|
| Everyday | 15 | 68.2% |
| A few times a week | 7 | 31.8% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **22** | **100%** |

| Do you have access to mobile devices with internet access? | | |
|---|---|---|
| Yes | 22 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **22** | **100%** |

| In what ways do you use computers for learning? | | |
|---|---|---|
| Research | 22 | 100.0% |
| Collaborative work | 2 | 9.1% |
| Meetings | 4 | 18.2% |
| Online training | 2 | 9.1% |
| Communication | 22 | 100.0% |
| Networking | 22 | 100.0% |
| Sharing ideas | 4 | 18.2% |
| Other | 0 | 0.0% |

| How do you normally take part in Training? | | |
|---|---|---|
| Distance Learning | 2 | 9.1% |
| Face to Face Training | 22 | 100.0% |
| Placement | 2 | 9.1% |
| Workplace - On the Job | 22 | 100.0% |
| Self Study | 2 | 9.1% |
| Social Networking / Virtual Worlds | 0 | 0.0% |
| Other | 0 | 0.0% |

| Have you used second life before? | | |
|---|---|---|
| Yes | 1 | 4.5% |
| No | 21 | 95.5% |
| **Total** | **22** | **100%** |

***Table 4.2: Questionnaire results from the Pilot Study showing information about the research participants.***

Participants at Langdel were aged between 18 and 55 with a mean age of 27.

Participants were invited to participate in the research study via email by their Human Resources Manager and then signed a consent form (see Appendix C) to participate in the research.

Before the pilot studies, all participants attended a familiarisation training session into Second Life® and navigated around the island using the control and menu options. They were given a short reference guide that they could use, following the orientation session (see Appendix F).

### 4.2.2 Rationale for the Pilot Study

I began with a pilot study which compared customer service training carried out face-to-face in a training room setting with follow up training carried out three months later in the virtual world. The study explored the features of virtual worlds that employees see as positive and negative.

The training workshop was a mix of slides, group discussions and role plays. In brief, the customer service training workshop included the following:

(i) Brand values and sales strategy

(ii) Product knowledge

(iii) Call processes, call scripts and questioning

(iv) Building rapport with customers

(v) Objection handling

(vi) Closing a sale

(vii) Customer retention

The pilot provided a useful check on the wording of questions and to ensure they were clear and unambiguous. Following the advice of Bell (2005), a check was completed with the pilot participants on how long completion took. The participants were asked if any questions needed to be added, amended or omitted.

The pilot study was carried out with two key objectives:

- To evaluate the effects of current face-to-face training without any connection to technology so that a comparison can be made with training in virtual worlds.

- Complete an initial study within Second Life® to explore the features that employees, the learning providers, staff and apprentices see as positive and negative. This study will inform the methodology for the main study and refine the relevance and scope of the research.

The pilot study was carried out to evaluate the effects of the introduction of a 3D virtual world to a training activity that was not normally mediated by technology. In particular, it looked for evidence to whether it may be a useful analogue and/or substitution for the real world and explored the social context of learning and communities of practice. It did this by first holding the training as normal, in the classroom setting. The training was then repeated three months later with the introduction of Second Life® to a normally classroom-based customer service training course and asked participants to complete a questionnaire (see Appendices E and G) after each of the two training courses. This was then followed up by a focus group that supplemented the questionnaire

data generated by the participants at the time of each of the two training courses.

The pilot study was designed to reveal the mechanisms by which an online learning community might be successful and develop from the use of shared activity within a 3D virtual world. The training session during the pilot study provided an opportunity for two-way conversations and group work to be carried out, to see if the virtual environment allowed employees to work in ways they cannot in real life.

Participants were encouraged to use Second Life® to practice the training exercises. The aim was to see if the use of a 3D virtual world would encourage user engagement and provide a useful analogue for the real world and whether this would resemble a community of practice. The aim was also to discover whether the environment created connections between the participants and whether this increased intrinsic motivation and created opportunities for teams to self-organise, lessons from Hagel and Brown (2009).

The pilot study explored five research areas:

1. The impact of 3D technology using Second Life® in comparison to face-to-face classroom training and whether the virtual world was an analogue for the real world.

2. Features of collaboration and whether this resembled a community of practice

3. Whether and how professional development took place

4. Participant identity formation and development associated with 3D usage

5. Factors that encourage or inhibit informal learning

### 4.2.3 Methods

The pilot study thematically synthesises findings utilising the 22 responses received voluntarily through survey questionnaires, focus group discussion and discussion that took place during the training both within the classroom and within the virtual world. The questions asked participants to respond, regarding their experiences with regards to working in a virtual world. Quantitative analysis is applied to a form of data collection that might typically be regarded as qualitative. Content analysis has also been applied to answer a wide range of questions in this thesis. The review of literature in the methods chapter 3 showed how this form of analysis has been used by researchers for online interaction and it was chosen because it is an effective form of analysis to identify changes over time in the focus of learners. Content analysis has been used to research similar subjects to this research study including various types of learning including collaborative learning and informal learning (de Wever et al, 2006). It is a useful way to track changes in the focus of the participants within the virtual world, over the course of the study.

The pilot questionnaire (see Appendix G) asked:

1. Have you faced any particular challenges with this face to face training – if so, what have these been?

2. What are the disadvantages of learning in this format?

3. What are the advantages of learning in this format?

4. Do you think there are any advantages of using virtual worlds for work-based learning – if so, what are they?

5. Do you think there are any disadvantages of using virtual worlds for work-based learning – if so, what are they?

6. Have you faced any particular challenges with your work-based learning in virtual worlds – if so, what have these been?

7. Do you think working in the virtual world environment can be a useful substitution for real life? If yes, please provide examples.

The questionnaire contained both closed and open questions. Open questions were used to elicit people's views of the positive and negatives features of online learning. Closed questions were asked, in order, to describe the data set, for example age and gender, so that some analysis could be carried out on this basis.

Open questions such as 'What are the advantages of learning in this format?' were included to provide a richer dataset and open up new themes to explore. Open questions allowed people to answer in their own words, which provided relevant themes to be identified.

Data from the workshops were analysed according to the coding schema (Appendix J).

In both the classroom and virtual world, the training was hosted by the Customer Services Manager and involved the participants listening to the trainer's presentation in Microsoft PowerPoint[12] and taking part in role plays to practice out customer services scenarios, often with a member of staff from the Learning Provider entering the virtual world to oversee (See Figure 4.1). This enabled both employer and the learning provider to track progress of the apprentice, providing real time feedback and support. The Researcher, Managers, Staff from the Learning Provider and the Trainer also communicated via Skype during the virtual world sessions, in order, to discuss and manage the training as it progressed.

[12] PowerPoint is software made by Microsoft to create electronic presentations.

***Figure 4.1: A role play takes place in the virtual world, between Manager and Apprentice overseen by the Learning provider.***

It is important to note that this is a small-scale pilot study based in one organisation with twenty-two questionnaires returned, a response rate of 100 per cent. Data gathered came in two stages, during the activity and after the activity had taken place. Data created during the Langdel pilot study included:

- Analysis of the text live chat within the virtual world
- Focus Group Discussion Transcribed
- Questionnaire Data

Prompts during the focus groups were non-directive, but designed to encourage participants to discuss all aspects of the research activity. Participants were

asked if they had done any preparation before attending the training, such as visiting the Second Life website or testing their login. Participants were then encouraged to talk informally about their experience of using Second Life® and how they felt at the start, during and by the end of the training. They were asked if they enjoyed the training and whether they had felt that they had learned anything or had any informal learning interests triggered by the activity and if they had any recommendations for improvements to be made in preparation for the main study.

The pilot study investigated elements of the research, asking whether collaborative creation of knowledge through participation in the 3D world activity could be replicated in informal settings and without the guide of the trainer being present.

## *4.3 Data Collection and Results*

In this section, I present findings from the pilot study which analyses the questionnaire results, focus group discussion and dialogue during the training. All participants are referred to by their code name.

The pilot study produced very detailed data across a host of coding, which provides striking differences between working face-to-face and operating within the virtual world. The comparisons across the range of codes are discussed in detail in the next section. But first the total results are shown in table 4.3 (shown in two parts), detailing the number of utterances coded for each category, for all participants for the classroom training (see appendix J for codes). These results feature significantly more cognitive learning activity than affective or metacognitive learning activities (see table 4.3).

| Research Participant | Codes (See Appendix H) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cognitive Learning Activities | | | | | | | | | | |
| | *Debating* | | | | | *Using external information and experiences* | | | | *Linking or repeating internal information* | |
| | ***CDPF*** | ***CDPNF*** | ***CDAF*** | ***CDANF*** | ***CDAQ*** | ***CCEI*** | ***CREI*** | ***CSEI*** | ***CREE*** | ***CIL*** | ***CIR*** |
| 03244 | 0 | 2 | 0 | 0 | 0 | 1 | 11 | 3 | 24 | 5 | 22 |
| 05662 | 1 | 5 | 1 | 2 | 1 | 1 | 17 | 8 | 18 | 2 | 50 |
| 09261 | 4 | 5 | 0 | 0 | 1 | 3 | 7 | 6 | 26 | 1 | 26 |
| 02201 | 2 | 5 | 1 | 0 | 1 | 5 | 21 | 9 | 24 | 3 | 22 |
| 02688 | 0 | 5 | 1 | 0 | 1 | 6 | 18 | 4 | 10 | 5 | 12 |
| 10219 | 0 | 1 | 1 | 0 | 1 | 5 | 19 | 7 | 11 | 4 | 14 |
| 03688 | 0 | 2 | 1 | 2 | 2 | 4 | 15 | 9 | 28 | 1 | 28 |
| 05671 | 4 | 0 | 0 | 3 | 1 | 3 | 17 | 5 | 18 | 1 | 55 |
| 12448 | 3 | 0 | 0 | 1 | 3 | 3 | 21 | 6 | 26 | 1 | 14 |
| 08694 | 1 | 2 | 0 | 2 | 2 | 3 | 8 | 3 | 36 | 2 | 21 |
| 09928 | 1 | 1 | 3 | 0 | 1 | 3 | 9 | 2 | 34 | 2 | 26 |
| 12777 | 1 | 1 | 1 | 0 | 1 | 2 | 11 | 5 | 51 | 3 | 13 |
| 11803 | 1 | 2 | 2 | 0 | 2 | 2 | 13 | 6 | 28 | 1 | 23 |
| 01306 | 0 | 0 | 1 | 2 | 2 | 1 | 7 | 7 | 25 | 2 | 18 |
| 04122 | 0 | 0 | 1 | 2 | 2 | 2 | 6 | 4 | 47 | 4 | 30 |
| 06717 | 0 | 3 | 1 | 2 | 2 | 1 | 3 | 9 | 39 | 5 | 20 |
| 01240 | 0 | 0 | 1 | 0 | 2 | 1 | 7 | 9 | 29 | 7 | 27 |
| 07751 | 0 | 3 | 0 | 1 | 2 | 1 | 8 | 7 | 24 | 3 | 37 |
| 08231 | 0 | 5 | 0 | 1 | 2 | 2 | 11 | 1 | 19 | 3 | 11 |
| 01680 | 2 | 2 | 0 | 1 | 1 | 4 | 20 | 1 | 11 | 2 | 25 |
| 01688 | 5 | 3 | 0 | 1 | 5 | 3 | 4 | 2 | 35 | 1 | 14 |
| 06261 | 1 | 3 | 0 | 1 | 3 | 1 | 7 | 4 | 26 | 4 | 9 |
| **Totals** | **26** | **50** | **15** | **21** | **38** | **57** | **260** | **117** | **589** | **62** | **517** |
| | 1.2% | 2.4% | 0.7% | 1.0% | 1.8% | 2.7% | 12.3% | 5.5% | 27.8% | 2.9% | 24.4% |

| Research Participant | Codes (See Appendix H) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Affective Learning Activities | | | Metacognitive Learning Activities | | | | | | | | Rest Activities | |
| | | | | *Planning* | | | *Keeping clarity* | | | *Monitoring* | | | |
| | ***AM*** | ***AA*** | ***AC*** | ***MPA*** | ***MAA*** | ***MEA*** | ***MSD*** | ***MAC*** | ***MGE*** | ***MKW*** | ***MRP*** | ***RNE*** | ***TOTALS*** |
| 03244 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 3 | 80 |
| 05662 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 115 |
| 09261 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 8 | 0 | 0 | 2 | 1 | 94 |
| 02201 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 1 | 2 | 103 |
| 02688 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 11 | 1 | 0 | 1 | 2 | 81 |
| 10219 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 1 | 71 |
| 03688 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 2 | 103 |
| 05671 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 2 | 121 |
| 12448 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 2 | 91 |
| 08694 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 6 | 2 | 0 | 0 | 3 | 94 |
| 09928 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 3 | 101 |
| 12777 | 1 | 0 | 1 | 3 | 2 | 0 | 0 | 8 | 0 | 0 | 2 | 2 | 108 |
| 11803 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 2 | 95 |
| 01306 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 17 | 1 | 0 | 0 | 4 | 91 |
| 04122 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 14 | 0 | 1 | 1 | 1 | 120 |
| 06717 | 2 | 0 | 2 | 0 | 2 | 0 | 0 | 11 | 0 | 0 | 1 | 8 | 111 |
| 01240 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 5 | 97 |
| 07751 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 8 | 0 | 0 | 1 | 3 | 103 |
| 08231 | 3 | 0 | 3 | 2 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 4 | 78 |
| 01680 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 14 | 0 | 0 | 0 | 4 | 91 |
| 01688 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 8 | 0 | 1 | 0 | 7 | 94 |
| 06261 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 10 | 1 | 1 | 0 | 5 | 78 |
| **Totals** | **38** | **4** | **26** | **19** | **7** | **0** | **0** | **185** | **5** | **5** | **11** | **68** | **2120** |
| | 1.8% | 0.2% | 1.2% | 0.9% | 0.3% | 0.0% | 0.0% | 8.7% | 0.2% | 0.2% | 0.5% | 3.2% | |

***Table 4.3: Coded Utterance Values for 2-Hour Classroom Customer Service Training at Langdel***

Figure 4.2 is a graphical representation of the coded utterance values from table 4.3, for 2-hour classroom customer service training at Langdel. A significant number of occurrences of utterances coded CREE, CIR, CREI, CSEI and MAC are clearly visible (see appendix J for codes) which suggests participants were asking for explanations and clarifications. They were referring to information outside of the discourse and repeating information without interpretation or drawing conclusions. These results are discussed in more detail in section 4.4, which follows.

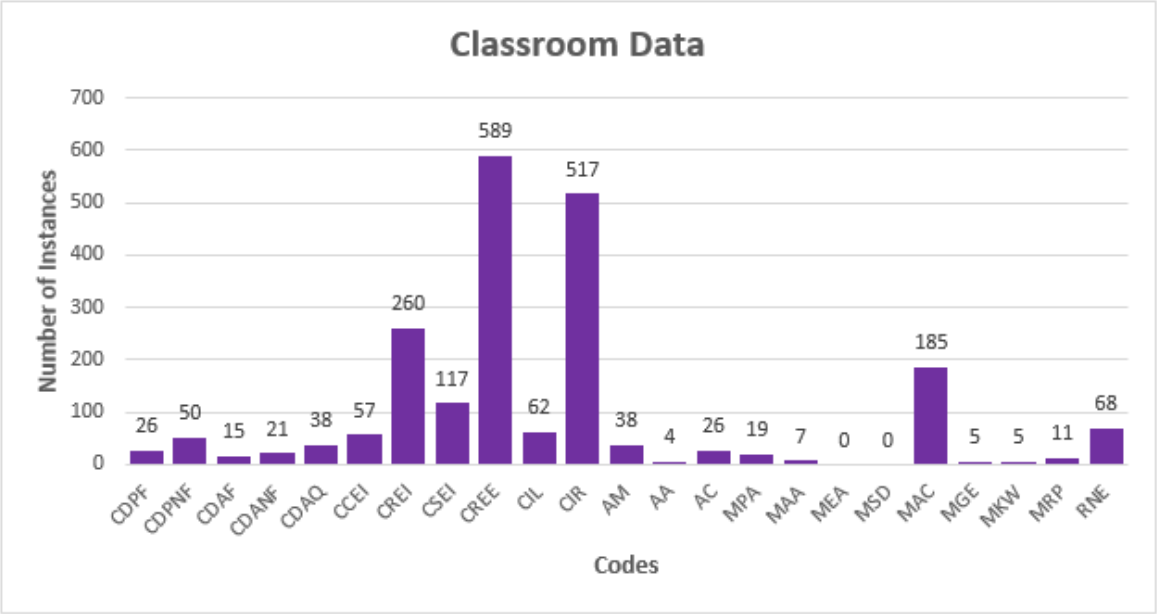



***Figure 4.2: A graphical representation of the Coded Utterance Values for 2-Hour Classroom Customer Service Training at Langdel***

Figure 4.3 is a graphical representation of the coded utterance values from table 4.3, as a percentage of the total number of utterances for 2-Hour Classroom Customer Service Training at Langdel.

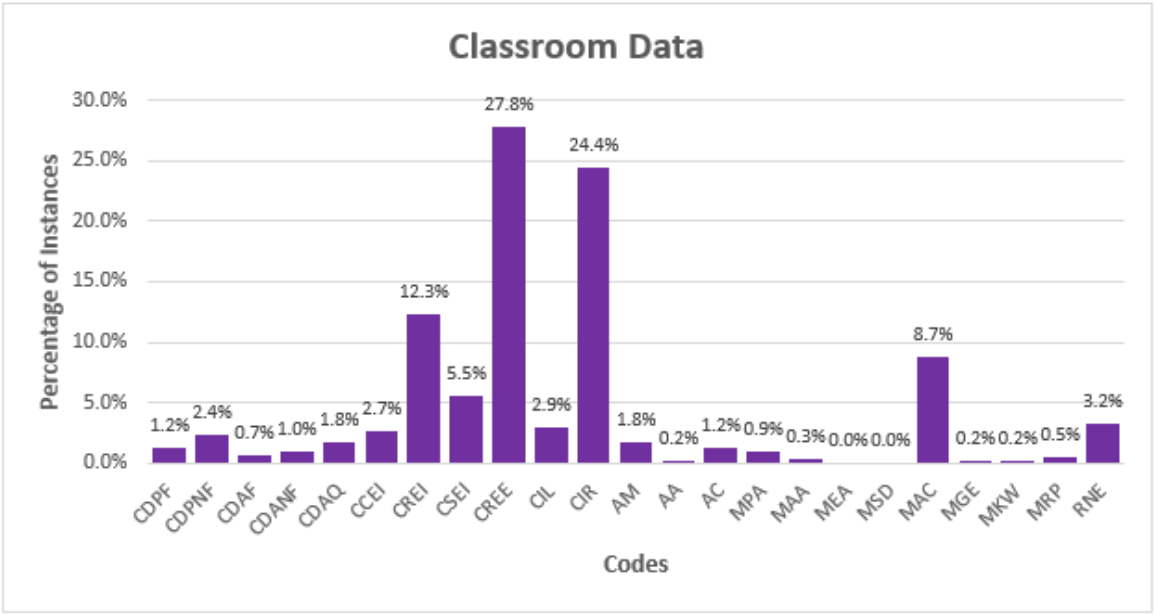



***Figure 4.3: A graphical representation of the Coded Utterance Values as a percentage of the total number of utterances for 2-Hour Classroom Customer Service Training at Langdel***

Table 4.4 shows the number of utterances coded for each category, for all participants for the training held in the virtual world three months later (see appendix J for codes). The results show a striking change from the classroom, with utterances being coded across a greater variety of learning activities and a noticeable increase in affective activities coded AM, AA and AC suggesting much more social conversation and more peer-to-peer feedback.

| Research Participant | Codes (See Appendix H) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cognitive Learning Activities | | | | | | | | | | |
| | *Debating* | | | | | *Using external information and experiences* | | | | *Linking or repeating internal information* | |
| | ***CDPF*** | ***CDPNF*** | ***CDAF*** | ***CDANF*** | ***CDAQ*** | ***CCEI*** | ***CREI*** | ***CSEI*** | ***CREE*** | ***CIL*** | ***CIR*** |
| 03244 | 12 | 0 | 0 | 0 | 2 | 49 | 22 | 25 | 35 | 31 | 7 |
| 05662 | 10 | 0 | 0 | 1 | 1 | 53 | 14 | 20 | 93 | 42 | 6 |
| 09261 | 12 | 0 | 1 | 1 | 0 | 65 | 32 | 19 | 65 | 37 | 11 |
| 02201 | 12 | 0 | 1 | 1 | 0 | 28 | 29 | 22 | 22 | 45 | 1 |
| 02688 | 13 | 0 | 1 | 0 | 0 | 49 | 36 | 20 | 31 | 27 | 10 |
| 10219 | 11 | 1 | 0 | 0 | 0 | 36 | 21 | 7 | 22 | 36 | 13 |
| 03688 | 9 | 0 | 0 | 0 | 0 | 21 | 22 | 14 | 32 | 41 | 8 |
| 05671 | 3 | 0 | 0 | 0 | 0 | 62 | 14 | 9 | 15 | 25 | 13 |
| 12448 | 5 | 0 | 0 | 0 | 0 | 52 | 27 | 11 | 21 | 28 | 5 |
| 08694 | 5 | 0 | 0 | 0 | 0 | 21 | 21 | 10 | 27 | 36 | 7 |
| 09928 | 6 | 0 | 0 | 0 | 0 | 29 | 20 | 12 | 15 | 14 | 8 |
| 12777 | 3 | 0 | 0 | 0 | 0 | 38 | 13 | 4 | 12 | 25 | 4 |
| 11803 | 3 | 0 | 0 | 0 | 0 | 74 | 22 | 16 | 19 | 36 | 7 |
| 01306 | 6 | 2 | 0 | 1 | 0 | 92 | 17 | 9 | 17 | 28 | 7 |
| 04122 | 9 | 1 | 0 | 0 | 0 | 56 | 11 | 11 | 14 | 21 | 11 |
| 06717 | 8 | 0 | 0 | 0 | 0 | 28 | 11 | 3 | 12 | 20 | 10 |
| 01240 | 11 | 0 | 0 | 0 | 0 | 33 | 25 | 11 | 13 | 24 | 5 |
| 07751 | 10 | 0 | 1 | 0 | 1 | 41 | 37 | 19 | 9 | 21 | 10 |
| 08231 | 6 | 1 | 2 | 1 | 0 | 36 | 14 | 8 | 4 | 36 | 10 |
| 01680 | 8 | 0 | 1 | 0 | 0 | 52 | 36 | 21 | 14 | 28 | 9 |
| 01688 | 13 | 0 | 1 | 0 | 0 | 68 | 23 | 7 | 11 | 31 | 9 |
| 06261 | 7 | 0 | 1 | 0 | 0 | 90 | 17 | 16 | 17 | 20 | 7 |
| **Totals** | **182** | **5** | **9** | **5** | **4** | **1073** | **484** | **294** | **520** | **652** | **178** |
| | 2.7% | 0.1% | 0.1% | 0.1% | 0.1% | 16.1% | 7.3% | 4.4% | 7.8% | 9.8% | 2.7% |

| Research Participant | Codes (See Appendix H) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Affective Learning Activities | | | Metacognitive Learning Activities | | | | | | | | Rest Activities | |
| | | | | *Planning* | | | *Keeping clarity* | | | *Monitoring* | | | |
| | ***AM*** | ***AA*** | ***AC*** | ***MPA*** | ***MAA*** | ***MEA*** | ***MSD*** | ***MAC*** | ***MGE*** | ***MKW*** | ***MRP*** | ***RNE*** | ***TOTALS*** |
| 03244 | 45 | 67 | 18 | 41 | 0 | 11 | 0 | 16 | 0 | 11 | 19 | 0 | 411 |
| 05662 | 31 | 55 | 11 | 35 | 0 | 7 | 0 | 11 | 0 | 6 | 7 | 0 | 403 |
| 09261 | 25 | 49 | 9 | 25 | 0 | 4 | 0 | 9 | 0 | 19 | 26 | 0 | 409 |
| 02201 | 38 | 64 | 7 | 14 | 0 | 0 | 0 | 15 | 0 | 7 | 11 | 0 | 317 |
| 02688 | 16 | 94 | 14 | 27 | 1 | 0 | 0 | 12 | 0 | 5 | 5 | 0 | 361 |
| 10219 | 22 | 35 | 22 | 22 | 1 | 17 | 0 | 11 | 0 | 6 | 7 | 0 | 290 |
| 03688 | 29 | 36 | 8 | 19 | 1 | 0 | 0 | 10 | 0 | 11 | 10 | 1 | 272 |
| 05671 | 14 | 21 | 7 | 21 | 0 | 9 | 0 | 7 | 0 | 6 | 9 | 1 | 236 |
| 12448 | 29 | 25 | 11 | 32 | 2 | 5 | 0 | 19 | 0 | 7 | 5 | 0 | 284 |
| 08694 | 49 | 55 | 13 | 25 | 1 | 4 | 0 | 22 | 0 | 5 | 11 | 0 | 312 |
| 09928 | 35 | 54 | 15 | 10 | 1 | 4 | 0 | 12 | 0 | 8 | 17 | 0 | 260 |
| 12777 | 52 | 58 | 21 | 8 | 2 | 7 | 0 | 17 | 0 | 11 | 19 | 1 | 295 |
| 11803 | 41 | 48 | 10 | 14 | 1 | 6 | 0 | 11 | 0 | 5 | 12 | 0 | 325 |
| 01306 | 25 | 32 | 22 | 31 | 0 | 3 | 0 | 10 | 0 | 3 | 2 | 0 | 307 |
| 04122 | 17 | 29 | 16 | 19 | 0 | 1 | 0 | 6 | 0 | 12 | 17 | 0 | 251 |
| 06717 | 15 | 38 | 18 | 23 | 0 | 0 | 0 | 19 | 0 | 11 | 15 | 0 | 231 |
| 01240 | 20 | 35 | 23 | 19 | 0 | 0 | 0 | 9 | 0 | 13 | 16 | 0 | 257 |
| 07751 | 14 | 27 | 24 | 11 | 0 | 5 | 0 | 13 | 0 | 3 | 11 | 0 | 257 |
| 08231 | 17 | 26 | 18 | 27 | 0 | 2 | 0 | 24 | 0 | 13 | 25 | 0 | 270 |
| 01680 | 11 | 36 | 10 | 28 | 0 | 0 | 0 | 6 | 0 | 11 | 13 | 2 | 286 |
| 01688 | 19 | 21 | 14 | 29 | 0 | 1 | 0 | 11 | 0 | 22 | 29 | 0 | 309 |
| 06261 | 12 | 28 | 25 | 28 | 0 | 1 | 0 | 21 | 0 | 9 | 14 | 0 | 313 |
| **Totals** | **576** | **933** | **336** | **508** | **10** | **87** | **0** | **291** | **0** | **204** | **300** | **5** | **6656** |
| | 8.7% | 14.0% | 5.0% | 7.6% | 0.2% | 1.3% | 0.0% | 4.4% | 0.0% | 3.1% | 4.5% | 0.1% | |

***Table 4.4: Coded Utterance Values for 2-Hour Customer Service Training at Langdel taking place within Second Life ®***

Figure 4.4 shows a graphical representation of the coded utterance values from table 4.4, for a 2-hour customer service training at Langdel taking place within Second Life ®. There is a much more distributed spread of learning activities taking place when working in the virtual world, in comparison to the classroom.

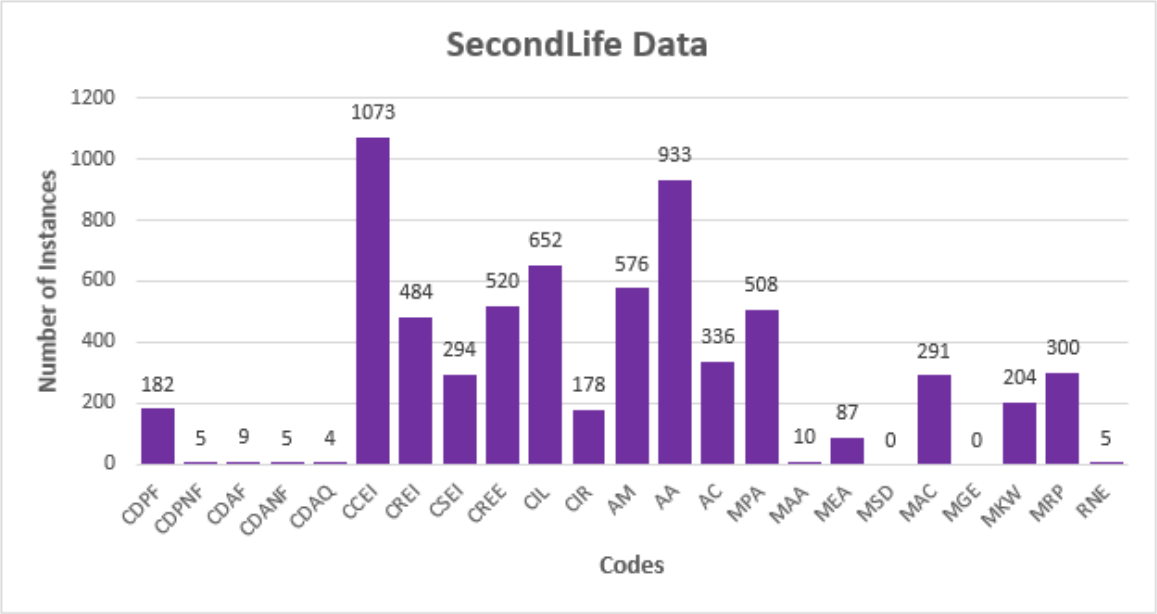



***Figure 4.4: A graphical representation of the Coded Utterance Values for 2-Hour Customer Service Training at Langdel taking place within Second Life ®***

Figure 4.5 is a graphical representation of the coded utterance values as a percentage of the total number of utterances, from table 4.4, for the 2-hour customer service training at Langdel taking place within Second Life ®.

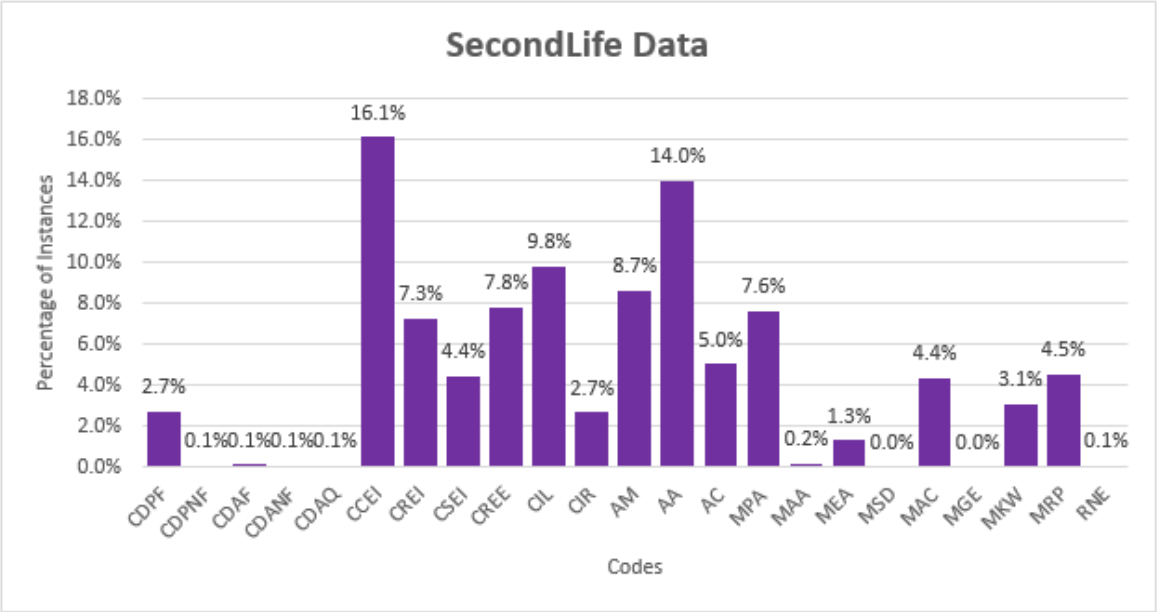



***Figure 4.5: A graphical representation of the Coded Utterance Values as a percentage of the total number of utterances for a 2-Hour Customer Service Training at Langdel taking place within Second Life ®***

Figure 4.6 is a graphical representation from tables 4.3 and 4.4 of the coded utterance values as a percentage of the total number of utterances for the 2-hour customer service training at Langdel taking place both within the classroom and within Second Life ® so that the two sets of data can be compared.

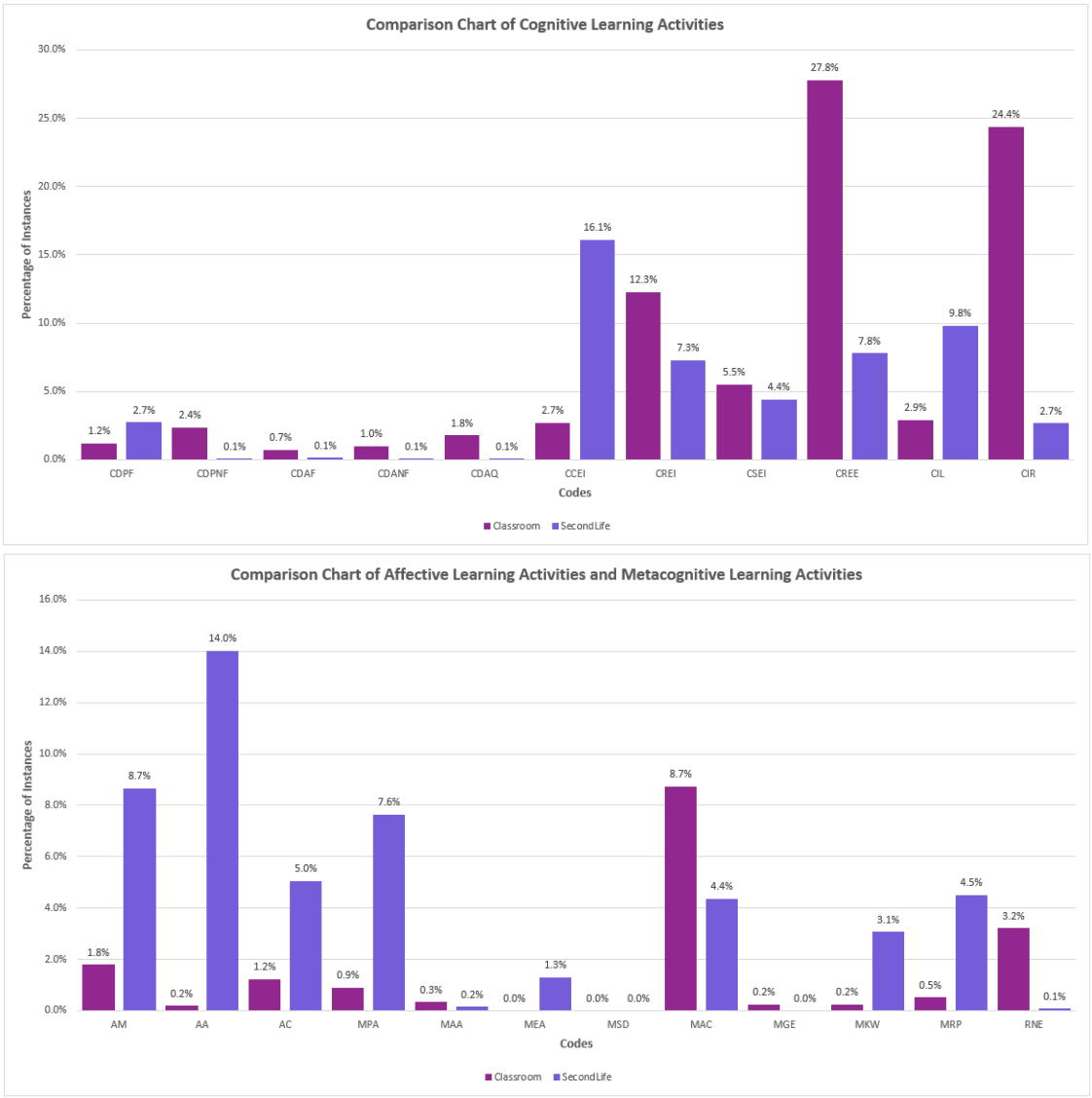



***Figure 4.6: A graphical representation of the coded utterance values as a percentage of the total number of utterances for the 2-hour customer service training at Langdel taking place both within the classroom and within Second Life ®***

There was a marked distinction between the kind of learning that took place in the classroom training, in comparison to the training taking place in the virtual world (see Figures 4.7 and 4.8).

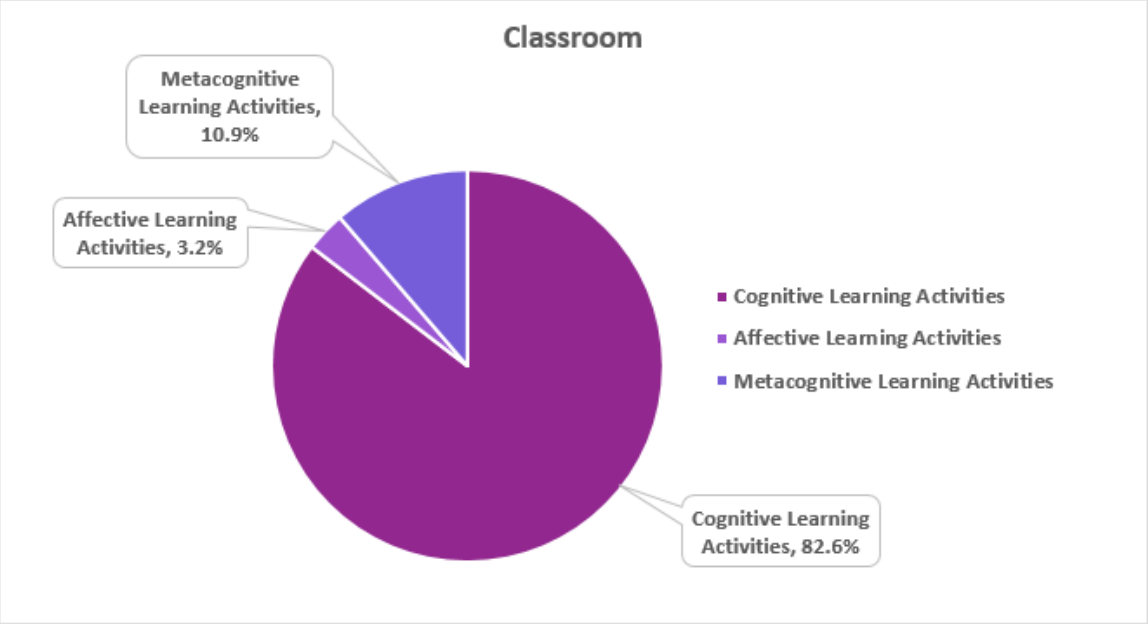



***Figure 4.7 A pie chart showing the split of coding between cognitive, meta-cognitive and affective learning taking place in the classroom.***

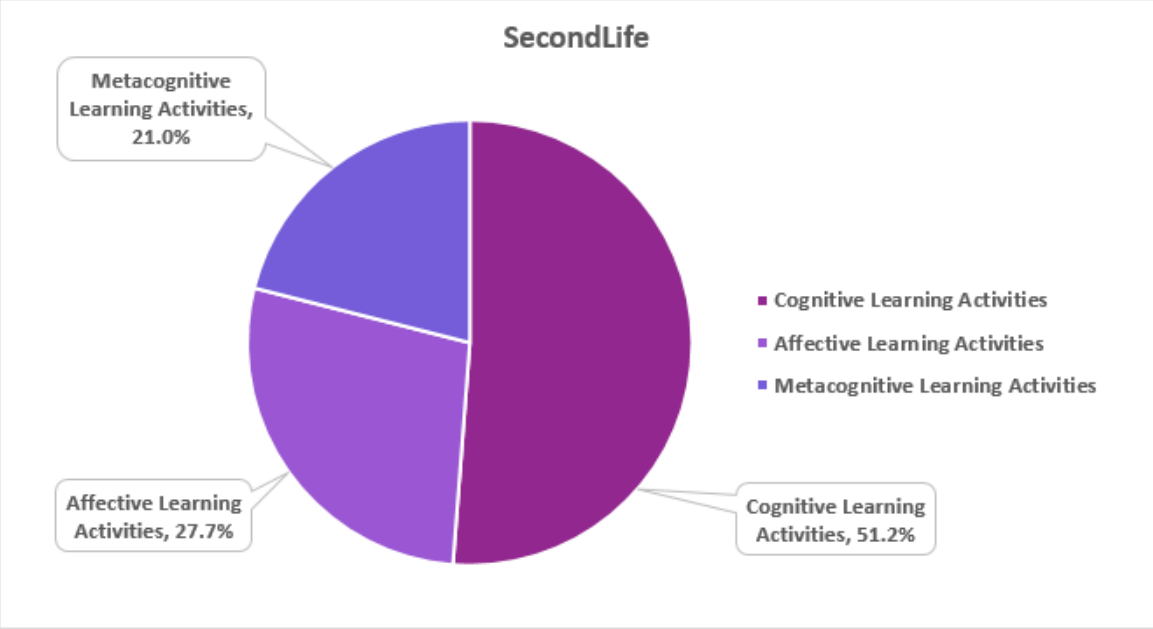



***Figure 4.8 A pie chart showing the split of coding between cognitive, meta-cognitive and affective learning taking place in the virtual world.***

Figures 4.9 and 4.10 show the pie charts broken down by code within the categories of cognitive, meta-cognitive and affective.

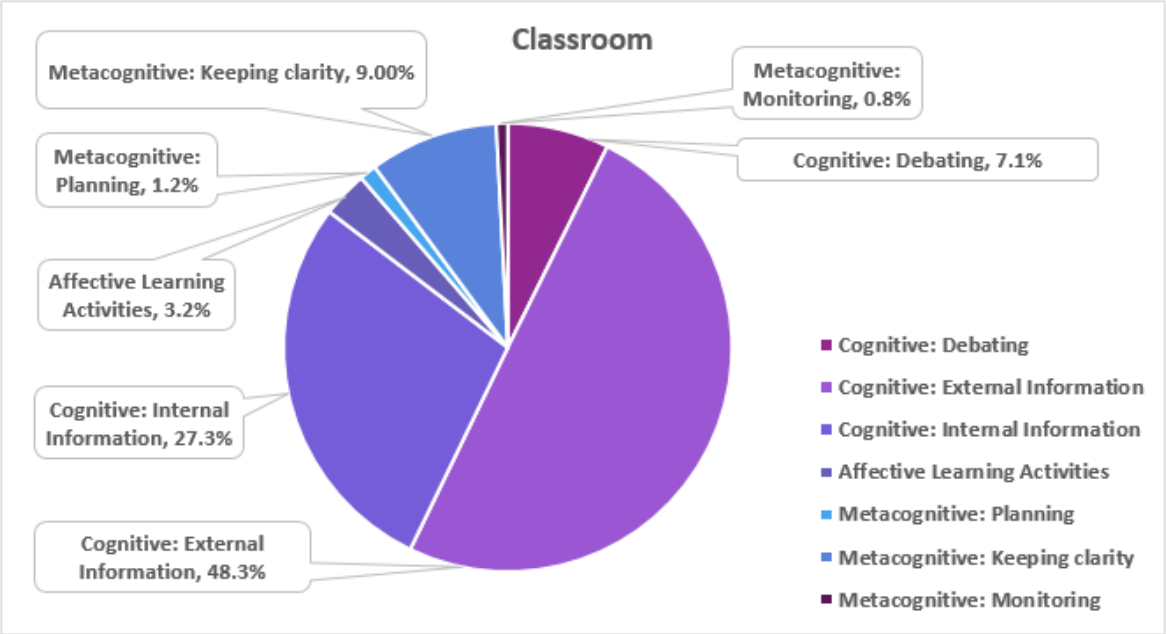



***Figure 4.9 A pie chart showing the breakdown of coding for cognitive, meta-cognitive and affective learning taking place in the classroom.***

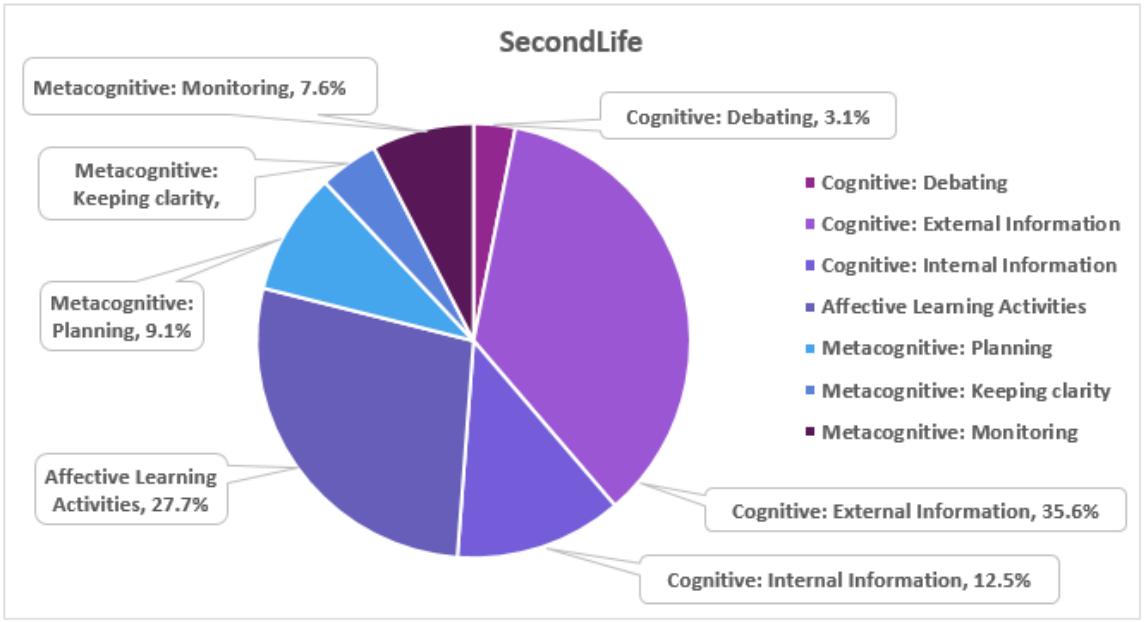



***Figure 4.10 A pie chart showing the breakdown of coding for cognitive, meta-cognitive and affective learning taking place in the virtual world.***

## *4.4 Pilot Study Discussion*

### 4.4.1 Cognitive Learning Activities

In the classroom, 82.6% of utterances related to cognitive learning activities (see Figure 4.7), in comparison to 51.2% in the virtual world (see Figure 4.8). In the following sections, these results are broken down further and discussed by code.

#### *4.4.1.1 Debating*

As shown in Appendix J, the coding for debating within cognitive learning activities, were as follows:

| Code | Cognitive learning activities |
|---|---|
| | *Debating* |
| CDPF | • A problem, solution or idea is presented. This contribution is followed by an illustration or argumentation. |
| CDPNF | • A problem, solution or idea is presented. This contribution is *not* followed by an illustration or argumentation. |
| CDAF | • A student does or does not agree with the opinion or idea contributed by another student or author. This viewpoint is followed by a backing, refutation or restriction. |
| CDANF | • A student does or does not agree with the opinion or idea contributed by another student or author. This viewpoint is *not* followed by a backing, refutation or restriction. |
| CDAQ | • Asking a content-directed question |

***Table 4.5 Debating codes within cognitive learning activities from Veldhuis-Diermanse Schema (2002)***

7.1% of coded utterances in the classroom related to debating, whereas in the virtual world, this was less than half of that coded in the classroom, with 3.1% of

utterances coded as debating (see Figs. 4.9 and 4.10). There was significantly more evidence of cognitive learning activities within the classroom (82.6% of utterances) in comparison to the virtual world (51.2% of utterances), as shown in Figs. 4.7 and 4.8.

However, as shown in Figure 4.6, the bulk of the utterances in the classroom were asking questions of the tutor (1.8% coded CDAQ in the classroom in comparison to 0.1% in the virtual world) and stating problems but nothing then said to follow up with illustration and expand on the ideas expressed. In the classroom, there were 2.4% of utterances coded CDPNF (contributions not followed with illustration), in comparison to 0.1% in the virtual world and similarly 1% of utterances in the classroom were coded CDANF, where a participant does or does not agree with the opinion or idea but the viewpoint is not followed up by a backing, refutation or restriction. In the virtual world, this was only 0.1%.

In the classroom, participants agreed or disagreed with ideas or opinions, but there was little elaboration to why. For all there were less utterances coded under debating in the virtual world, the debating that did take place demonstrated more evidence of learning with contributions expanded on, debated and points backed up with examples.

Utterances coded CDAF (viewpoints followed by a backing, refutation or restriction) were higher in the classroom (0.7% of utterances) in comparison to in the virtual world (0.1%). In the classroom 1.2% of utterances were coded CDPF (ideas presented with illustration), in Second Life® 2.7%. A difference of 1.5% is not necessarily too significant, but it shows that participants were backing up their discussion with more evidence in the virtual world.

McConnell's (2000) work on implementing computer supported cooperative learning (CSCL) polarises two models of traditional versus collaborative learning, which was evident when comparing the face-to-face training with the virtual reality training. McConnell (*Ibid*) strongly believes in the value of cooperative learning.

It was evident in the classroom training of participants achieving stages one and two of Illeris' (2002) six stages of social interaction. The participants listened and observed. Staff took notes within the training. There was some evidence of staff reaching stages three and four, as there was some mimicking of role plays and repeating of call scripts. There was very little evidence of stages five and six where staff were working autonomously (1.8% of utterances coded CDAQ in the classroom and only 0.1% in the virtual world).

In comparison, within Second Life®, staff quickly moved through the stages and there was much more evidence of learners working independently and autonomously. Within Second Life® the learning was distinctly more active. Under the guise of avatars, the staff quickly began to act out what the instructor was teaching and staff naturally started to work independently to practice what was being taught (9.8% of utterances coded CIL and 16.1% coded CCEI in the virtual world, in the classroom 2.9% CIL and 2.7% CCEI).

Staff were hugely reluctant to carry out the role plays in the classroom and they were considerably shorter in length in comparison to what took place in Second Life®. Within Second Life®, staff were much more willing to explore and discuss. The roleplays were significantly different in Second Life® with many staff going to great lengths to cover scenarios within the role play. There was a lot more fun with the role plays seen in the virtual world with staff making it difficult for their partner by being difficult customers and taking longer to reach an agreement. In the classroom, the roleplays were much shorter and staff adopted the perfect customer and staff scenario and discussions were brief and answered without any questioning.

*One participant commented:*

> *"It was such a lot of fun. It was great that we all took on another persona through the avatar costumes and you totally forgot who you were working with. Everyone appeared on the same level and there wasn't any thought about 'Oh I'm talking to the Director' which was the case in the classroom and made it very nerve racking. Using Second Life broke down barriers and time flew by. We did a lot more*

*in the virtual world than we did face to face because it was funny doing the roleplays with the avatars. In the classroom, it is excruciatingly embarrassing. It was a lot of fun and at the same time we got a lot out of it."*

***(Participant 01306)***

Some participants emphasised that the technology made the training experience more enjoyable. When asked about the advantages of learning in Second Life®, one participant said:

*"…because I got to move about and look at different things whilst still being able to listen and take part. I liked being able to play whilst taking part in serious subject matter, otherwise it would have been boring sitting listening to other role plays"*

***(Participant 08694)***

Learning is an ongoing journey rather than a one-off experience and learning journeys connect together in a much longer process of lifelong learning. It is iterative rather than straightforward and comes from a mixture of experience, new ideas and action. Reflection is also vital to develop learning and turn this into developing practice and so Langdel encouraged staff to keep a portfolio alongside their work in the virtual world.

#### *4.4.1.2 Using external information and experiences*

Overall, using external information and experiences were higher in the classroom with 48.3% of utterances coded (see Figure 4.9) in comparison to 35.6% in the virtual world (see Figure 4.10). As shown in Appendix J, the coding for using external information and experiences within cognitive learning activities, were as follows:

| Code | Cognitive learning activities |
|---|---|
| | *Using external information and experiences* |
| CCEI | • Contributing new information found in other information sources (mentioned or not) than the discourse |
| CREI | • Referring to information found in other information sources (mentioned or not) than the discourse |
| CSEI | • Summarising or evaluating the information found in other information sources (mentioned or not) than the discourse |
| CREE | • Referring to earlier experiences (scholastic or daily) / Referring to outcomes of running a model |

***Table 4.6 Using external information and experiences codes within cognitive learning activities from Veldhuis-Diermanse Schema (2002)***

2.7% of participants within the face-to-face classroom training contributed new information found in other information sources (CCEI), in comparison to 16.1% in the virtual world.

12.3% of utterances in the classroom were referring to information found in other information sources than the discourse (CREI), in comparison, in the virtual world, this was lower at 7.3%. A lot of the conversation in the classroom related to earlier experiences (code CREE). The utterances within the classroom training were dominated on the subject of referring to earlier experiences at 27.8% (CREE). The results in Second Life ® were significantly lower (7.8%). 5.5% of utterances in the classroom referred to summarising or evaluating the information found in other information sources than the discourse (code CSEI), in the virtual world, this code accounted for 4.4% of utterances.

Within the classroom training, staff were consuming the training and reluctant to take control for their development, whereas in Second Life®, staff were motivated to try things out. 12.3% of the utterances during the face-to-face

classroom training were referring to information found in other information sources than the discourse (CREI). This was 7.3% in Second Life®.

When asked if working in the virtual world was a useful substitute for real life, one participant responded to say:

> "I have to say yes, despite being a huge critic. When the system crashed and there were access problems it was de-motivating. I thought working in Second Life® would be a complete waste of time and completely pointless. I really did not see the point of it at all, but now I can see the benefits of learning together. It is motivating to be in a sheltered place where we feel safe and protected and can test out anything without anyone seeing if we get it wrong, with the exception of our avatars."
>
> ***(Participant 05671)***

#### *4.4.1.3 Linking or repeating internal information*

The classroom study revealed 27.3% of utterances referring to linking or repeating internal information, in comparison to 12.5% in the virtual world (see Figs 4.9 and 4.10). As shown in Appendix J, the coding for linking or repeating internal information within cognitive learning activities, were as follows:

| Code | Cognitive learning activities |
|---|---|
| | *Linking or repeating internal information* |
| CIL | • Linking facts, ideas or remarks presented in the discourse / Referring explicitly to a contribution in the discourse |
| CIR | • Repeating information without drawing a conclusion or interpreting that information |

***Table 4.7 Linking or repeating internal information codes from Veldhuis-Diermanse Schema for Learning Process Coding (2002)***

In the classroom, it was a very traditional form of training with the instructor stood at the front of the class and teaching. Participants repeated information without drawing a conclusion or interpreting that information (CIR 24.4%). There was very little peer to peer learning taking place. There was evidence of Fordism in the style of the classroom training (Farnes, 1993; Aldrich, 2011). The results in Second Life ® were significantly lower (2.7% for CIR). 2.9% of the utterances during the face-to-face classroom training were participants linking facts, ideas or remarks presented (CIL). This was higher in Second Life ® with 9.8%.

### 4.4.2 Affective Learning Activities

In the classroom, just 3.2% of utterances related to affective learning activities (see Figure 4.7), in comparison to 27.7% in the virtual world (see Figure 4.8). In the following sections, these results are broken down further and discussed by code.

As shown in Appendix J, the coding for affective learning activities, were as follows:

| | **Affective learning activities** |
|---|---|
| AM | • General: reacting emotionally to notes of fellow-students, without directly reacting to the content of that note. This can be *positive, negative or neutral* |
| AA | • Asking for (general) feedback, responses or opinions by fellow-students |
| AC | • 'Chatting' or 'Social talks'; contributions that are not relevant to solve the case/task |

***Table 4.8 Affective learning activity codes from Veldhuis-Diermanse Schema for Learning Process Coding (2002)***

1.8% of participants within the face-to-face classroom training reacted emotionally to notes of fellow-students, without directly reacting to the content of that note (AM). This was significantly higher in Second Life ® with 8.7%, which supports the view of Anderson (2007) who talks of web 2.0 changing the way that people interact. In Second Life® 14% of utterances were participants asking for general feedback, responses and opinions by fellow- participants (code AA). In comparison, in the face-to-face setting, this only occurred 0.2%.

1.2% of utterances during the face-to-face classroom training were social talk and chat (AC). These contributions were not relevant to the task. This made up 5% of all utterances taking place in Second Life ®. Lave and Wenger (2002) suggest we need to pay more attention to learning in social situations and the social processes involved, instead of simply formal pedagogy; for example, a customer services staff member being trained in customer service practice will make connections in informal learning which will be vital information on aspects of customer service politics, as well as, issues in cost management.

In the classroom, there was very little questioning between peers, it was always directed at the Tutor, whereas, in SecondLife® there was much more discussion and questioning between the staff as they operated their avatars and worked through the roleplays. Wells and Claxton (2002) discuss how collaborative group work can increase motivation and performance. Pedagogically, roleplay activity helps staff to visualize their goals and objectives in customer service scenarios. It's most likely not for everyone, but it is likely to help visual learners (and perhaps some kinetic ones, too). Also, it provides a means for students to start thinking a bit more deeply about their goals/objectives for work-based learning as they work through scenarios because they must take the time to visualize and act out various situations (Brown and Thomas, 2008; Gee, 2007). It also helps them to think metaphorically, which is one step toward developing critical thinking/analytical skills. On the other hand, some goals/objectives may not translate as well with roleplay, and staff might lean toward ones that are; however, these activities are useful teaching tools with staffs, and this activity has the added bonus of being a great sharing activity, as well as, fun for staff to watch each other and share.

Delegates found the use of Second Life®, a useful way to collaborate. In the activity, team members from different locations worked together with one person responsible for noting observations, whilst another two colleagues worked on role play. Participants who did the activity in collaboration with others reported it as enjoyable, in stark contrast to the face-to-face training, that took place three months previously, where no one reported enjoying the roleplays. Participants were very positive about working collaboratively:

> *"The training experience felt very positive and working collaboratively was a lot of fun in a group of people. I think we could have easily have benefitted from having an even bigger group. It was visually appealing to watch and funny when we were all in avatar mode. There was a real sense of purpose and we could get on with it without feeling embarrassed. The role playing in the classroom was clumsy, embarrassing and staged. It didn't feel anything like that in Second Life®"*
>
> ***(Participant 03244)***

> *"It takes you away from the real world and was motivating to work in an area where we could collaborate together and learn from each other without feeling embarrassed because we had adopted a cover. It was a really good way to act out role plays which were much less embarrassing than in the real world. We practised a lot more than we did in the classroom setting and it helped us all build our confidence and test out scenarios."*
>
> ***(Participant 09261)***

### 4.4.3 Metacognitive Learning Activities

In the classroom, only 10.9% of utterances related to metacognitive learning activities (see Figure 4.7), in comparison to 21% in the virtual world (see Figure 4.8). In the following sections, these results are broken down further and discussed by code.

#### *4.4.3.1 Planning*

As shown in Appendix J, the coding for planning within metacognitive learning activities, were as follows:

| | **Metacognitive learning activities** |
|---|---|
| | *Planning* |
| MPA | • Presenting an approach or procedure to carry out the task |
| MAA | • Asking for an approach or procedure to carry out the task |
| MEA | • Explaining or summarising the approach already adopted |

***Table 4.9 Planning metacognitive learning activity codes from Veldhuis-Diermanse Schema for Learning Process Coding (2002)***

Langdel had highlighted that they wanted to be involved in this research study because they'd uncovered a lack of confidence, particularly with their apprenticeship staff in being able to deal with the wide range of customer service questions that arise. The pilot study highlighted the opportunity for this problem to be addressed through the use of virtual reality as a support for young people making the transition into work. The use of the virtual world allowed staff to explore every area of their work from career to processes, to customer relations and policies. 7.6% of Second Life® utterances were around presenting an approach or procedure to carry out a task (MPA) as opposed to only 0.9% in the classroom training.

One participant said:

> *"Working in the virtual world has helped me to re-examine what I do in my work and learn how to turn the training into practical ideas for successful customer service. You can use the virtual world for every aspect of your work which also includes snippets of personal information that you pick up about customers. It's providing me with a toolkit of resources to create the job I want in all its shapes and forms. My key focus has been on customers, learning from others to find out who they are and what they really want; because once I know, achieving what they want is much simpler. Starting a new job is a tumultuous time and there's a lot of change but using the virtual world has provided new possibilities to how I learn and given me much more support."*
>
> ***(Participant 01680)***

There were few utterances in either the classroom study (0.3%) or in the virtual world (0.2%) for asking an approach or procedure to carry out the task (code MAA) and no utterances in the classroom that related to code MEA – explaining or summarising the approach already adopted. In the virtual world, this accounted for 1.3% of utterances.

### *4.4.3.2 Keeping Clarity*

As shown in Appendix J, the coding for keeping clarity within metacognitive learning activities, were as follows:

| | **Metacognitive learning activities** |
|---|---|
| | *Keeping clarity* |
| MSD | • Structuring the contributions in the database |
| MAC | • Asking for an explanation, clarification or illustration as a reaction to a certain note |
| MGE | • Explaining unclear information in notes; answering a question asked by another participant |

***Table 4.10 Keeping clarity metacognitive learning activity codes from Veldhuis-Diermanse Schema for Learning Process Coding (2002)***

In the classroom, participants asked a lot more questions of the Tutor, whereas in Second Life®, staff were much more willing to work out solutions for themselves and draw upon experiences and share stories. 8.7% of the utterances during the face-to-face classroom training were staff members asking for an explanation, clarification or illustration as a reaction to a certain note (MAC) and approximately 50% less in Second Life ® (4.4%).

Delegates felt the addition of being able to work in Second Life® made a positive difference to their training experience. When asked in the questionnaire "Do you think working in the virtual world environment can be a useful substitution for real life? If yes, please provide examples." one participant responded:

> "Yes, I did and I really didn't expect to enjoy it that much. I thought it would be boring, pointless and drag on. It was quite the opposite – fun, exciting and the time flew by. I've learnt that adopting an avatar is a great way to test out scenarios without fear of reprisal."
>
> ***(Participant 07751)***

Another questionnaire response was:

> "I found working in a virtual world surprisingly enjoyable. It gave me the ability to practice and build confidence in difficult skills. I like the way you can practice, practice, practice before having to deliver for real."
>
> ***(Participant 02688)***

There were no utterances coded MSD – structuring the contributions in the database in either the classroom or virtual world studies. There were also no utterances explaining unclear information in notes in the virtual world (code MGE), however, this could have been due to the nature of the tasks. Utterances coded MGE accounted for 0.2% in the classroom training.

#### *4.4.3.3 Monitoring*

As shown in Appendix J, the coding for monitoring within metacognitive learning activities, were as follows:

| | **Metacognitive learning activities** |
|---|---|
| | *Monitoring* |
| MKW | • Monitoring the original planning, aim etc. |
| MRP | • Reflecting on one's own actions or on certain contributions to the database |

***Table 4.11 Monitoring metacognitive learning activity codes from Veldhuis-Diermanse Schema for Learning Process Coding (2002)***

3.1% of utterances within Second Life® were around monitoring the original planning and aim (MKW). This was only 0.2% in the classroom training. From the questionnaire responses from staff, they articulated the following benefits of:

- Closer working and learning engagement with colleagues and managers

- Learning from and with their peers including the development of their own capabilities and recognise the use of the virtual world as an important dimension to their continuous professional development (CPD).

- Raising of individual profiles in their organisation

- Enhanced input into work processes and engagement between stakeholders

- Organisational benefits include opportunities for staff to gain skills to support employability, and greater involvement in their work-based learning and work experiences. Retention is aided and enhanced engagement is developed between staff and managers. Staff are engaged within work-based learning and change. One of most important outcomes is that staff inspire and can lead their peers in learning and innovation.

It is important to recognise that adult learners want to create their own pathways through work and explore processes in different ways - having autonomous staff learning means that Langdel needed to develop content which could be interrogated in different ways but still contained the underpinning key principles of what needs to be in place to support successful working. The use of the virtual world was successful in achieving this. This model supports the work of Lave and Wenger (2002) who emphasise participation and the significance and rich value of social processes in learning situations. Identity is important and the meaning attached to that. They use an example of the Alcoholics Anonymous and how the process of learning is clear in the way members learn how to talk the same speech, for example, statements are prefixed with 'I'm a recovering alcoholic'. This was evident in the use of the virtual world in Langdel where apprentices learned the language of more experienced staff through observing demonstrations and taking part in presentations.

4.5% of utterances in Second Life® were participants reflecting on their own actions or on certain contributions (MRP). This only occurred for 0.5% of utterances in the face-to-face classroom training. Learning is an ongoing journey rather than a one-off experience and having access to a virtual world helps these

journeys connect together in a much longer process of lifelong learning. It is iterative rather than straightforward and comes from a mixture of experience, new ideas and action. Reflection is also vital to develop learning and turn this into developing practice.

Evidence of impact of using virtual reality is shown by these selected quotes from participants' questionnaires:

> "Being able to work without any conscious effort of what you look like has benefitted me. It's given me confidence to ask questions and be more assertive in the training than I would ever be in the classroom. Hearing more experienced staff tell their stories has made me realize how to adopt different strategies in my work and helped me work more confidently at work in 'real life'!".
>
> ***(Participant 12777)***
>
> "This course has given me the change to look into things much further by having access to the virtual world and discussing things with more experienced staff at how to ensure customers are given the correct level of service".
>
> ***(Participant 02201)***
>
> "Working in the virtual world has helped me to understand how to increase my impact at work. I found it a lot more effective than the classroom training because of the opportunity to practice and learn from others in a private environment".
>
> ***(Participant 08231)***

> "I found the virtual world a very supportive environment to work in with staff really enthusiastic. I found working through the avatars helped me focus and concentrate much more than classroom training".
>
> ***(Participant 01680)***

> "It's not just given me ideas, it's inspired me with a whole new approach to how I work as a result of working things out with the avatars and testing different ways of doing things".
>
> ***(Participant 05662)***

Having the community of practice within virtual reality including participation in the online training and events alongside the online advice and guidance and in the same place as informal conversations, offers staff the social element which is important for sharing of experiences and practice. This element has been highly valued by those who have participated in the virtual world. The training developed to ensure the participants experienced a blend of different sessions, discussion activities, a staff showcase session, a question and answer panel and group activities. This ensured staff were supported in different preferences and models of learning.

Participants reported that having the 3D space made them more productive to spend additional time practicing and sharing ideas than happened in the classroom scenario, although this cannot be quantified, as activity beyond that defined in this study was not measured (see table 1.1).

The pilot also triggered technology-related learning. Participants spent time in Second Life® for several months and many used this time to familiarise themselves with the functions and explored its usefulness for other activities. Some participants also used it to socialise at lunch time, playing Snakes and Ladders using the board on the island. One participant had searched for a virtual dice room that they could all log in to and view the dice rolls of each player's go.

Using Second Life® triggered informal learning both about how to use it, as well as, extending to other applications that would facilitate sharing of ideas, for example, how to upload and share images and documents.

One participant reported:

> *"The repetition of training scenarios in Second Life was really beneficial. We co-designed a number of different work situations and practiced out how we would tackle the conversation and discussed what action we would take. It was also useful to learn by watching others. I can honestly say it's been the most enjoyable training I've ever been on."*
>
> ***(Participant 01240)***

Delegates reported watching others in Second Life® was an opportunity to learn more about their colleagues and gain insight into how others would approach various scenarios. They talked about how they were encouraged to talk informally about what they had done and that they felt it was a successful experience. Some participants were keen to explore other aspects of Second Life® and other resources available on the Second Life® website, so the technology triggered some interest in the technology itself. Many were surprised and reported that they were pleased to discover new information in an area of training they thought they were already familiar with.

## 4.5 Conclusion

In conclusion, the pilot study showed that carefully constructed training can replace traditional classroom training in some cases and provide richer experiences - offering a bridge from the virtual training room to real life activity.

The ability through the use of the virtual world to develop a more 'rounded', accomplished employer (see Fig 1.3) is very appealing to both the employer and the learning provider. Langdel want to develop their staff so that they are not

just focused on skills development but developing into the 'right' person for the organisation that fits their culture and represents the employer with professionalism to their customers, for example.

The use of the virtual world can be an exciting prospect as it may allow learners to experience learning within an environment where everyone can be involved. It may offer a great opportunity for collaborative learning to take place within the workplace and employers are always looking for new ways to develop and improve their staff's training and professional development.

What the attributes are for staff is for each organisation to determine and fit with their strategic goals and culture. Using the virtual world for the development of attributes can allow staff to be imaginative in developing the required skills which represent the uniqueness of what is to be gained from working for that organisation.

The data from the pilot study resulted in many implications for the main study, the research questions and for the methodology. The pilot provided insights into the role of Second Life® in developing collaboration and forming a learning community. The study identified ways in which the technology can encourage informal learning by providing linkages to related and unrelated knowledge. The pilot also revealed where problems occur if the factors for creating a learning community are not in place. The environment has to be fit for purpose and fulfil a need.

**Research Question 1:** *How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world?*

Key themes identified from the data analysis showed how people improved their interpersonal skills and became more confident in their interactions with their peers in and out of the learning environment; the freedom and fun that virtual learning provides was highlighted by respondents and the overarching theme emerged around the benefits of confidence and leadership building through

practice in a virtual and safe environment. One staff member wrote in their questionnaire:

> "I would argue staff working in the virtual world is absolutely vital in developing skills early on and then they can use them wherever they go. In reality they are often already using these skills in their apprenticeships and are carrying out their job responsibilities within their contexts, but not always with a level of confidence. So, if we can give them some more tools to be able to do that really effectively and set themselves apart we're giving them a great opportunity to develop through their life chances and transitions and their future careers. This programme, working in the virtual world is completely unique and that makes it so important for young people. It's very different, but very concrete at the same time, meaningful in lots of different industries in the workplace and in education that carries quite a lot of weight but they also learn all the practical skills that go with it in a really accessible way to suit them."
>
> ***(Participant 04122)***

Another benefit was the emerging development of a three-way partnership between non-educators in the workplace, assessors from the FE college and the apprentice. The assessors from the FE college were able to enter the virtual world, sit in the background and monitor activity to see evidence of activity taking place. Their presence in the background allowed them to make note of areas for discussion in one-to-one reviews with the apprentice and to provide positive feedback and highlight areas for development and focus. The assessors had far more access to the apprentices they were working with, as they were not only relying on physical face-to-face meetings to review student progress.

Assessors also participated via Skype communicating with the Employer, without the participants within Second Life ® hearing what was being discussed, which allowed for live observations to take place without distracting the apprentices. This enabled areas for feedback to be noted and for these to be discussed in

one-to-one reviews with apprentices at a separate time with the college assessor.

The virtual world enabled apprentices to be given responsibilities without necessarily having all the skills required or having completed all the training. Working in the virtual worlds, helped staff to get a grasp of what was required for specific roles and responsibilities, so that they could focus on developing those particular skills.

Learning design had more influence on the research participants' experience in the virtual world than technological design. The participants focused on the training style as an important element and spoke very little about the design of the software, unless something went wrong and then this was a big issue.

There were some issues with audio in that it can be more difficult for non-native English speakers and they wanted to receive the feedback written down. Using chat as a medium was identified as the biggest challenge for staff who had English as their second language. It takes longer to compose a chat post for those who do not speak English as their first language. There are also issues when the conversation fragments, so a line can be a response to a dialogue three lines up, but in between two other conversations are happening, for example. Chat can sometimes be difficult to follow, for those whose language skills are not as strong.

Operating in the virtual world created mixed-mode training, where some were communicating via chat, others via voice and that created a power relationship and the voice participants dominated. In some occasions that is actually preferable. When one is teaching staff, you might want to be the only one with the voice and have the apprentices and staff members respond with text. This method was effectively used by the trainer in the pilot study, when she needed to get important key learning across to the participants and wanted everybody to observe to begin with. She asked participants to respond via the chat and just brought them in with voice if they had a long or complex contribution, but she controlled this via invitation. This helped all participants to understand, as there

were not lots of people breaking in over each other, which would make it difficult to follow.

The trainer adopted an approach to ask the participants to take it in turns to chat and if they had nothing to say, they could just pass, but it meant that no-one was unconsciously censored. It slows the interaction down considerably, but was found to be simply part of the adjustment that has to be made when moving into the virtual world.

Encouraging people to adapt to this slower pace is difficult but worthwhile from the data collected. Patiently waiting for someone to finish typing their comments so they can contribute equally to the conversation, rather than carrying on talking, is an essential technique when operating in the virtual world. Some of the participants commented that they missed the energetic to-and-fro of a face-to-face conversation, but without them realising, this is actually beneficial for overall learning and professional development.

Energetic free-flowing conversation which goes to and fro between participants can be very confusing for some people. There was a clear divide between participants who preferred the virtual world for this reason and those who were frustrated by it being too slow. If you are someone who needs a second or two to collect your thoughts before contributing or someone where English is not your first language then there is never a long enough gap to begin your contribution. As a result, the virtual reality working provided a much more inclusive environment for a range of preferences.

The key challenge and disadvantage to working in Second Life® was the system crashes. Participants reported it to be "*slow*", "*frustrating when it keeps crashing*", "*fed up of seeing 'Second Life® Crash Logger''* and "much slower paced online than face-to-face". This suggests that technology should be seen as a tool supporting other goal-driven activities; as something to "*learn with not from"* (Jonassen et al, 2003, p.11). Where the activity offers opportunities for technology mediated learning, Second Life® offers features that can help learners take advantage of them. However, where the learning opportunities do

not present themselves then the technology, although available, does not have a defined learning role to fulfil.

My interpretation of the results is that for those that excel at face-to-face interactions lost their dominant role or a role that they preferred in the real world. The remainder found online more egalitarian.

For this reason, a key finding from the pilot study is that working in the virtual world was more effective than face-to-face. It was more inclusive. A key recommendation from the study is that at the very least, there should be a mix of both online meetings and training, as well as, face-to-face in the real world, so that the strengths of both modes can come into play.

**Research Question 2:** *To what extent do virtual worlds develop identity, motivation and professional development?*

Key themes surfaced around confidence. 89% of results showed that working in Second Life® was a huge confidence – builder. Delegates spoke of being able to practice and build skills in a safe, protected environment. Many reported that it was a place they could practice and build confidence in their skills and interpersonal communication before delivering in the real world:

> *"I really liked how I managed to interact with people who weren't even in my age group and it helped me know more people and build my confidence. It helped me to just talk to anybody even if they were higher than me. I don't need to be worried I can just go and talk to them, nothing bad will actually come out of it. It has really helped. Working in the virtual world makes me think I can. I've definitely more confidence in work now, after working in Second Life ®."*
>
> ***(Participant 09928)***

> "I've become a lot happier since working in the virtual world, more confident, I've come out of my shell a lot more and I can just go and do things and achieve them."
>
> ***(Participant 05662)***

Delegates reported that working in Second Life® was a welcome break from the routine and acted like a stress reliever. 62% of the messages coded had the word 'fun' in responses. The way working in Second Life® harnessed team work and a sense of community was strong in the questionnaire results. 77% of delegates discussed how working in the virtual world created a stronger team and was helpful in building relationships and networking. Barriers were broken down because of the use of avatars.

A noticeable difference between the classroom training in comparison to training in virtual reality was the move towards providing feedback in the form of audio. The real benefit seen in the data collected was that it was less open to interpretation. There is a natural tendency, particularly amongst young apprentices who are in a position of constantly being assessed and so are probably more vulnerable to criticism, to read into the text the most negative tone possible. With audio feedback anyone commenting on the work can do so in a more conciliatory gentle tone and that is appreciated and supports the development of identity and professional development and provides confidence to staff to motivate them to participate.

This new virtual space at Langdel is a personal space for staff to collaborate, it is owned by the staff and allows presentation of who they are as a well-rounded individual. Langdel clearly demonstrated better integration between the workplace and the learning provider for apprentices through the virtual world. It provides a very clear and present opportunity for integration to take place.

A benefit was the 24/7 availability of the virtual world, whereas the classroom was only available for a finite length of time. As a result of this accessibility to the virtual world, informal learning took place collaboratively amongst the community of staff across two countries over a longer period than the classroom

training. Data from additional activity was not captured or analysed, but it is worthy of nothing that this activity took place.

A marked difference was the level of detailed discussion that took place in the virtual world, in comparison to very limited conversation in the classroom training. Many people did not want to express themselves in the classroom roleplay but in comparison in the virtual world went to great lengths to explore a wide range of scenarios. Assessors from the FE college also reported antidotally that their discussion with their apprentices was a lot more productive as a result of working in virtual worlds. Their face-to-face time with apprentices became more effective, as they had already witnessed activity and progress and the meetings could focus on key learning and development and formal assessments. Assessors reported that they felt they could provide more ongoing support and communication with their apprentices facilitated through the virtual world, as they were being given access to work-based activity that they would not ordinarily have seen.

Having a set of attributes that every staff member can demonstrate is made possible with the advent of the virtual world and having a personal learning space in particular. By this mechanism, staff can discern their personal development and learning journey from their peers by mixing common core work procedures and competencies with a set of personal attributes and even attitudes, many of which will be drawn from evidence gained outside the confines of their apprenticeship or work programme, all of which then go to showing a unique staff member and potential for future promotions.

> *"They might have the study record, but they don't know how to look people in the eye or to hold a conversation or to follow instructions. And it's those things that are really key that we can try to instil through avatars working in the virtual world. Working in the virtual world really helps them stop feeling so overwhelmed about taking on new responsibilities."*
>
> ***(Participant 04122)***

Langdel staff working in the virtual world achieved this by using tagging of artefacts and contributions. They added to a personal space, set against a range of evidential work, experiences, accomplishments, views, actions and activities and so on. Instead of simply listing a set of terms or processes against a job description, they were able to rearrange their learning by attributes.

Langdel supported every apprentice during their training acquiring a set of demonstrable personal attributes. The employer is developing and presenting the professional, technical person and not just the skills. Langdel staff within the virtual world developed scholarship, autonomy, creativity, cross cultural and internal awareness.

Staff developed presentations, role plays and demonstrations within the virtual world which provided useful evidence of their learning and development within the role. Langdel management worked closely with the educational provider who supplies apprentices to the company and invited them into the virtual world so that regular reviews of progress took place. Both could see real evidence from the apprentice and see them demonstrating skills and practices within the virtual world which would transfer into the real world.

This also benefited the relationship between assessor and apprentice, as the assessors had access to additional work-based learning artefacts. Whilst it is acknowledged the evidence from assessors was not part of the research study and could not be substantiated; it is worth noting the potential benefits of a three-way partnership between apprentice, learning provider and workplace. Although it is recognised this may vary from institution to institution and apprenticeship to apprenticeship.

**Research Question 3:** *In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning?*

A key learning from the pilot study was the difference in progression through the six stages of social interaction (see Table 2.1) created from Illeris (2002). In the

classroom training, staff did not progress beyond stage two, whereas in the virtual world training, they reached stages five and six.

Before the advent of utilising the virtual world within the SME, the demonstration of personal skills was not formalised and the mechanism for staff members to demonstrate them was not easy to do, unless that specific work experience occurred at the time that a review was required or a manager was available to provide feedback and review. Staff received coaching and listened to call recordings between themselves and customers but this never gave true control of what was presented to the employee, but relied more on what was gleaned by the manager. Utilising the virtual world takes employees on a journey to being fully skilled in their workplace role and they can use virtual reality to signpost accomplishments in making that journey through informal collaborations, virtual roleplays and demonstrations etc.

The outcomes of the pilot studies suggest that Second Life® may support learning in a variety of ways. The element of choice for participants in the pilot study helped users to be more effective, because they'd made a decision when to attend. When developing a learning community, it is important to provide choice and allow flexibility to suit individual needs and preferences.

Beneficial to apprentices and staff was having a space where they could continuously practice and build confidence through repetition in a safe environment. They were able to watch in virtual reality the process and engage in discussion about the work processes and then participate themselves. This was seen to be an enormously successful learning process, although sometimes time intensive. In terms of collaboration skills, creativity and cognitive processing, carrying out processes in the virtual world rated highly amongst participants.

### 4.5.1 Conceptual framework implications from the pilot study

There were a number of important factors that arose from the pilot study that were incorporated into the main PhD study:

The conceptual framework (see Figure 1.2) worked well to organise the data and group the factors that influenced the activities within the virtual world. The pilot study proved the conceptual framework was a useful way to organise data and investigate working in the virtual world.

When developing informal learning through the use of virtual worlds, it is important to consider and ensure all elements of the VINE framework are supported. During the pilot, it proved a useful way to make decisions about the provision and use of the virtual world which meets the needs of the participants for informal learning and develops their professional development and prepares them for the real world.

The remaining chapters of this thesis will now present the data, analysis and conclusions from the main study and each one focuses on answering one of the three research questions. The next chapter examines how virtual worlds allow SMEs to work in ways they cannot in real life and considers whether they are a useful analogue and/or substitution of the real world. Study 1 described in the next chapter takes place in a UK nationwide courier company. Study 1 includes data about how the participants see the virtual world as an alternative to the real world and links findings with the pilot study, study 2 and study 3.

# Chapter 5: An Analogue or Substitution for the Real World

## *5.1 Introduction*

Chapter 5 begins the data analysis by addressing **Research Question 1:** *How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world?* It uses the responses from the questionnaire and focus group, along with the story-boards and live text analysis to discover the employees' experiences of 3D usage and how it was of benefit for learning in the workplace and whether it was found to be an analogue or substitution for working in the real world. It identifies the employees' experiences of 3D usage and explores how virtual environments allow SMEs to work in ways they cannot in real life and how virtual environments differ from the real world and if it is a useful analogue and/or substitution of the real world.

Chapter 5 begins my account of the research with study 1, exploring how virtual worlds allow SMEs to work in ways they cannot in real life and asks whether they are a useful analogue and/or substitution of the real world. This chapter includes information about the learning that took place in the virtual world and researching the communities and culture that emerged. I explain the data analysis and the process of generating themes, finishing with the main findings of Study 1. An overview of Study 1 is provided in Table 5.1.

Section 5.2 discusses how the research was conducted with the courier company and the composition of the research sample.

Section 5.3 describes study 1's data collection, results and relevance. Key themes emerged around how learning took place through practising, imitating best practice and learning through informal conversations.

Section 5.4 discusses the findings from study 1.

Section 5.5 presents the main challenges and disadvantages experienced by Samedel when working in the virtual world.

Section 5.6 concludes whether virtual worlds did allow the SME to work in ways it cannot in real life.

### Study 1: Samedel – Doorstep Driver Training

#### Description

The courier company has grown rapidly and with this growth, the number of procedures and services provided at the doorstep have also increased. More and more customer service offerings have been added and the courier staff are failing to follow all procedures correctly and customer complaints are increasing. It is recognised that there are a large number of apprentices that have also joined the workforce that lack experience and knowledge. The training has fallen upon the individual drivers who have acted as a training buddy for the apprentice, but at the same time, they have not received training themselves in all the new requirements. There are numerous things that the couriers have to carry out when delivering a parcel at the doorstep. They have to site the delivery in the correct room, unpack the parcel and assemble. Rubbish has to be removed and relevant paperwork has to be completed.

#### What it solves

The use of the virtual world resolves the issue of being able to train staff whilst still maintaining the daily business requirements. It also overcomes the issue of the drivers being remote and unable to attend face-to-face training without the day's deliveries being cancelled. The use of the virtual world allowed staff to repeatedly practice customer doorstep scenarios and be faced with a number of different situations that could be practiced in the virtual world. It provided a better solution than a face-to-face one because staff could repeatedly practice scenarios and were not embarrassed to carry out the role plays under the guise of the avatar. Training and ongoing communication can take place now without jeopardising the business. It is much more cost effective. It does not require drivers to travel to a training centre and fits around their working shift. Training can be tailored to the needs of each delivery depot.

#### Who

| **1x Manager** | **38x Courier Drivers** | **38x Courier Apprentices** |
|---|---|---|
| Operating from the site cabin. | Operating from their lorry cab and site cabin. | Operating from their lorry cab and site cabin. |

#### Benefits?

Building a virtual community for the drivers across the UK to collaborate, communicate and train, which fit around their working shifts and was deliverable from their workplace out-bases. The ability to practice customer scenarios repeatedly developed confidence

#### Issues?

The solution relies on internet connection and a reliable connection to load Second Life®. The computer required a graphics card sufficient to run the virtual world. There were certain situations that could not be replicated entirely in the virtual world. The drivers reported environmental factors that did impact on how deliveries were to be carried out, for example, the contours of driveways, weather, problems at the doorstep such as pet dogs. Issues with their handheld terminals could not be replicated in the virtual world, for example, if their touch pad was not working or the internet connection was lost, so these issues had to be imagined and built into the scenarios in the virtual world.

#### Scenario

**Who**

Courier drivers and apprentices working for a courier company.

**Problem**

Mistakes are being made at the doorstep, when delivering items to customers and complaints are being received. Procedures not being followed correctly.

**Situation**

The operation would come to a halt if all the drivers were to be trained in one go. They operate from truck yards all over the country with limited facilities. There's only a small number of staff at each base.

**Virtual World Activity**

Training took place in second life. All the drivers used laptops in the site office cabin and across the country joined together from their truck yards. They had training every day at the start of their shift for 20 minutes, so didn't impact on their work.

**Result**

It was reported by Langdel that apprentices and Staff were trained without impacting the operation or jeopardising a single delivery. They communicated how this was a significant achievement, given the scale of the training and the dispersed locations of the staff. They have also reported that is evident from their key performance indicators measured internally that complaints significantly reduced and customer satisfaction increased, however, it isn't possible for this to be quantified within this study

**Table 5.1: An Overview of Study 1**

## *5.2 Conduct of Research*

### 5.2.1 The Research Participants in Study 1

For Study 1, 1 Manager, 38 staff members and 38 apprentices from Samedel, took part in the research, with a spread of age ranges from 18 to 47 with a mean age of 26. All participants took part in courier doorstep training within Second Life ®. All staff attended 20 minutes of daily training in the virtual world for five weeks, totalling 8 hours of use within the virtual world. Assessors from the apprentices' learning providers would also log in to view progress and share feedback. See Table 5.2 for demographic information about the participants, collected from questionnaire data.

| **What is your age?** | | |
|---|---|---|
| Population | 77 | |
| Minimum | 18 | |
| Maximum | 47 | |
| Range | 29 | |
| Mode | 18 | |
| Mean | 26.2 | |
| Median | 25 | |
| Lower Quartile | 19 | |
| Upper Quartile | 32.5 | |
| Standard Deviation | 8.18 | |
| **What is your gender?** | | |
| Male | 67 | 87.0% |
| Female | 10 | 13.0% |
| **Total** | **77** | **100%** |
| **Is English your 1st Language** | | |
| Yes | 77 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **77** | **100%** |
| **Do you have any disabilities?** | | |
| No | 71 | 92.2% |
| Yes | 6 | 7.8% |
| **Total** | **77** | **100%** |
| ***Summary of disabilities*** | | |
| Learning difficulty | 4 | 5.2% |
| Autistic Spectrum Disorder / Asperger Syndrome | 0 | 0.0% |
| Blind or partially sighted | 1 | 1.3% |
| Deaf or hard of hearing | 0 | 0.0% |
| Wheelchair user or mobility difficulties | 0 | 0.0% |
| Mental health difficulties | 1 | 1.3% |
| Other | 0 | 0.0% |

***Table 5.2: Questionnaire results from Study 1 showing information about the research participants.***

All the research participants in study 1 were frequent users of a computer. 100% reported using a computer at least a few times a week. 100% had access to the internet and access to mobile internet devices. All participants used the computer for communication and approximately half of all the research participants used a computer for research in their work. Prior to the research study, all their training took place face to face and on the job. Only 5.2% of research participants had used Second Life ® before (See table 5.3 for questionnaire results from study 1 showing information about the research participants' use of technology at work and experience of using Second Life ® for work-based learning).

In order to provide an opportunity for a virtual community to develop around the 3D virtual world training activity, the study was designed to run over a period of five weeks. During this time, participants were asked to take part in a 20-minute training session each day for five weeks. It also aimed to explore whether participating in the same activity at different times combined with opportunities to a shared virtual communication space would result in the development of a virtual learning community.

Participants were encouraged by their employer to use the Second Life® environment during the five-week period, although activity taking place outside of the set daily training, was not captured for a data analysis. It was hoped that the shared space could form an informal knowledge repository and start the formation of an online learning community.

| How often do you use a computer? | | |
|---|---|---|
| Everyday | 1 | 1.3% |
| A few times a week | 76 | 98.7% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **77** | **100%** |
| **Do you have access to a computer connected to the internet?** | | |
| Yes | 77 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **77** | **100%** |
| **How often do you use the internet?** | | |
| Everyday | 1 | 1.3% |
| A few times a week | 76 | 98.7% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **77** | **100%** |
| **Do you have access to mobile devices with internet access?** | | |
| Yes | 77 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **77** | **100%** |
| **In what ways do you use computers for learning?** | | |
| Research | 39 | 50.6% |
| Collaborative work | 0 | 0.0% |
| Meetings | 0 | 0.0% |
| Online training | 0 | 0.0% |
| Communication | 77 | 100.0% |
| Networking | 0 | 0.0% |
| Sharing ideas | 1 | 1.3% |
| Other | 77 | 100.0% |
| **How do you normally take part in Training?** | | |
| Distance Learning | 0 | 0.0% |
| Face to Face Training | 77 | 100.0% |
| Placement | 4 | 5.2% |
| Workplace - On the Job | 77 | 100.0% |
| Self Study | 0 | 0.0% |
| Social Networking / Virtual Worlds | 0 | 0.0% |
| Other | 0 | 0.0% |
| **Have you used second life before?** | | |
| Yes | 4 | 5.2% |
| No | 73 | 94.8% |
| **Total** | **77** | **100%** |

***Table 5.3: Questionnaire results from Study 1 showing information about the research participants' use of technology at work and experience of using Second Life ® for work-based learning.***

### 5.2.2 Rationale for Study 1

This study was designed to show how virtual environments may allow SMEs to work in ways they cannot in real life and how they are a useful analogue and in some cases, a better substitution of the real world.

The Courier Manager advised that customer complaints were increasing due to issues at the doorstep when the courier staff were delivering items. Processes were not being followed correctly and there was a lack of customer service being provided. The Courier company were in a predicament because widespread training was required across the country, but to deliver this training to every member of staff would bring the operation to a standstill. Training using Second Life ® addressed a number of issues. It provided a mechanism for all staff to practise real-life scenarios in the virtual world and to re-enact situations as they occurred at the doorstep. It also allowed for training to be carried out without the courier drivers having to leave their local depots. The manager reported at the end of the research that all the training was successfully carried out to all staff members without a single order being jeopardised (although data cannot be provided as part of this study to evidence this). The company reported this was a major achievement for the organisation, with such a large number of staff to be trained and all distributed around the country in small out-base sites and with all staff having to maintain the work schedule.

## *5.3 Data Collection and Results*

In this section, I present findings from study 1, which analyses the results from the card story boards, questionnaire results, focus group discussion and dialogue during the training. All participants are referred to by their code name. The same methods as used in the pilot study were repeated for all three studies (see section 4.2.3). A copy of the questionnaire is shown in Appendix E. As detailed in the pilot study, the data collected has been coded using the Veldhuis-Diermanse Schema for Learning Processes Coding (Veldhuis-Diermanse, 2002) – see Appendix J, as used in the pilot study.

### 5.3.1 Study 1 Virtual World Card Story-Boards

In addition, card story-boards were used as a form of data collection and were created as a result of the data analysis in the pilot study. This technique attributed to Roth (1985) is an 'idea organising' method using tree logic and other hierarchical diagrams and outline. It allowed me to focus idea generation on particular topics and sub-topics much more closely than is normally possible in open ended methods.

It uses a tabular layout – a simple row of header cards and sub-header cards each with a column of ideas cards below it, with a question. Four questions were presented and the research participants had to work in groups of 3 or 4 to rank their answers in order of priority, to reflect their experiences of working in the virtual world. See Table 5.4 for a copy of the four questions and answers. Each was presented on an individual card for sorting.

## Card Story-boards

| QA | **PROFESSIONAL DEVELOPMENT**<br>**Which of these personal skills and attributes do you expect to gain from working in the virtual world?** |
|---|---|
| 1 | Team Work |
| 2 | Collaborative Working |
| 3 | Communication Skills |
| 4 | Lifelong Learning |
| 5 | Wider understanding of cross sectors and industry |
| 6 | Confidence and Proficiency |
| 7 | Problem Solving and Critical Thinking |
| 8 | Professional Skills and Development |
| 9 | Leadership Skills |
| 10 | Practical Knowledge |
| 11 | Experience in Subject Specialism |
| 12 | Technical Knowledge |

| QB | ANALOGUE FOR THE REAL WORLD<br>In what ways do you find working in the virtual world is the equivalent of working in the real world or a replacement for the real world? |
|---|---|
| 1 | Working with people you would not otherwise have been able to do |
| 2 | Less distracting and more effective than the real world |
| 3 | Access to work experiences and projects that you would not otherwise have been involved in. |
| 4 | Develop skills quicker, working in the virtual world eg. because of the ability to repeat and practice tasks |
| 5 | It was easier to learn under the guise of an avatar than in the real world. |
| 6 | Learning through informal, social interaction |

| QC | IDENTITY AND AGENCY<br>Which of these affective factors do you expect to develop whilst working |
|---|---|
| 1 | Helps me build my self-confidence |
| 2 | Builds my self-esteem |
| 3 | Helps me develop my abilities and achieve in my work |
| 4 | Helps me work with people more effectively |
| 5 | Helps give me direction in my work |
| 6 | Helps me monitor my progress |
| 7 | Helps motivate me in my work |
| 8 | Helps me develop a sense of how I learn best in the workplace |

| QD | COMMUNITY OF PRACTICE AND INFORMAL LEARNING<br>In which ways do you learn using Virtual Worlds? |
|---|---|
| 1 | Learning through practising |
| 2 | Learning by imitating best practice |
| 3 | Learning through conversation |
| 4 | Learning through roleplay |
| 5 | Learning through collaboration |
| 6 | Learning through coaching and mentoring |
| 7 | Learning through informal social interaction |

***Table 5.4: Card Story-Board Questions and Answers***

The card story-boards were designed as part of the focus group activity to help the research participants talk about their use of the virtual world. It enabled participants to rank their experiences of using the virtual world in work-based learning.

It was also used as a developmental activity to help the research participants understand more clearly their uses of the virtual world in the workplace. The

cards were used as a mechanism and trigger for discussion and for participants to share ideas about how they are using the virtual world in the workplace.

This method of data collection proved interesting for participants to work together in groups of 3 or 4 to sort the coloured cards. It was a means to gather a lot of data in a relatively short time in comparison to other methods, for example, observation.

The activity was easy to combine with other data collection methods and supported the focus group discussion that followed. It also focused the attention of the research participants and put them in control, whilst at the same time allowing them to recollect more examples than they would have originally considered. Blank cards were also provided for participants to record additional responses. The activity successfully had the participants working straight away on answering the questions and replaced the need for an icebreaker activity.

The data from the card story board activity was analysed quantitatively. The total data collection set from all 116 research participants is presented in Appendix I and each data set for each organisation is discussed and presented individually in each chapter.

For the purpose of analysing the data, the higher the number, the higher the rank for each question. The highest score was the total number of answers for an individual question, so in Question 1 on Professional Development, there were 12 answers, so it scored top with a score of 12 if the group ranked it first.

The results of the card story-board for Samedel are shown in tables 5.5 – 5.8. If participants did not find a card to be relevant, it was removed.

| QA - PROFESSIONAL DEVELOPMENT | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Communication Skills | Lifelong Learning | Wider understanding of cross sectors and industry | Technical Knowledge | Practical Knowledge | Experience in Subject Specialism | Team Work | Confidence and Proficiency | Professional Skills and Development | Leadership Skills | Collaborative Working | Problem Solving and Critical Thinking |
| Group 1 | 7 | 1 | 2 | 3 | 4 | 8 | 9 | 12 | 6 | 5 | 11 | 10 |
| Group 2 | 4 | 10 | 11 | 3 | 2 | 6 | 5 | 9 | 7 | 1 | 12 | 8 |
| Group 3 | 11 | 4 | 10 | 7 | 2 | 6 | 5 | 12 | 9 | 1 | 8 | 3 |
| Group 4 | 11 | 3 | 6 | 1 | 5 | 7 | 2 | 12 | 10 | 4 | 9 | 8 |
| Group 5 | 11 | 2 | 5 | 8 | 4 | 6 | 1 | 12 | 10 | 3 | 9 | 7 |
| Group 6 | 11 | 5 | 3 | 7 | 2 | 4 | 6 | 12 | 10 | 8 | 9 | 1 |
| Group 7 | 8 | 1 | 4 | 5 | 9 | 3 | 2 | 12 | 7 | 11 | 6 | 10 |
| Group 8 | 12 | 7 | 11 | 8 | 4 | 3 | 5 | 10 | 1 | 2 | 6 | 9 |
| Group 9 | 12 | 1 | 10 | 8 | 4 | 7 | 6 | 11 | 3 | 2 | 9 | 5 |
| Group 10 | 8 | 1 | 3 | 4 | 5 | 6 | 9 | 12 | 7 | 2 | 11 | 10 |
| Group 11 | 10 | 1 | 3 | 4 | 9 | 7 | 6 | 12 | 5 | 2 | 8 | 11 |
| Group 12 | 12 | 1 | 4 | 3 | 7 | 6 | 8 | 11 | 10 | 2 | 9 | 5 |
| Group 13 | 12 | 9 | 3 | 7 | 8 | 4 | 2 | 11 | 10 | 5 | 1 | 6 |
| Group 14 | 9 | 2 | 1 | 8 | 6 | 12 | 7 | 11 | 10 | 5 | 4 | 3 |
| Group 15 | 7 | 1 | 2 | 3 | 11 | 6 | 8 | 12 | 5 | 4 | 9 | 10 |
| Group 16 | 11 | 3 | 4 | 5 | 8 | 6 | 7 | 12 | 10 | 2 | 9 | 1 |
| Group 17 | 7 | 2 | 4 | 3 | 10 | 6 | 9 | 12 | 8 | 5 | 1 | 11 |
| Group 18 | 7 | 1 | 3 | 2 | 10 | 6 | 9 | 12 | 8 | 4 | 5 | 11 |
| Group 19 | 11 | 1 | 2 | 6 | 4 | 5 | 7 | 12 | 9 | 3 | 10 | 8 |
| Group 20 | 8 | 1 | 6 | 2 | 3 | 9 | 10 | 7 | 5 | 4 | 11 | 12 |
| Group 21 | 11 | 1 | 3 | 2 | 6 | 7 | 4 | 12 | 10 | 5 | 9 | 8 |
| Group 22 | 11 | 1 | 2 | 8 | 4 | 5 | 6 | 10 | 12 | 3 | 9 | 7 |
| Group 23 | 12 | 4 | 3 | 9 | 8 | 10 | 6 | 1 | 11 | 2 | 5 | 7 |
| Group 24 | 3 | 1 | 12 | 2 | 8 | 10 | 9 | 7 | 5 | 11 | 4 | 6 |
| Group 25 | 9 | 2 | 3 | 1 | 7 | 11 | 10 | 6 | 8 | 5 | 4 | 12 |
| Group 26 | 12 | 1 | 8 | 9 | 2 | 6 | 5 | 11 | 10 | 3 | 7 | 4 |
| Group 27 | 11 | 6 | 5 | 1 | 4 | 3 | 2 | 12 | 10 | 7 | 9 | 8 |
| Group 28 | 3 | 2 | 4 | 1 | 7 | 9 | 8 | 12 | 6 | 5 | 10 | 11 |
| **Totals** | **261** | **75** | **137** | **130** | **163** | **184** | **173** | **297** | **222** | **116** | **214** | **212** |
| **2184** | 12.0% | 3.4% | 6.3% | 6.0% | 7.5% | 8.4% | 7.9% | 13.6% | 10.2% | 5.3% | 9.8% | 9.7% |

***Table 5.5: How the Research Participants from Samedel ranked each answer for professional development in the Story Board Activity (see table 5.4 for full description of the questions and answers).***

The research participants were asked to rank in order their experiences of professional development in the virtual world (see Figure. 5.1). Gaining confidence and proficiency ranked the top priority at 13.6%. Communication skills also ranked the second highest which is not unusual given the nature of the couriers work and how they are communicating all day long with customers.

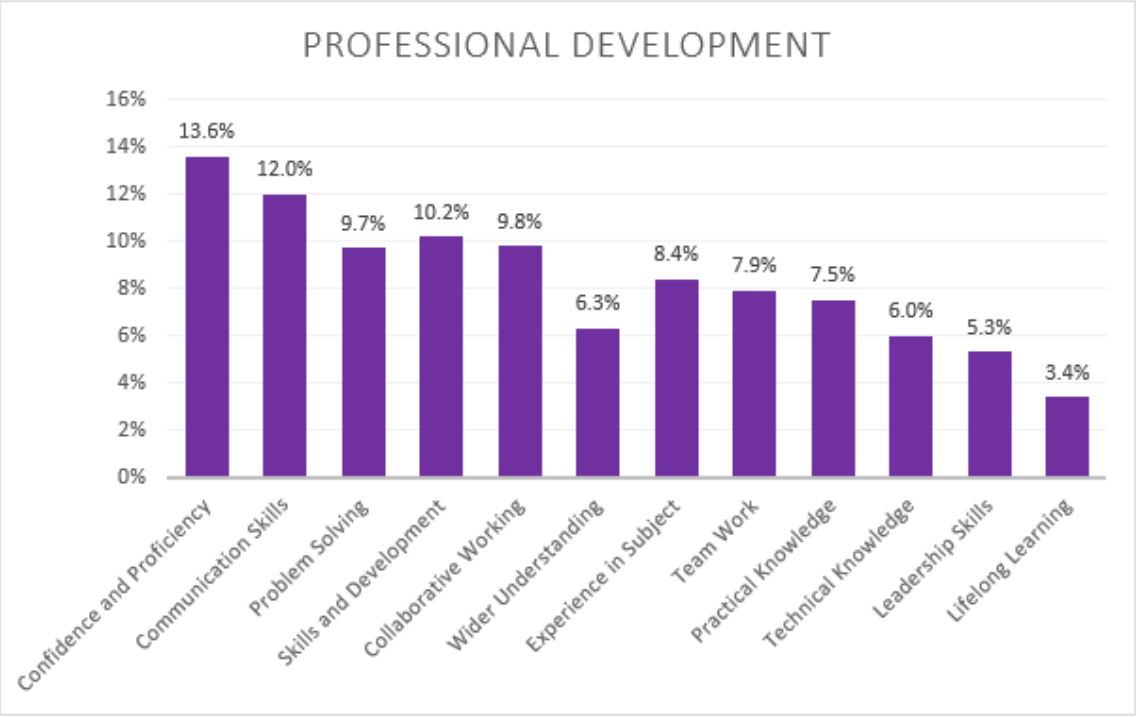



***Figure 5.1: Card Story-Board Results for Professional Development for Samedel***

Staff and apprentices enjoyed the freedom to learn in the virtual world. Problem solving, skills development and collaborative working all scored highly. The participants gained confidence and proficiency in their roles and wider softer skills whilst working in the virtual world. Comments on the questionnaires included:

> "*It's nice to be somewhere else not at my desk staring at my screen but looking at the sea.*"
>
> ***(Participant 03395)***

and

> "*I feel totally engrossed and forget I'm at work and that helps me build confidence and keep repeating tasks until I feel ready to try them in the real world.*"
>
> ***(Participant 05690)***

When working in the virtual world, the manager and learning assessors would remain in the space but not facilitate. Staff commented on how they'd forget that anyone was watching them, which allowed them to build confidence by working in groups around the virtual world and enabled the employer and educational assessor to view a true reflection of how each individual was performing. Teamwork and leadership roles also developed whilst working online. Management and the Learning Providers would dip in and out of the virtual world would provide feedback and verification. One manager commented:

> "*The activities, discussions and work that takes place in the virtual world is often unstructured based on an investigative task where the apprentices with other staff have to explore a variety of scenarios in response to a training question, it can appear disorganised, but then I or an assessor from the college or learning provider, draws the learning together based on what the staff have been working through in the virtual world*".
>
> ***(Participant 04161)***

| QB - ANALOGUE FOR THE REAL WORLD | | | | | | |
|---|---|---|---|---|---|---|
| | It was easier to learn under the guise of an avatar than in the real world. | Learning through informal, social interaction | Develop skills quicker, working in the virtual world | Less distracting and more effective than the real world | Working with people you would not otherwise have been able to do | Access to work experiences and projects that you would not otherwise have been involved in |
| Group 1 | 5 | 3 | 6 | 4 | 1 | 2 |
| Group 2 | 6 | 2 | 4 | 5 | 3 | 1 |
| Group 3 | 6 | 2 | 5 | 4 | 3 | 1 |
| Group 4 | 6 | 2 | 4 | 5 | 3 | 1 |
| Group 5 | 3 | 1 | 4 | 5 | 2 | 6 |
| Group 6 | 4 | 2 | 5 | 6 | 3 | 1 |
| Group 7 | 5 | 4 | 6 | 2 | 1 | 3 |
| Group 8 | 3 | 5 | 6 | 2 | 1 | 4 |
| Group 9 | 4 | 3 | 6 | 5 | 1 | 2 |
| Group 10 | 6 | 4 | 5 | 3 | 1 | 2 |
| Group 11 | 2 | 5 | 6 | 3 | 1 | 4 |
| Group 12 | 2 | 1 | 5 | 4 | 3 | 6 |
| Group 13 | 6 | 3 | 4 | 5 | 1 | 2 |
| Group 14 | 4 | 3 | 5 | 2 | 1 | 6 |
| Group 15 | 6 | 2 | 4 | 5 | 3 | 1 |
| Group 16 | 1 | 6 | 5 | 3 | 2 | 4 |
| Group 17 | 2 | 5 | 4 | 3 | 1 | 6 |
| Group 18 | 3 | 1 | 6 | 5 | 2 | 4 |
| Group 19 | 4 | 1 | 5 | 2 | 3 | 6 |
| Group 20 | 6 | 1 | 5 | 4 | 2 | 3 |
| Group 21 | 6 | 2 | 4 | 5 | 1 | 3 |
| Group 22 | 4 | 1 | 3 | 5 | 2 | 6 |
| Group 23 | 3 | 4 | 6 | 2 | 1 | 5 |
| Group 24 | 6 | 4 | 2 | 5 | 1 | 3 |
| Group 25 | 2 | 5 | 6 | 3 | 1 | 4 |
| Group 26 | 5 | 2 | 6 | 4 | 1 | 3 |
| Group 27 | 5 | 2 | 6 | 4 | 1 | 3 |
| Group 28 | 5 | 2 | 6 | 4 | 1 | 3 |
| **Totals** | **120** | **78** | **139** | **109** | **47** | **95** |
| **588** | 20.4% | 13.3% | 23.6% | 18.5% | 8.0% | 16.2% |

***Table 5.6: How the Research Participants from Samedel ranked each answer on analogue of the real world in the Story Board Activity (see table 5.4 for full description of the questions and answers).***

The use of the virtual world enabled a much more experiential approach to learning and the results showed that participants felt they developed skills quicker. 23.6% of participants ranked "Developing skills more quickly" (see Figure 5.2) as a top experience and a close second was participants feeling learning was easier under the guise of an avatar (20.4%). It suggests a more agile way to learn which fostered many skills amongst the apprentices, such as collaborative working, troubleshooting issues, problem solving and thinking on their feet and being creative. One participant said:

> "*It's nice to work somewhere uncluttered and distraction free. You forget where you are and become totally immersed in what you're doing*".
>
> ***(Participant 12222)***

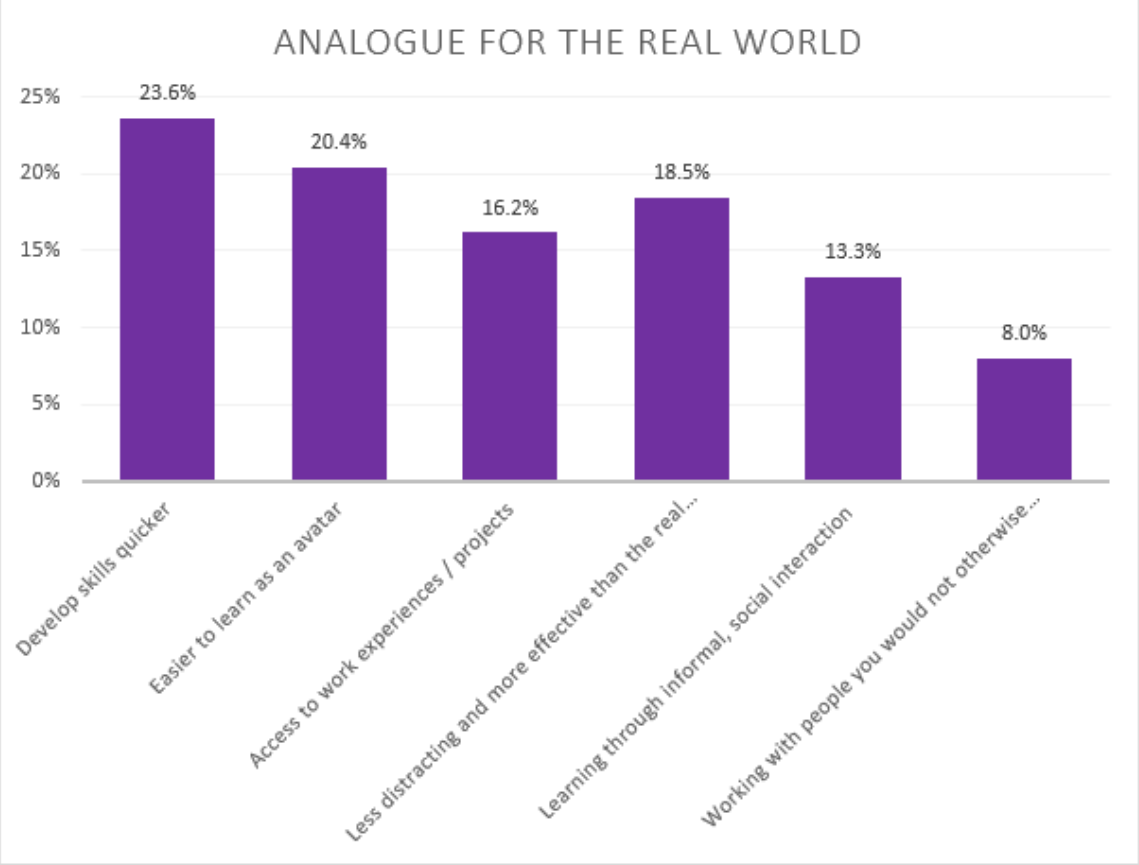



***Figure 5.2: Card Story-Board Results for an analogue of the real world for Samedel***

| QC - IDENTITY AND AGENCY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Builds my self-confidence | Develops my abilities and achieve in my work | Builds my self-esteem | Helps motivate me in my work | Helps me work with people more effectively | Helps me monitor my progress | Develops a sense of how I learn best in the workplace | Gives me direction in my work |
| Group 1 | 8 | 7 | 5 | 2 | 3 | 6 | 1 | 4 |
| Group 2 | 8 | 6 | 5 | 3 | 7 | 1 | 2 | 4 |
| Group 3 | 8 | 7 | 1 | 6 | 3 | 5 | 4 | 2 |
| Group 4 | 8 | 6 | 7 | 2 | 4 | 1 | 3 | 5 |
| Group 5 | 8 | 7 | 6 | 2 | 5 | 3 | 1 | 4 |
| Group 6 | 8 | 6 | 7 | 4 | 5 | 2 | 1 | 3 |
| Group 7 | 8 | 5 | 4 | 7 | 1 | 2 | 3 | 6 |
| Group 8 | 8 | 7 | 6 | 4 | 5 | 1 | 2 | 3 |
| Group 9 | 7 | 1 | 5 | 3 | 4 | 6 | 2 | 8 |
| Group 10 | 8 | 5 | 7 | 3 | 4 | 1 | 2 | 6 |
| Group 11 | 8 | 6 | 4 | 7 | 1 | 2 | 5 | 3 |
| Group 12 | 7 | 5 | 6 | 3 | 8 | 1 | 2 | 4 |
| Group 13 | 8 | 7 | 6 | 3 | 4 | 2 | 1 | 5 |
| Group 14 | 8 | 6 | 7 | 3 | 5 | 4 | 2 | 1 |
| Group 15 | 8 | 7 | 6 | 4 | 5 | 1 | 2 | 3 |
| Group 16 | 7 | 6 | 8 | 3 | 2 | 1 | 5 | 4 |
| Group 17 | 8 | 4 | 7 | 1 | 2 | 6 | 3 | 5 |
| Group 18 | 8 | 5 | 7 | 1 | 4 | 6 | 2 | 3 |
| Group 19 | 8 | 7 | 6 | 1 | 3 | 2 | 4 | 5 |
| Group 20 | 8 | 6 | 7 | 1 | 3 | 2 | 4 | 5 |
| Group 21 | 8 | 7 | 5 | 1 | 6 | 2 | 3 | 4 |
| Group 22 | 8 | 6 | 7 | 1 | 5 | 3 | 2 | 4 |
| Group 23 | 8 | 6 | 7 | 1 | 5 | 2 | 3 | 4 |
| Group 24 | 8 | 6 | 7 | 1 | 5 | 2 | 3 | 4 |
| Group 25 | 8 | 6 | 7 | 1 | 5 | 2 | 3 | 4 |
| Group 26 | 8 | 6 | 7 | 1 | 5 | 2 | 3 | 4 |
| Group 27 | 8 | 6 | 7 | 1 | 5 | 2 | 3 | 4 |
| Group 28 | 8 | 6 | 7 | 1 | 5 | 2 | 3 | 4 |
| **Totals** | **221** | **165** | **171** | **71** | **119** | **72** | **74** | **115** |
| **1008** | 21.9% | 16.4% | 17.0% | 7.0% | 11.8% | 7.1% | 7.3% | 11.4% |

***Table 5.7: How the Research Participants from Samedel ranked each answer for identity and agency in the Story Board Activity (see table 5.4 for full description of the questions and answers).***

The participants working in the virtual world demonstrated all of the characteristics of heutagogic learners (Canning and Callen, 2010; Hase and Kenyon, 2007; Kenyon and Hase, 2010 and Mezirow, 1997). Their learning was active and self-determined and they stopped looking to managers for answers, but to instead work things out amongst themselves. It became evident that through the use of the virtual world, training and learning in the workplace was no longer limited to what a training instructor could tell the staff in a training room or limited from a training manual, as content is available to all the staff everywhere through interaction between themselves. All of them became instructors in one way or another. Staff learned from apprentices and noted what they found difficulty in, so that they could adopt a different approach for future new recruits. Staff also worked together to help explain things in different ways until apprentices understood. The card sort activity showed that self-confidence was the most important skill at 21.9% in working in the virtual world, in relation to developing identity and agency. Using the virtual world to build self-esteem ranked highly (17%) and using the virtual world to develop abilities and achieve in the workplace rated 16.4% (see Figure. 5.3).

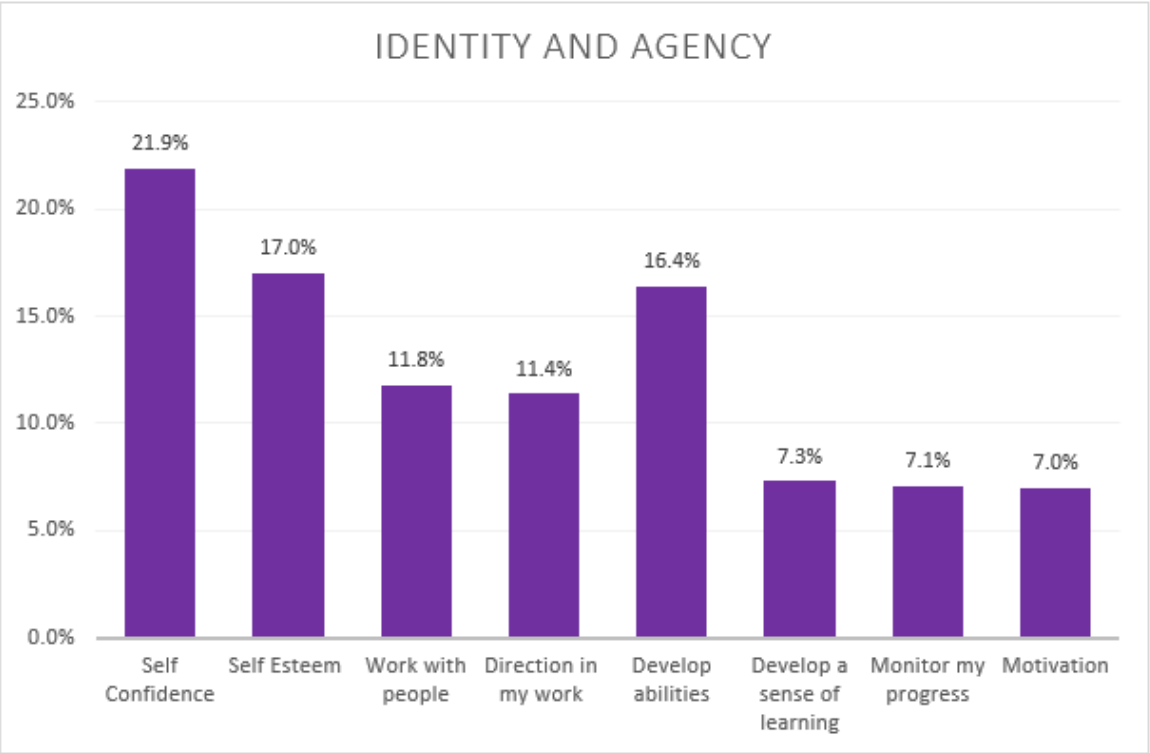



***Figure 5.3: Card Story-Board Results for identify and agency, for Samedel***

| QD - COMMUNITY OF PRACTICE AND INFORMAL LEARNING | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Learning through roleplay | Learning through collaboration | Learning by imitating best practice | Learning through coaching and mentoring | Learning through social interaction | Learning through conversation | Learning through practising |
| Group 1 | 6 | 2 | 4 | 1 | 3 | 5 | 7 |
| Group 2 | 4 | 3 | 2 | 1 | 5 | 7 | 6 |
| Group 3 | 7 | 1 | 2 | 4 | 3 | 5 | 6 |
| Group 4 | 7 | 3 | 2 | 6 | 1 | 4 | 5 |
| Group 5 | 7 | 6 | 2 | 1 | 3 | 5 | 4 |
| Group 6 | 7 | 4 | 5 | 1 | 3 | 2 | 6 |
| Group 7 | 6 | 2 | 3 | 4 | 5 | 1 | 7 |
| Group 8 | 6 | 3 | 5 | 2 | 4 | 1 | 7 |
| Group 9 | 5 | 4 | 6 | 3 | 1 | 2 | 7 |
| Group 10 | 4 | 1 | 5 | 3 | 2 | 7 | 6 |
| Group 11 | 5 | 4 | 6 | 3 | 1 | 2 | 7 |
| Group 12 | 4 | 2 | 5 | 3 | 1 | 7 | 6 |
| Group 13 | 3 | 7 | 6 | 4 | 5 | 2 | 1 |
| Group 14 | 6 | 1 | 3 | 2 | 4 | 5 | 7 |
| Group 15 | 5 | 2 | 3 | 4 | 6 | 1 | 7 |
| Group 16 | 6 | 2 | 1 | 3 | 4 | 5 | 7 |
| Group 17 | 4 | 5 | 6 | 7 | 1 | 3 | 2 |
| Group 18 | 5 | 4 | 2 | 7 | 1 | 3 | 6 |
| Group 19 | 6 | 2 | 3 | 1 | 5 | 4 | 7 |
| Group 20 | 5 | 3 | 2 | 1 | 4 | 6 | 7 |
| Group 21 | 6 | 2 | 4 | 3 | 5 | 1 | 7 |
| Group 22 | 3 | 7 | 5 | 1 | 4 | 2 | 6 |
| Group 23 | 6 | 3 | 4 | 1 | 2 | 5 | 7 |
| Group 24 | 6 | 4 | 5 | 1 | 3 | 2 | 7 |
| Group 25 | 5 | 4 | 6 | 1 | 3 | 2 | 7 |
| Group 26 | 6 | 4 | 5 | 3 | 2 | 1 | 7 |
| Group 27 | 6 | 2 | 3 | 1 | 4 | 5 | 7 |
| Group 28 | 7 | 1 | 2 | 4 | 3 | 5 | 6 |
| **Totals** | **153** | **88** | **107** | **76** | **88** | **100** | **172** |
| **784** | 19.5% | 11.2% | 13.6% | 9.7% | 11.2% | 12.8% | 21.9% |

***Table 5.8: How the Research Participants from Samedel ranked each answer for community of practice and informal learning in the Story Board Activity (see table 5.4 for full description of the questions and answers).***

A key focus for using the virtual world by staff was learning through practising (21.9%) and learning by carrying out role plays (19.5%). Learning by imitating best practice also scored highly (13.6%) (see Figure 5.4). The focus no longer was on passing on old knowledge, but on equipping apprentices and staff with the agility and smartness to deal with how to problem solve when issues arise. The nature of the courier work was that issues arise and no two days are the same. It is impossible to predict all the scenarios that could happen whilst out on the road. One of the tasks for the virtual world through the daily training was to help staff use the immense power of the technology and support staff and apprentices into higher performers. Technology enhanced learning in the workplace is available to support lifelong learners.

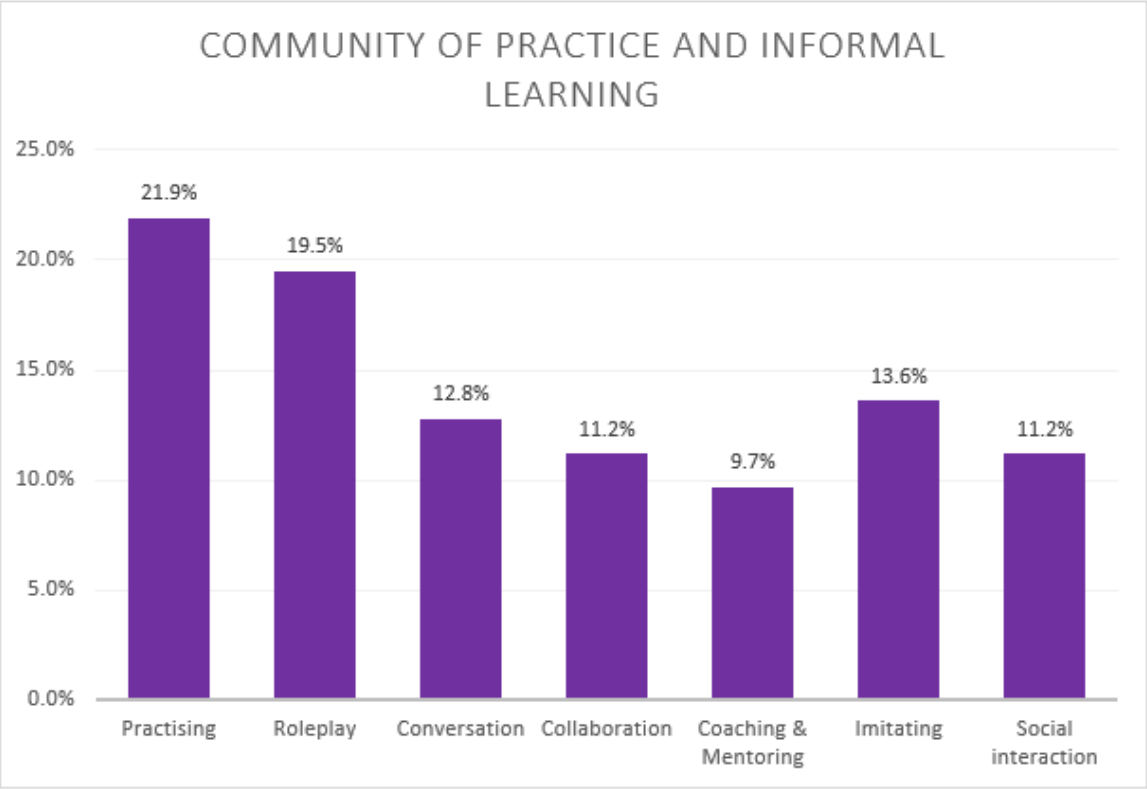



***Figure 5.4: Card Story-Board Results for a community of practice and informal learning, for Samedel***

### 5.3.2 Evolution of Virtual World Activity

In this section, I present a comparison between activity that takes place within the virtual world at the start of the study and activity at the end of the study. A key advantage of using content analysis is that it is useful to see how changes evolve over time. There were significant changes as staff utilised the virtual world more often, compared to at the start of the study.

Table 5.9 (displayed on the following two pages) shows the number of utterances coded for each category, for all participants for a 20-minute activity within the virtual world at Samedel, taking place at the start of Study 1.

| Research Participant | Codes (See Appendix H) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cognitive Learning Activities | | | | | | | | | | |
| | *Debating* | | | | | *Using external information and experiences* | | | | *Linking or repeating internal information* | |
| | *CDPF* | *CDPNF* | *CDAF* | *CDANF* | *CDAQ* | *CCEI* | *CREI* | *CSEI* | *CREE* | *CIL* | *CIR* |
| 06681 | 0 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 11 |
| 02373 | 1 | 5 | 1 | 0 | 5 | 1 | 0 | 0 | 0 | 1 | 25 |
| 06286 | 4 | 5 | 0 | 0 | 6 | 0 | 0 | 0 | 1 | 1 | 12 |
| 12223 | 2 | 5 | 1 | 0 | 5 | 0 | 0 | 0 | 3 | 3 | 9 |
| 04223 | 0 | 5 | 1 | 0 | 1 | 0 | 0 | 0 | 4 | 5 | 5 |
| 04440 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 7 | 4 | 6 |
| 09440 | 0 | 2 | 1 | 0 | 8 | 0 | 0 | 0 | 0 | 1 | 14 |
| 05690 | 4 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 1 | 20 |
| 06808 | 3 | 0 | 0 | 1 | 1 | 3 | 0 | 0 | 5 | 1 | 6 |
| 08262 | 1 | 2 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 2 | 10 |
| 04808 | 1 | 1 | 3 | 0 | 2 | 0 | 0 | 0 | 2 | 2 | 13 |
| 04816 | 1 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 1 | 3 | 5 |
| 04168 | 1 | 2 | 2 | 0 | 3 | 2 | 0 | 0 | 1 | 1 | 11 |
| 06694 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 5 | 2 | 9 |
| 01810 | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 1 | 0 | 2 | 15 |
| 01762 | 0 | 3 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 2 | 10 |
| 01528 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 1 | 1 | 14 |
| 09765 | 0 | 3 | 0 | 1 | 4 | 1 | 0 | 0 | 1 | 1 | 16 |
| 05633 | 0 | 5 | 0 | 0 | 0 | 2 | 0 | 0 | 6 | 3 | 4 |
| 08631 | 2 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | 10 |
| 12852 | 4 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 1 | 13 |
| 12185 | 2 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 11 |
| 03395 | 0 | 5 | 1 | 0 | 1 | 0 | 0 | 0 | 4 | 5 | 4 |
| 04266 | 0 | 1 | 1 | 0 | 1 | 5 | 1 | 1 | 6 | 4 | 5 |
| 04511 | 0 | 2 | 1 | 2 | 6 | 0 | 0 | 0 | 1 | 1 | 14 |
| 04244 | 4 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 1 | 1 | 26 |
| 04161 | 3 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 3 | 1 | 5 |
| 07500 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 10 |
| 07231 | 1 | 1 | 3 | 0 | 3 | 3 | 0 | 0 | 3 | 2 | 13 |
| 05132 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 6 | 3 | 6 |
| 10692 | 1 | 2 | 2 | 1 | 2 | 2 | 0 | 0 | 2 | 1 | 11 |
| 03353 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 6 | 2 | 9 |
| 07825 | 0 | 0 | 1 | 0 | 4 | 2 | 2 | 1 | 2 | 4 | 15 |
| 02463 | 0 | 3 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 5 | 10 |
| 01107 | 0 | 0 | 1 | 0 | 5 | 1 | 0 | 0 | 1 | 7 | 14 |
| 04951 | 0 | 3 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 3 | 16 |
| 02789 | 0 | 5 | 0 | 1 | 0 | 2 | 0 | 0 | 3 | 3 | 5 |
| 06784 | 2 | 2 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 2 | 11 |
| 03227 | 4 | 5 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 13 |
| 12222 | 2 | 5 | 1 | 0 | 4 | 3 | 0 | 0 | 0 | 3 | 11 |
| 01414 | 0 | 5 | 1 | 0 | 1 | 0 | 0 | 0 | 3 | 5 | 6 |
| 04788 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 6 | 4 | 7 |
| 09397 | 0 | 2 | 1 | 2 | 5 | 4 | 0 | 0 | 1 | 1 | 14 |
| 05219 | 4 | 0 | 0 | 0 | 6 | 3 | 0 | 0 | 1 | 1 | 28 |
| 06382 | 3 | 0 | 0 | 1 | 2 | 3 | 0 | 0 | 6 | 1 | 7 |
| 08981 | 1 | 2 | 0 | 2 | 1 | 3 | 0 | 0 | 2 | 2 | 10 |
| 04665 | 1 | 1 | 3 | 0 | 3 | 3 | 0 | 0 | 2 | 2 | 13 |
| 04244 | 1 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 5 | 3 | 7 |
| 06727 | 1 | 2 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 11 |
| 12402 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 5 | 2 | 9 |
| 03496 | 0 | 0 | 1 | 0 | 2 | 2 | 2 | 1 | 2 | 4 | 15 |
| 10489 | 0 | 3 | 1 | 2 | 2 | 1 | 0 | 0 | 3 | 5 | 10 |
| 03415 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 1 | 0 | 13 |
| 07734 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 1 | 0 | 13 |
| 02756 | 0 | 3 | 0 | 1 | 4 | 1 | 0 | 0 | 2 | 0 | 18 |
| 12736 | 0 | 5 | 0 | 1 | 3 | 2 | 0 | 0 | 1 | 0 | 11 |
| 09489 | 2 | 2 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 2 | 13 |
| 05415 | 4 | 5 | 0 | 0 | 13 | 3 | 0 | 0 | 1 | 2 | 13 |
| 10142 | 2 | 5 | 1 | 0 | 11 | 0 | 0 | 0 | 2 | 0 | 11 |
| 09435 | 0 | 5 | 1 | 0 | 1 | 0 | 0 | 0 | 7 | 0 | 6 |
| 06414 | 0 | 1 | 1 | 0 | 1 | 5 | 1 | 1 | 6 | 0 | 7 |
| 08489 | 0 | 2 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 1 | 14 |
| 04224 | 4 | 0 | 0 | 1 | 7 | 3 | 0 | 0 | 1 | 1 | 23 |
| 10151 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 5 | 1 | 7 |
| 03555 | 1 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 10 |
| 04471 | 1 | 1 | 3 | 0 | 2 | 3 | 0 | 0 | 0 | 2 | 13 |
| 10856 | 1 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 5 | 3 | 7 |
| 03615 | 1 | 2 | 2 | 0 | 1 | 2 | 0 | 0 | 1 | 1 | 11 |
| 04779 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 6 | 2 | 9 |
| 04793 | 0 | 0 | 1 | 0 | 4 | 2 | 2 | 1 | 0 | 1 | 15 |
| 04753 | 0 | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 10 |
| 10408 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 13 |
| 04744 | 0 | 3 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 1 | 18 |
| 10382 | 0 | 5 | 0 | 1 | 0 | 2 | 0 | 0 | 3 | 1 | 5 |
| 07271 | 2 | 2 | 0 | 1 | 3 | 4 | 0 | 0 | 1 | 1 | 13 |
| 10312 | 5 | 3 | 0 | 1 | 0 | 3 | 0 | 1 | 6 | 2 | 7 |
| 07444 | 1 | 3 | 0 | 1 | 0 | 1 | 0 | 1 | 5 | 1 | 4 |
| **Totals** | **83** | **161** | **58** | **43** | **198** | **108** | **13** | **11** | **167** | **151** | **868** |
| | 3.2% | 6.2% | 2.2% | 1.6% | 7.6% | 4.1% | 0.5% | 0.4% | 6.4% | 5.8% | 33.3% |
| | 20.8% | | | | | 11.5% | | | | 39.1% | |
| | 71.3% | | | | | | | | | | |

| Research Participant | Codes (See Appendix H) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Affective Learning | | | Metacognitive Learning Activities | | | | | | | | | Rest Activities | |
| | *Affective Learning* | | | *Planning* | | | *Keeping clarity* | | | *Monitoring* | | | | |
| | *AM* | *AA* | *AC* | *MPA* | *MAA* | *MEA* | *MSD* | *MAC* | *MGE* | *MKW* | *MRP* | | *RNE* | *TOTALS* |
| 06681 | 1 | 10 | 3 | 0 | 0 | 0 | 0 | 5 | 0 | 1 | 0 | | 1 | 40 |
| 02373 | 1 | 8 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 52 |
| 06286 | 1 | 6 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | | 0 | 41 |
| 12223 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 35 |
| 04223 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | | 0 | 27 |
| 04440 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | | 1 | 29 |
| 09440 | 4 | 8 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | | 1 | 41 |
| 05690 | 2 | 8 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 41 |
| 06808 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 25 |
| 08262 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | | 0 | 26 |
| 04808 | 3 | 3 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 | 33 |
| 04816 | 1 | 0 | 1 | 3 | 2 | 0 | 0 | 1 | 0 | 0 | 2 | | 0 | 24 |
| 04168 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 | 30 |
| 06694 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | | 0 | 28 |
| 01810 | 1 | 8 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | | 0 | 42 |
| 01762 | 2 | 9 | 2 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 1 | | 0 | 39 |
| 01528 | 2 | 6 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | | 0 | 34 |
| 09765 | 2 | 7 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | | 0 | 41 |
| 05633 | 3 | 1 | 3 | 2 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | | 0 | 34 |
| 08631 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 24 |
| 12852 | 1 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | | 0 | 37 |
| 12185 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 26 |
| 03395 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | | 0 | 26 |
| 04266 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | | 0 | 29 |
| 04511 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | | 0 | 34 |
| 04244 | 2 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 47 |
| 04161 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 20 |
| 07500 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | | 0 | 21 |
| 07231 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 | 35 |
| 05132 | 1 | 0 | 1 | 3 | 2 | 0 | 0 | 1 | 0 | 0 | 2 | | 2 | 30 |
| 10692 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 | 31 |
| 03353 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | | 0 | 28 |
| 07825 | 1 | 7 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | | 1 | 46 |
| 02463 | 2 | 2 | 2 | 0 | 2 | 0 | 0 | 3 | 0 | 0 | 1 | | 0 | 36 |
| 01107 | 2 | 8 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | | 0 | 42 |
| 04951 | 2 | 8 | 1 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | | 0 | 43 |
| 02789 | 3 | 1 | 3 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 | 29 |
| 06784 | 1 | 4 | 1 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | | 0 | 31 |
| 03227 | 1 | 3 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | | 0 | 36 |
| 12222 | 1 | 5 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | | 0 | 39 |
| 01414 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | | 0 | 29 |
| 04788 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | | 0 | 26 |
| 09397 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | | 0 | 39 |
| 05219 | 2 | 9 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 55 |
| 06382 | 2 | 2 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | 1 | 31 |
| 08981 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | | 0 | 30 |
| 04665 | 3 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 37 |
| 04244 | 1 | 1 | 1 | 3 | 2 | 0 | 0 | 2 | 0 | 0 | 2 | | 1 | 33 |
| 06727 | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 28 |
| 12402 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | | 0 | 27 |
| 03496 | 1 | 5 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | | 1 | 41 |
| 10489 | 2 | 3 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | | 0 | 38 |
| 03415 | 2 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 1 | 28 |
| 07734 | 2 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 28 |
| 02756 | 2 | 5 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 40 |
| 12736 | 3 | 2 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 33 |
| 09489 | 1 | 3 | 1 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | | 0 | 32 |
| 05415 | 1 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | | 1 | 52 |
| 10142 | 1 | 3 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | | 1 | 41 |
| 09435 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | | 1 | 29 |
| 06414 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 26 |
| 08489 | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 31 |
| 04224 | 2 | 10 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 53 |
| 10151 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | | 2 | 27 |
| 03555 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | | 0 | 24 |
| 04471 | 3 | 7 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | | 0 | 39 |
| 10856 | 1 | 1 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | | 0 | 32 |
| 03615 | 2 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 2 | 29 |
| 04779 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | | 0 | 29 |
| 04793 | 1 | 6 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | | 1 | 39 |
| 04753 | 2 | 4 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | | 0 | 30 |
| 10408 | 2 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 29 |
| 04744 | 2 | 11 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 44 |
| 10382 | 3 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 25 |
| 07271 | 1 | 6 | 1 | 1 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | | 0 | 41 |
| 10312 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | | 0 | 38 |
| 07444 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3 | 1 | 1 | 0 | | 0 | 24 |
| **Totals** | **139** | **259** | **84** | **70** | **25** | **0** | **0** | **80** | **17** | **11** | **42** | | **21** | **2609** |
| | 5.3% | 9.9% | 3.2% | 2.7% | 1.0% | 0.0% | 0.0% | 3.1% | 0.7% | 0.4% | 1.6% | | 0.8% | |
| | 18.5% | | | 3.6% | | | 3.7% | | | 2.0% | | | | |
| | 18.5% | | | 9.4% | | | | | | | | | | |

***Table 5.9: Coded Utterance Values for 20 minutes Virtual World Activity at Samedel at the start of Study 1.***

Figure 5.5 is a graphical representation of the coded utterance values from table 5.6, for the 20-minute virtual world activity at Samedel.

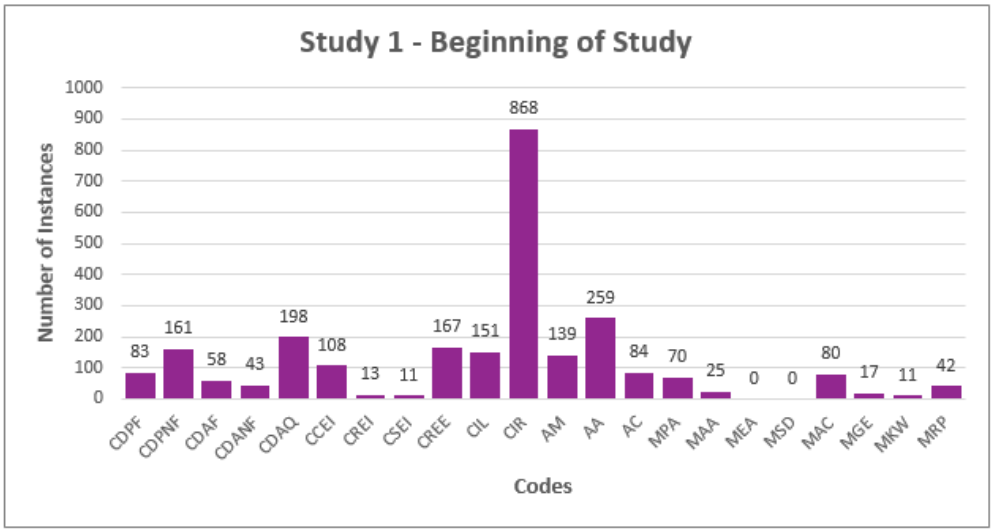



***Figure 5.5: Coded utterance totals for all participants in a 20-minute activity in the virtual world at Samedel at the start of Study 1.***

Figure 5.6 is a graphical representation of the coded utterance values from table 5.6, as a percentage of the total number of utterances, for 20-minutes virtual world activity, at the start of the study.

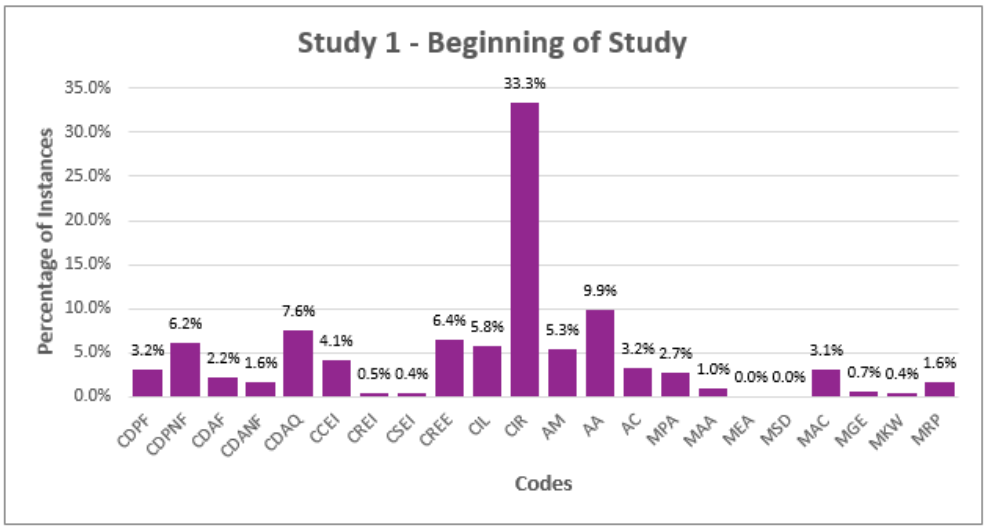



***Figure 5.6: Coded utterance percentages for all participants in a 20-minute activity in the virtual world at Samedel at the start of Study 1.***

Figure 5.7 shows a pie chart summarising the split of utterances across cognitive, meta-cognitive and affective learning for the 20-minute activity take place within the virtual world, utilising Veldhuis-Diermanse Schema for Learning Process Coding (2002), as shown in Appendix J.

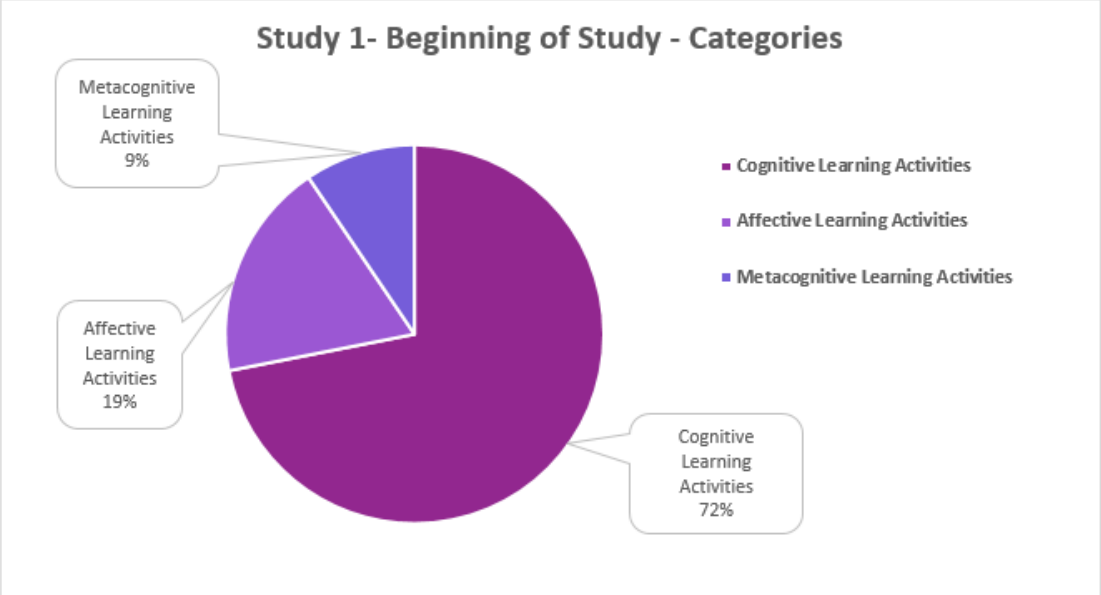



***Figure 5.7: A pie chart showing cognitive, meta-cognitive and affective learning taking place in the virtual world at the start of Study 1.***

Figure 5.8 shows the same data again from Figure 5.7, broken down by activity utterance code within the categories of cognitive, meta-cognitive and affective.

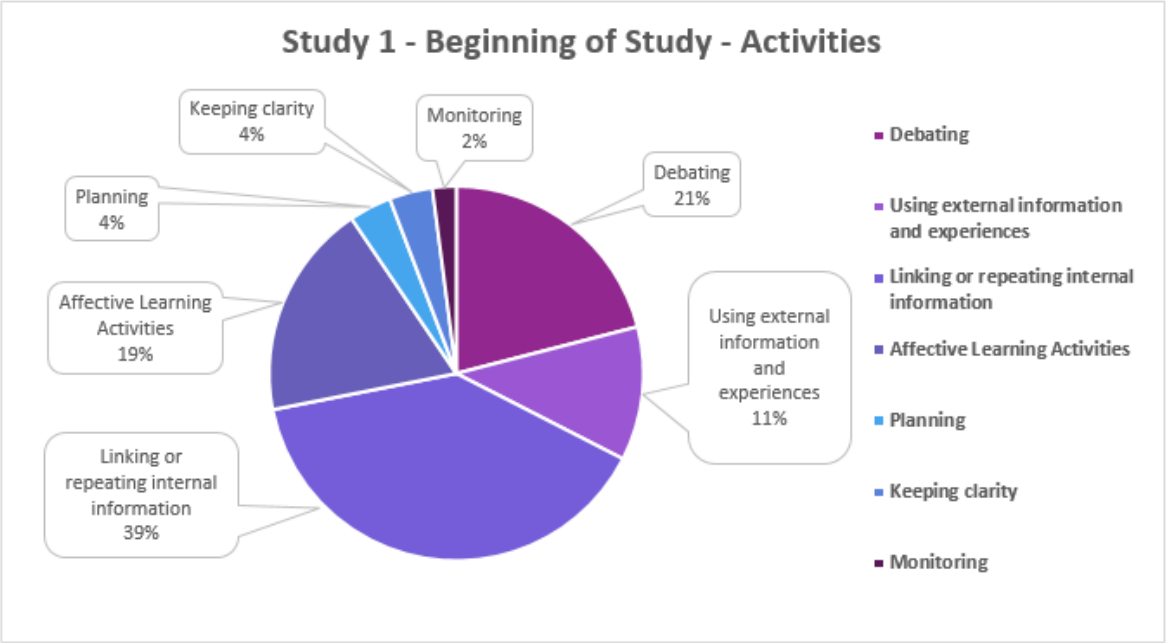



***Figure 5.8: A pie chart showing the breakdown of activities coded within the categories of cognitive, meta-cognitive and affective learning taking place in the virtual world at the start of Study 1.***

The nature of the work during this session focused on staff learning, observing, practising and repeating processes for customer service at the doorstep when delivering items into people's homes. There are a number of processes that the couriers have to follow, including putting on shoe protectors when entering the home and unpacking the items, as well as, assessing health and safety and access, together with ensuring the relevant paperwork is completed correctly with the customer.

Cognitive activities were the most prominent at 72% (see Figure 5.7). Linking or repeating internal information featured most highly at 39%, made up of 33.3% of the utterances coded CIR – repeating information without drawing a conclusion or interpreting that information, together with 5.8% of utterances coded CIL – "Linking facts, ideas or remarks presented in the discourse (see Figure 5.6). Staff found working in the virtual world beneficial because of being able to keep

repeating processes and learn from copying and following others through role play. Participants said:

> "*Roleplaying was a way of finding my way to communicate with customers and build my confidence before trying it out in the real world*".
>
> ***(Participant 04440)***

> "*Working in the virtual world felt real even though we were avatars. There was no embarrassment and there were no distractions because we were all focused on looking at the screen and watching what was going on. It wasn't role play. It was real. It was just we were in a virtual world. It helped me build my confidence and things stayed in my head better because I was able to focus on the one thing and get it right without distractions that go on in the real world. It was a better way for me to learn*".
>
> ***(Participant 05132)***

Debating was the second highest cognitive learning activity, making up 21% of the coded utterances. This was made up of 7.6% of utterances coded CDAQ – asking a content-directed question. New processes were being learned and participants asked a lot of questions, as a way of learning.

6.2% of utterances were coded CDPNF – problems / solutions / ideas presented but not followed by illustration or argumentation. 3.2% of utterances were coded CDPF - problems / solutions / ideas presented and followed by illustration or argumentation. 2.2% of utterances were coded CDAF – A participant does or does not agree with the opinion or idea contributed by another participant. This viewpoint is followed by a backing, refutation or restriction and 1.6% of utterances coded CDANF – A participant does or does not agree with the opinion contributed by another. This viewpoint is not followed by a backing, refutation or restriction.

There was a lot of debating that took place during the session, as staff worked through the new processes, which made for a productive and collaborative learning experience. During the role play, many of the staff enjoyed making it more difficult for the people they were working with by putting obstacles in the way, for example, playing the role of a difficult customer or adding in conditions that impacted health and safety or making access difficult, due to delivering in a flat and the lift was broken or delivering in a red route in London with double red lines which prohibits any parking. The more difficulties staff thought up, the more in-depth the learning that took place, during the collaborative group activities.

Affective learning activities made up 19% of the total utterances. This was made up of 9.9% of utterances coded AA – Asking for feedback, responses or opinions. 5.3% of utterances were coded AM – reacting emotionally (positive, negative or neutral) to notes of fellow participants without directly reacting to the content of that note and 3.2% of utterances were coded AC – chat or social talk that was not relevant to the task.

The benefit of staff taking part in the training within the virtual world allowed for staff to mix with other staff from other outbases and therefore, staff benefited from hearing of other staff's experiences. Participants used the virtual world to work collaboratively and the use of the software enabled them the opportunity to produce learning in a way that suited them. They are the people on the ground who know the kinds of situations that they have to deal with. Their collective experience and knowledge is far more powerful than what can be taught through a text book. The virtual world supported the development of personal knowledge management, skills building for their work and social collaboration skills. It allowed them the freedom to creatively express themselves in an environment that was safe for them to practice how best to respond to situations.

Utterances that were coded as meta-cognitive learning activities were not as high (9%). This was made up of 4% of utterances coded as planning activities; 4% coded as keeping clarity and 2% as monitoring.

The virtual world environment enabled feedback to be provided amongst the participants and for responses to be given and opinions and ideas to be shared. Participants made use of the technology to motivate each other and provide supportive encouragement. During the session, they were also able to have visibility of progress by observing others and discussing what worked well or did not work so well.

Table 5.10 (displayed on the following two pages) shows the number of utterances coded for each category, for all participants for a 20-minute activity within the virtual world at Samedel, taking place at the end of Study 1. As can be seen, there was a much more even distribution of metacognitive, cognitive and affective learning activities taking place within the virtual world at the end of the study suggesting informal and social learning taking place within the formation of a community. This will be discussed in more detail within this chapter.

| Research Participant | Codes (See Appendix H) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cognitive Learning Activities | | | | | | | | | | |
| | *Debating* | | | | | *Using external information and experiences* | | | | *Linking or repeating internal information* | |
| | *CDPF* | *CDPNF* | *CDAF* | *CDANF* | *CDAQ* | *CCEI* | *CREI* | *CSEI* | *CREE* | *CIL* | *CIR* |
| 06681 | 1 | 0 | 1 | 0 | 1 | 3 | 1 | 1 | 5 | 2 | 0 |
| 02373 | 1 | 0 | 1 | 0 | 3 | 4 | 1 | 0 | 12 | 3 | 1 |
| 06286 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 6 | 2 | 0 |
| 12223 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 4 | 3 | 0 |
| 04223 | 0 | 1 | 0 | 0 | 1 | 5 | 5 | 0 | 2 | 2 | 2 |
| 04440 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 1 | 3 | 3 | 1 |
| 09440 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 7 | 1 | 0 |
| 05690 | 0 | 0 | 0 | 0 | 5 | 1 | 1 | 0 | 10 | 1 | 0 |
| 06808 | 3 | 0 | 3 | 1 | 1 | 2 | 2 | 0 | 3 | 1 | 0 |
| 08262 | 3 | 0 | 3 | 0 | 1 | 3 | 2 | 0 | 4 | 2 | 0 |
| 04808 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 6 | 2 | 0 |
| 04816 | 2 | 0 | 2 | 0 | 1 | 4 | 2 | 0 | 2 | 3 | 1 |
| 04168 | 2 | 0 | 2 | 0 | 3 | 1 | 3 | 0 | 5 | 1 | 0 |
| 06694 | 1 | 2 | 1 | 0 | 2 | 3 | 1 | 0 | 4 | 2 | 0 |
| 01810 | 2 | 0 | 2 | 2 | 2 | 4 | 2 | 2 | 7 | 2 | 1 |
| 01762 | 1 | 0 | 1 | 2 | 2 | 3 | 1 | 0 | 5 | 2 | 1 |
| 01528 | 1 | 0 | 1 | 0 | 1 | 4 | 2 | 0 | 7 | 1 | 1 |
| 09765 | 1 | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 8 | 1 | 0 |
| 05633 | 2 | 0 | 2 | 0 | 1 | 3 | 0 | 0 | 2 | 3 | 1 |
| 08631 | 1 | 0 | 1 | 1 | 1 | 2 | 3 | 0 | 5 | 2 | 0 |
| 12852 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 6 | 1 | 0 |
| 12185 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 0 | 6 | 3 | 0 |
| 03395 | 0 | 1 | 0 | 0 | 1 | 2 | 4 | 0 | 2 | 3 | 0 |
| 04266 | 5 | 0 | 5 | 0 | 1 | 1 | 0 | 1 | 2 | 2 | 0 |
| 04511 | 2 | 0 | 0 | 2 | 3 | 2 | 1 | 0 | 7 | 1 | 0 |
| 04244 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 0 | 13 | 1 | 1 |
| 04161 | 0 | 0 | 3 | 1 | 2 | 4 | 2 | 0 | 4 | 1 | 0 |
| 07500 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 0 | 5 | 2 | 0 |
| 07231 | 2 | 0 | 3 | 0 | 3 | 2 | 1 | 0 | 6 | 2 | 0 |
| 05132 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 4 | 3 | 2 |
| 10692 | 2 | 0 | 2 | 1 | 2 | 3 | 5 | 0 | 3 | 1 | 0 |
| 03353 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 4 | 2 | 0 |
| 07825 | 0 | 0 | 2 | 0 | 3 | 2 | 4 | 1 | 5 | 4 | 0 |
| 02463 | 1 | 0 | 1 | 2 | 2 | 4 | 4 | 0 | 4 | 2 | 0 |
| 01107 | 1 | 0 | 1 | 0 | 2 | 3 | 2 | 0 | 3 | 2 | 0 |
| 04951 | 1 | 0 | 1 | 1 | 3 | 5 | 4 | 0 | 6 | 3 | 1 |
| 02789 | 2 | 0 | 2 | 1 | 1 | 3 | 0 | 0 | 2 | 3 | 1 |
| 06784 | 0 | 0 | 0 | 1 | 1 | 4 | 5 | 0 | 4 | 2 | 1 |
| 03227 | 0 | 0 | 0 | 0 | 2 | 1 | 4 | 0 | 5 | 1 | 0 |
| 12222 | 3 | 0 | 0 | 0 | 3 | 4 | 3 | 0 | 4 | 2 | 2 |
| 01414 | 0 | 0 | 0 | 0 | 1 | 3 | 4 | 0 | 3 | 4 | 0 |
| 04788 | 0 | 2 | 1 | 0 | 1 | 4 | 1 | 0 | 3 | 3 | 0 |
| 09397 | 4 | 0 | 0 | 2 | 3 | 5 | 2 | 2 | 5 | 2 | 0 |
| 05219 | 3 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 6 | 2 | 0 |
| 06382 | 3 | 0 | 0 | 1 | 1 | 3 | 5 | 0 | 2 | 1 | 0 |
| 08981 | 1 | 0 | 0 | 2 | 1 | 2 | 1 | 0 | 2 | 2 | 0 |
| 04665 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 3 | 4 | 2 |
| 04244 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 | 2 | 0 |
| 06727 | 1 | 0 | 0 | 0 | 3 | 3 | 2 | 0 | 3 | 4 | 0 |
| 12402 | 0 | 0 | 0 | 2 | 2 | 4 | 2 | 0 | 2 | 3 | 0 |
| 03496 | 3 | 0 | 2 | 0 | 2 | 2 | 2 | 0 | 3 | 2 | 0 |
| 10489 | 0 | 1 | 0 | 2 | 2 | 3 | 2 | 0 | 4 | 3 | 3 |
| 03415 | 0 | 0 | 0 | 0 | 1 | 5 | 1 | 1 | 3 | 3 | 0 |
| 07734 | 4 | 0 | 0 | 0 | 2 | 4 | 1 | 0 | 3 | 2 | 0 |
| 02756 | 3 | 0 | 0 | 1 | 1 | 8 | 1 | 0 | 4 | 1 | 0 |
| 12736 | 3 | 0 | 0 | 1 | 1 | 3 | 1 | 0 | 4 | 1 | 0 |
| 09489 | 3 | 0 | 0 | 1 | 2 | 3 | 1 | 0 | 5 | 1 | 2 |
| 05415 | 3 | 0 | 0 | 0 | 4 | 5 | 2 | 0 | 4 | 1 | 0 |
| 10142 | 2 | 0 | 0 | 0 | 3 | 4 | 2 | 0 | 11 | 2 | 0 |
| 09435 | 2 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 2 | 2 | 0 |
| 06414 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 3 | 0 |
| 08489 | 0 | 0 | 0 | 2 | 1 | 3 | 1 | 0 | 3 | 3 | 2 |
| 04224 | 4 | 0 | 0 | 1 | 2 | 4 | 4 | 0 | 6 | 2 | 1 |
| 10151 | 3 | 0 | 0 | 1 | 1 | 2 | 5 | 0 | 3 | 2 | 1 |
| 03555 | 1 | 0 | 0 | 2 | 1 | 2 | 1 | 0 | 2 | 4 | 1 |
| 04471 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 3 | 3 | 0 |
| 10856 | 1 | 0 | 0 | 1 | 1 | 2 | 2 | 0 | 1 | 2 | 0 |
| 03615 | 1 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 2 | 4 | 0 |
| 04779 | 0 | 1 | 0 | 2 | 1 | 2 | 1 | 0 | 3 | 3 | 1 |
| 04793 | 0 | 0 | 2 | 0 | 2 | 8 | 1 | 1 | 2 | 2 | 0 |
| 04753 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 0 | 3 | 2 | 0 |
| 10408 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 0 | 4 | 2 | 1 |
| 04744 | 0 | 0 | 0 | 1 | 2 | 2 | 5 | 0 | 5 | 2 | 0 |
| 10382 | 0 | 0 | 0 | 1 | 1 | 3 | 5 | 0 | 1 | 3 | 2 |
| 07271 | 2 | 1 | 0 | 1 | 2 | 2 | 2 | 0 | 3 | 2 | 0 |
| 10312 | 5 | 1 | 0 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 0 |
| 07444 | 1 | 3 | 0 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | 0 |
| **Totals** | **96** | **15** | **48** | **43** | **127** | **219** | **154** | **13** | **321** | **169** | **33** |
| | 2.8% | 0.4% | 1.4% | 1.2% | 3.7% | 6.3% | 4.5% | 0.4% | 9.3% | 4.9% | 1.0% |
| | 9.5% | | | | | 20.5% | | | | 5.9% | |
| | 35.9% | | | | | | | | | | |

| Research Participant | Codes (See Appendix H) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Affective Learning Activities | | | Metacognitive Learning Activities | | | | | | | | Rest Activities | |
| | *Affective Learning Activities* | | | *Planning* | | | *Keeping clarity* | | | *Monitoring* | | | |
| | *AM* | *AA* | *AC* | *MPA* | *MAA* | *MEA* | *MSD* | *MAC* | *MGE* | *MKW* | *MRP* | *RNE* | *TOTALS* |
| 06681 | 2 | 6 | 8 | 1 | 1 | 2 | 0 | 5 | 6 | 1 | 1 | 0 | 48 |
| 02373 | 3 | 6 | 11 | 2 | 1 | 1 | 0 | 4 | 13 | 1 | 2 | 0 | 70 |
| 06286 | 4 | 5 | 7 | 2 | 1 | 3 | 0 | 3 | 6 | 3 | 4 | 0 | 51 |
| 12223 | 2 | 2 | 5 | 1 | 2 | 2 | 0 | 1 | 3 | 2 | 3 | 0 | 33 |
| 04223 | 3 | 2 | 13 | 1 | 1 | 1 | 0 | 1 | 3 | 1 | 4 | 1 | 49 |
| 04440 | 2 | 2 | 11 | 0 | 1 | 1 | 0 | 1 | 2 | 1 | 4 | 0 | 39 |
| 09440 | 3 | 8 | 5 | 2 | 1 | 1 | 0 | 4 | 6 | 2 | 4 | 0 | 49 |
| 05690 | 4 | 6 | 3 | 1 | 3 | 2 | 0 | 3 | 4 | 3 | 5 | 0 | 52 |
| 06808 | 2 | 1 | 7 | 2 | 2 | 3 | 0 | 0 | 3 | 2 | 6 | 0 | 44 |
| 08262 | 4 | 2 | 8 | 1 | 1 | 2 | 0 | 0 | 5 | 1 | 5 | 0 | 47 |
| 04808 | 4 | 3 | 6 | 1 | 1 | 1 | 0 | 2 | 2 | 1 | 4 | 0 | 38 |
| 04816 | 1 | 1 | 13 | 3 | 2 | 3 | 0 | 0 | 3 | 1 | 2 | 2 | 48 |
| 04168 | 2 | 2 | 4 | 1 | 0 | 1 | 0 | 1 | 4 | 1 | 6 | 0 | 39 |
| 06694 | 2 | 2 | 9 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 3 | 0 | 36 |
| 01810 | 3 | 5 | 12 | 2 | 3 | 3 | 0 | 4 | 3 | 1 | 2 | 0 | 64 |
| 01762 | 3 | 6 | 11 | 3 | 2 | 2 | 0 | 3 | 2 | 3 | 1 | 0 | 54 |
| 01528 | 3 | 6 | 13 | 4 | 3 | 4 | 0 | 5 | 5 | 4 | 1 | 0 | 66 |
| 09765 | 4 | 7 | 8 | 2 | 4 | 5 | 0 | 5 | 4 | 1 | 2 | 0 | 57 |
| 05633 | 1 | 1 | 12 | 2 | 0 | 1 | 0 | 0 | 2 | 3 | 2 | 0 | 38 |
| 08631 | 2 | 1 | 8 | 1 | 1 | 1 | 0 | 2 | 3 | 2 | 4 | 0 | 41 |
| 12852 | 3 | 3 | 5 | 1 | 0 | 1 | 0 | 3 | 4 | 1 | 2 | 0 | 35 |
| 12185 | 2 | 2 | 6 | 1 | 0 | 2 | 0 | 2 | 2 | 2 | 1 | 0 | 36 |
| 03395 | 1 | 1 | 7 | 1 | 0 | 1 | 0 | 0 | 2 | 1 | 1 | 0 | 28 |
| 04266 | 1 | 1 | 4 | 4 | 0 | 1 | 0 | 0 | 3 | 1 | 1 | 0 | 33 |
| 04511 | 3 | 4 | 3 | 4 | 0 | 4 | 0 | 3 | 7 | 2 | 1 | 0 | 49 |
| 04244 | 4 | 5 | 11 | 4 | 5 | 3 | 0 | 5 | 12 | 2 | 1 | 0 | 73 |
| 04161 | 1 | 1 | 8 | 2 | 0 | 1 | 0 | 0 | 2 | 1 | 2 | 0 | 35 |
| 07500 | 5 | 0 | 5 | 1 | 4 | 2 | 0 | 1 | 3 | 2 | 2 | 0 | 37 |
| 07231 | 3 | 2 | 2 | 1 | 4 | 2 | 0 | 2 | 4 | 2 | 1 | 1 | 43 |
| 05132 | 1 | 1 | 7 | 3 | 2 | 1 | 0 | 0 | 2 | 1 | 2 | 0 | 32 |
| 10692 | 2 | 1 | 9 | 1 | 4 | 2 | 0 | 1 | 3 | 2 | 1 | 0 | 45 |
| 03353 | 3 | 1 | 5 | 5 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 0 | 30 |
| 07825 | 1 | 5 | 6 | 1 | 5 | 2 | 0 | 2 | 4 | 1 | 1 | 0 | 49 |
| 02463 | 3 | 2 | 10 | 2 | 4 | 3 | 0 | 1 | 3 | 2 | 1 | 0 | 51 |
| 01107 | 3 | 3 | 8 | 1 | 3 | 4 | 0 | 2 | 4 | 3 | 1 | 0 | 46 |
| 04951 | 3 | 3 | 14 | 2 | 2 | 5 | 0 | 3 | 3 | 1 | 1 | 0 | 62 |
| 02789 | 3 | 1 | 12 | 2 | 0 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 37 |
| 06784 | 1 | 2 | 16 | 1 | 1 | 1 | 0 | 2 | 3 | 1 | 0 | 0 | 46 |
| 03227 | 1 | 3 | 2 | 1 | 2 | 2 | 0 | 3 | 4 | 1 | 2 | 0 | 34 |
| 12222 | 1 | 2 | 14 | 1 | 3 | 1 | 0 | 2 | 4 | 1 | 1 | 0 | 51 |
| 01414 | 2 | 1 | 9 | 1 | 0 | 1 | 0 | 0 | 2 | 2 | 2 | 1 | 36 |
| 04788 | 0 | 1 | 18 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 1 | 0 | 40 |
| 09397 | 6 | 4 | 11 | 0 | 4 | 3 | 0 | 4 | 4 | 5 | 1 | 0 | 67 |
| 05219 | 6 | 5 | 5 | 1 | 4 | 3 | 0 | 5 | 5 | 3 | 1 | 0 | 53 |
| 06382 | 3 | 1 | 9 | 2 | 0 | 1 | 0 | 1 | 2 | 4 | 3 | 0 | 42 |
| 08981 | 2 | 2 | 5 | 1 | 2 | 1 | 0 | 3 | 2 | 2 | 3 | 0 | 34 |
| 04665 | 3 | 1 | 3 | 1 | 3 | 1 | 0 | 3 | 3 | 1 | 4 | 0 | 38 |
| 04244 | 1 | 1 | 8 | 3 | 2 | 1 | 0 | 1 | 2 | 1 | 2 | 0 | 30 |
| 06727 | 2 | 2 | 6 | 1 | 0 | 2 | 0 | 0 | 2 | 3 | 3 | 0 | 37 |
| 12402 | 3 | 1 | 7 | 2 | 0 | 1 | 0 | 1 | 2 | 2 | 6 | 0 | 40 |
| 03496 | 4 | 3 | 2 | 1 | 0 | 1 | 0 | 3 | 3 | 1 | 1 | 0 | 35 |
| 10489 | 2 | 2 | 3 | 1 | 2 | 1 | 0 | 3 | 4 | 1 | 1 | 0 | 40 |
| 03415 | 5 | 2 | 5 | 1 | 3 | 2 | 0 | 4 | 5 | 3 | 1 | 0 | 45 |
| 07734 | 4 | 2 | 4 | 1 | 3 | 2 | 0 | 4 | 6 | 2 | 1 | 0 | 45 |
| 02756 | 3 | 4 | 8 | 2 | 3 | 3 | 0 | 4 | 6 | 1 | 1 | 0 | 54 |
| 12736 | 2 | 3 | 3 | 2 | 2 | 3 | 0 | 5 | 6 | 1 | 0 | 0 | 41 |
| 09489 | 6 | 3 | 7 | 1 | 3 | 2 | 0 | 6 | 4 | 2 | 3 | 0 | 55 |
| 05415 | 4 | 4 | 5 | 1 | 4 | 3 | 0 | 6 | 13 | 2 | 2 | 0 | 63 |
| 10142 | 4 | 5 | 4 | 1 | 3 | 2 | 0 | 4 | 3 | 2 | 1 | 0 | 53 |
| 09435 | 3 | 1 | 2 | 4 | 0 | 1 | 0 | 1 | 2 | 3 | 1 | 0 | 29 |
| 06414 | 2 | 1 | 3 | 5 | 0 | 1 | 0 | 1 | 5 | 1 | 5 | 0 | 35 |
| 08489 | 4 | 5 | 11 | 1 | 4 | 2 | 0 | 3 | 2 | 4 | 5 | 0 | 56 |
| 04224 | 8 | 7 | 13 | 1 | 5 | 3 | 0 | 4 | 5 | 4 | 3 | 0 | 77 |
| 10151 | 2 | 1 | 9 | 2 | 2 | 1 | 0 | 1 | 2 | 3 | 4 | 0 | 45 |
| 03555 | 1 | 1 | 8 | 1 | 1 | 2 | 0 | 1 | 6 | 3 | 0 | 0 | 38 |
| 04471 | 3 | 2 | 1 | 1 | 3 | 3 | 0 | 2 | 7 | 3 | 3 | 0 | 38 |
| 10856 | 1 | 1 | 8 | 3 | 2 | 1 | 0 | 1 | 6 | 2 | 2 | 0 | 37 |
| 03615 | 2 | 2 | 5 | 1 | 2 | 2 | 0 | 1 | 5 | 1 | 6 | 0 | 38 |
| 04779 | 3 | 1 | 8 | 2 | 2 | 1 | 0 | 1 | 4 | 1 | 2 | 0 | 39 |
| 04793 | 1 | 6 | 8 | 1 | 4 | 4 | 0 | 1 | 4 | 1 | 3 | 1 | 52 |
| 04753 | 2 | 4 | 7 | 1 | 2 | 3 | 0 | 1 | 3 | 2 | 2 | 0 | 39 |
| 10408 | 3 | 5 | 13 | 1 | 4 | 5 | 0 | 4 | 5 | 2 | 1 | 0 | 57 |
| 04744 | 3 | 4 | 6 | 2 | 5 | 6 | 0 | 5 | 4 | 3 | 1 | 0 | 56 |
| 10382 | 1 | 1 | 3 | 2 | 2 | 1 | 0 | 1 | 1 | 2 | 1 | 0 | 31 |
| 07271 | 3 | 6 | 4 | 1 | 1 | 4 | 0 | 3 | 5 | 1 | 2 | 0 | 45 |
| 10312 | 1 | 1 | 6 | 3 | 2 | 1 | 0 | 1 | 2 | 1 | 3 | 0 | 39 |
| 07444 | 1 | 1 | 9 | 4 | 2 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 37 |
| **Totals** | **205** | **214** | **574** | **130** | **150** | **156** | **0** | **169** | **298** | **141** | **170** | **6** | **3451** |
| | 5.9% | 6.2% | 16.6% | 3.8% | 4.3% | 4.5% | 0.0% | 4.9% | 8.6% | 4.1% | 4.9% | | |
| | 28.8% | | | 12.6% | | | 13.5% | | | 9.0% | | 0.2% | |
| | 28.8% | | | 35.2% | | | | | | | | | |

***Table 5.10: Coded Utterance Values for 20 minutes Virtual World Activity at Samedel taking place at the end of Study 1.***

Figure 5.9 is a graphical representation of the coded utterance values from table 5.7, for the 20-minute virtual world activity at the end of Study 1. This graph shows that there were significant amounts of chatting and social talk contributions taking place (coded AC) suggesting the informality of the virtual world environment.

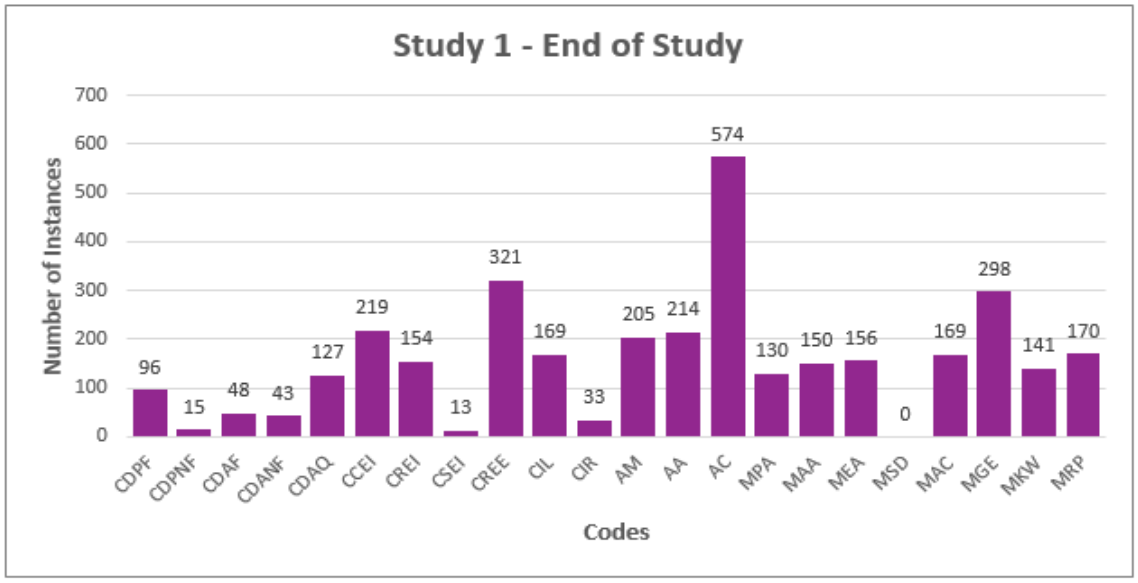



***Figure 5.9: Coded utterance totals for all participants in a 20-minute activity in the virtual world at Samedel at the end of Study 1.***

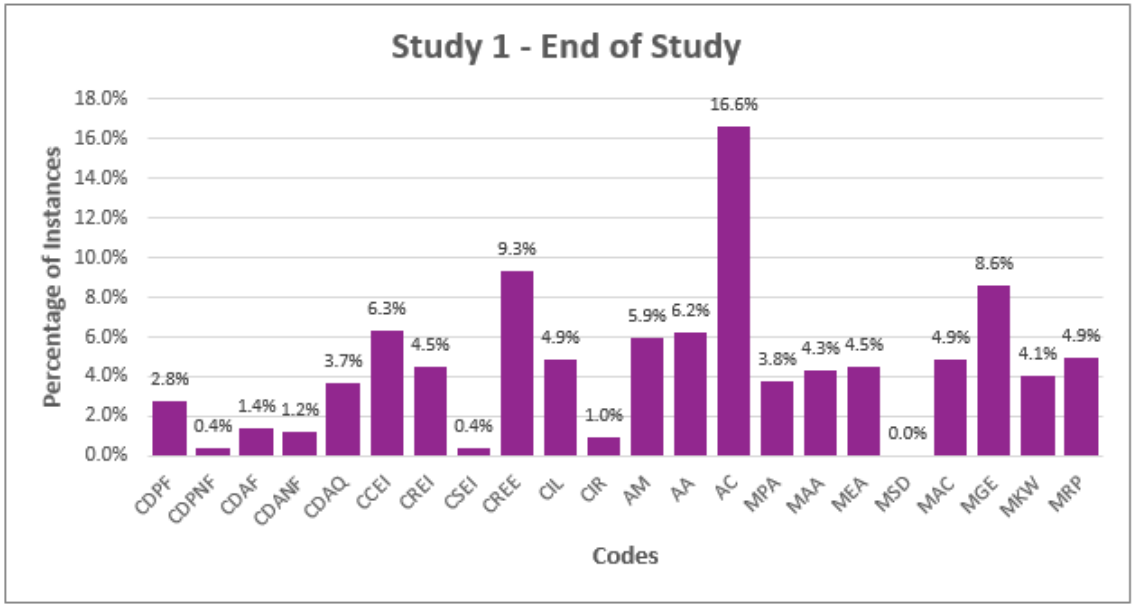



***Figure 5.10: Coded utterance percentages for all participants in a 20-minute activity in the virtual world at Samedel at the end of Study 1.***

Figure 5.11 shows a pie chart summarising the split of utterances across cognitive, meta-cognitive and affective learning for a 20-minute activity take place within the virtual world at the end of Study 1, utilising Veldhuis-Diermanse Schema for Learning Process Coding (2002), as shown in Appendix J.

Figure 5.12 shows the same data again from Figure 5.11, broken down by activity utterance code within the categories of cognitive, meta-cognitive and affective.

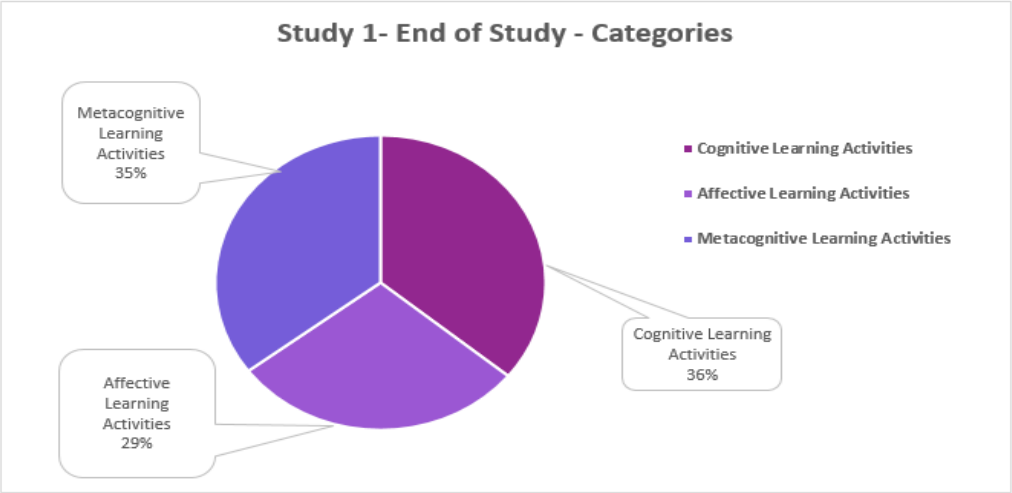



***Figure 5.11: A pie chart showing cognitive, meta-cognitive and affective learning taking place in the virtual world at the end of the study.***

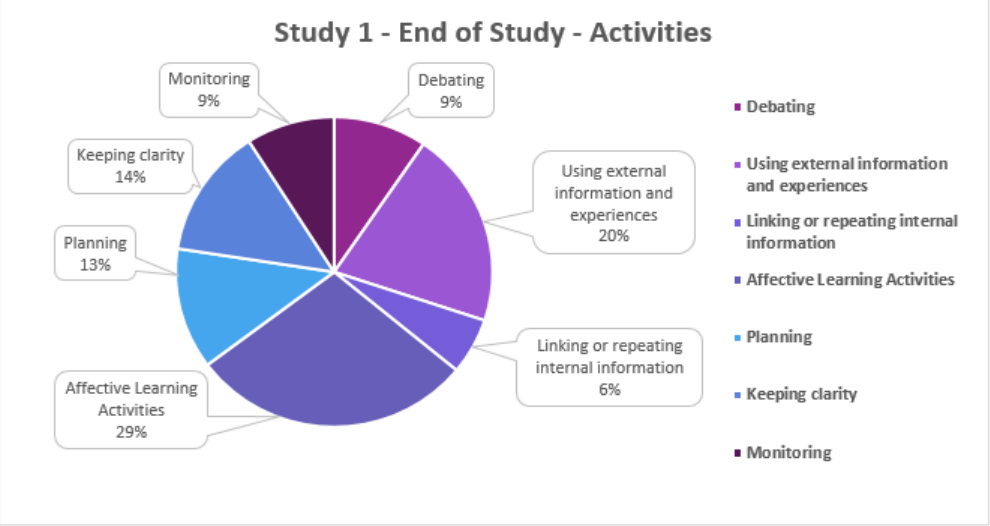
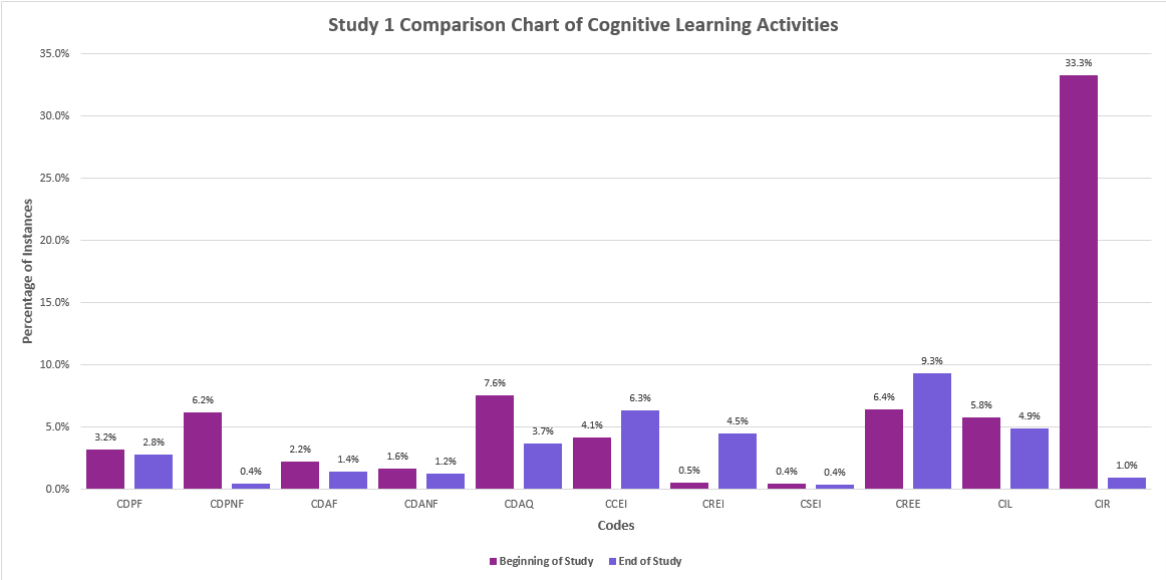



***Figure 5.12: A pie chart showing the breakdown of activities coded within the categories of cognitive, meta-cognitive and affective learning taking place in the virtual world at the start of Study 1.***

Figure 5.13 shows the two sets of data together, for a comparison to be made between activity taking place in the virtual world at the start and end of study 1.



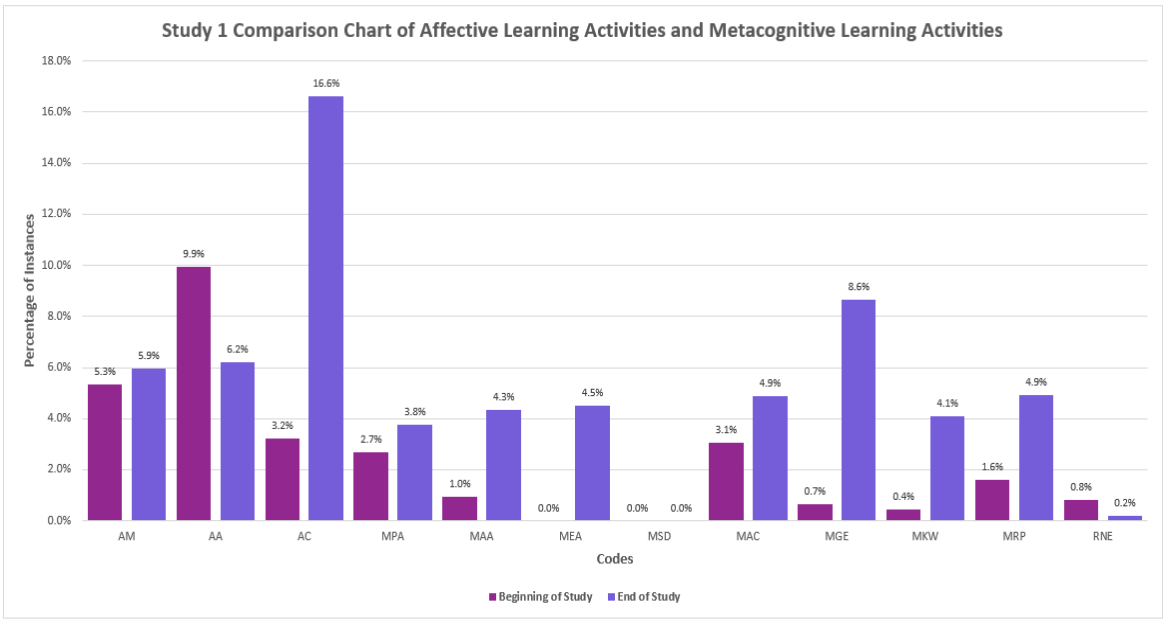
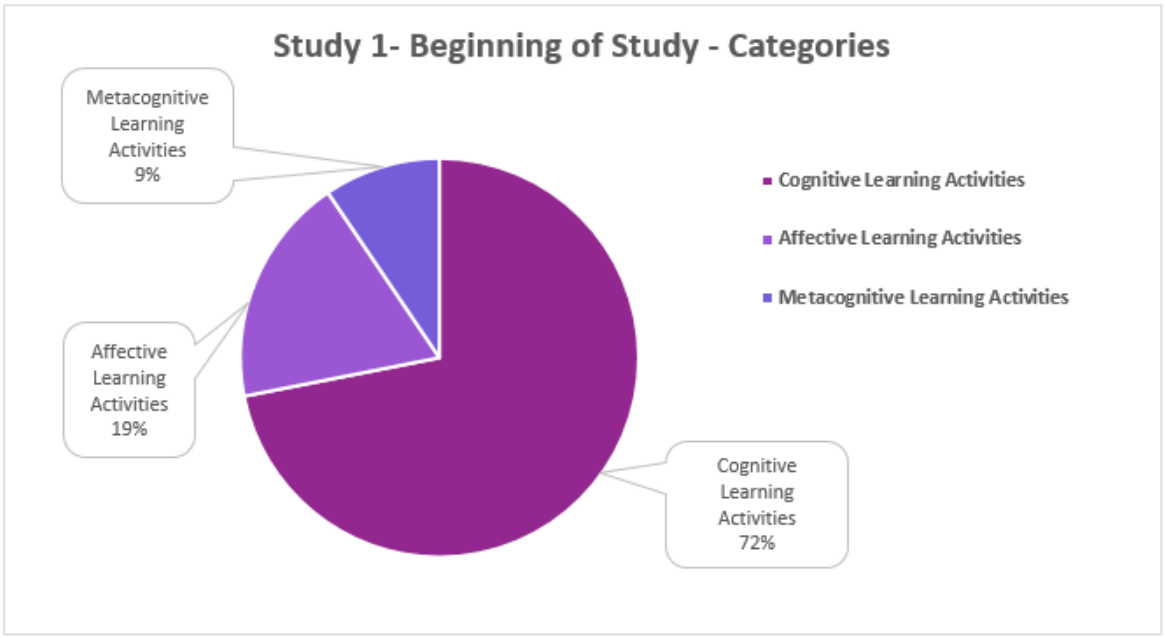




***Figure 5.13: A comparison of coded utterances during virtual world activity at the start and end of Study 1***

For ease of comparison, Figure 5.14 is a repeat of Figures 5.7 and 5.11 together, to show how activity within the virtual world evolved over the five weeks.



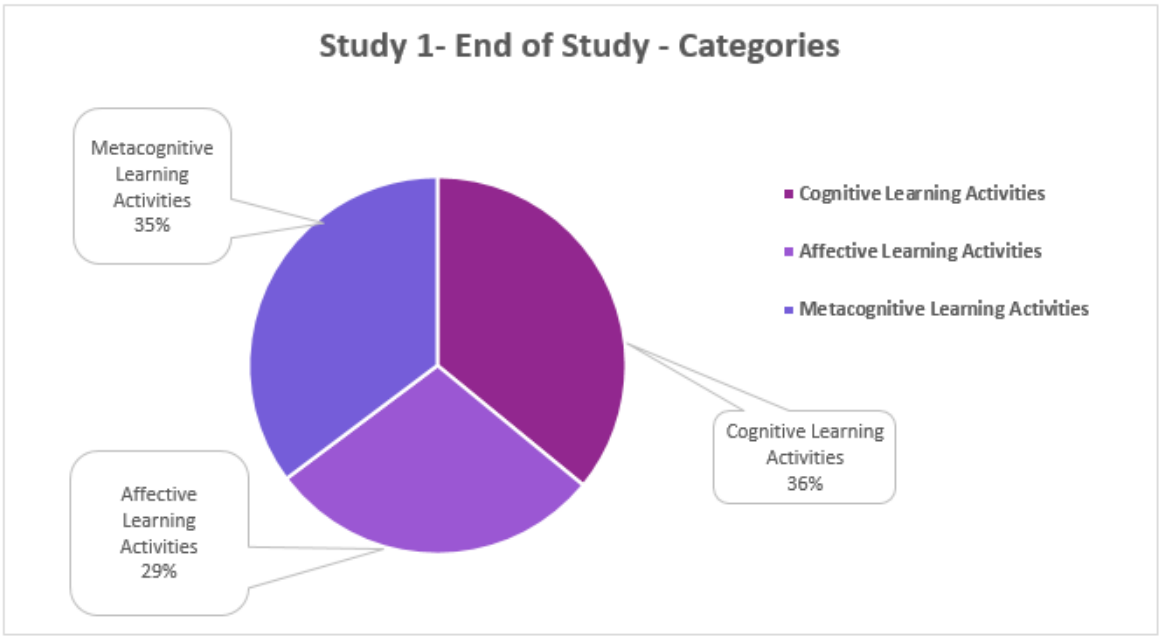
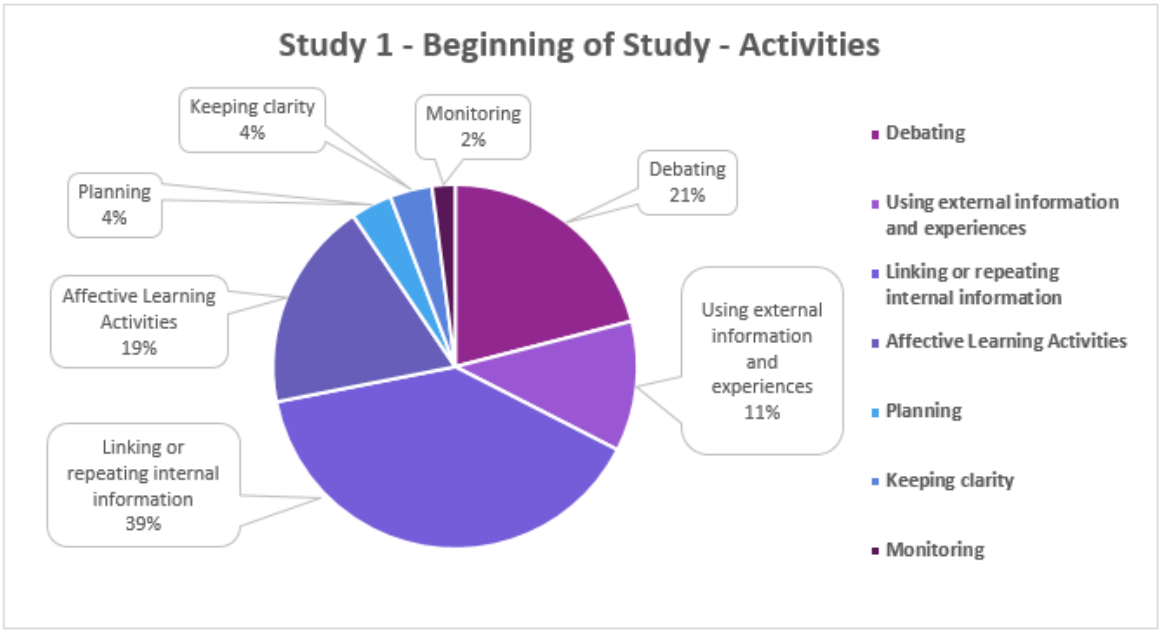




***Fig 5.14: A repeat of Figures 5.7 and 5.11 for ease of comparison, to show how activity categories within the virtual world evolved over the five weeks.***



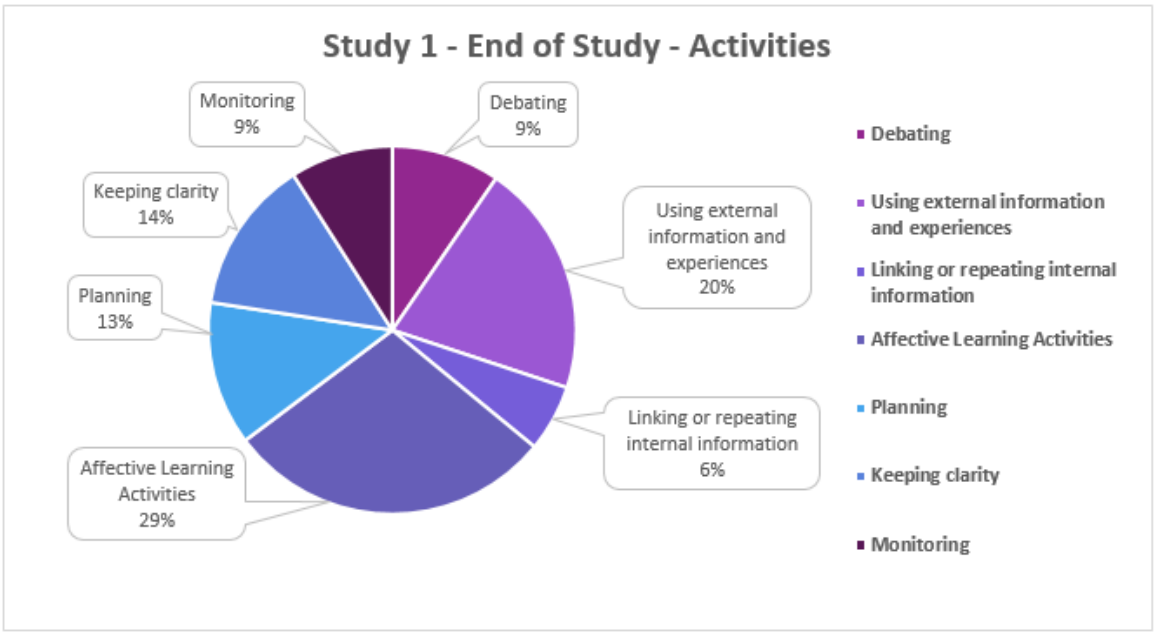




***Fig 5.15: A repeat of Figures 5.8 and 5.12 for ease of comparison, to show how activity within the virtual world evolved over the five weeks.***

At the end of study 1, the activity taking place within the virtual world was split more evenly across cognitive (36%), meta-cognitive (35%) and affective (29%) learning activities (see Figure 5.11). This was a marked difference to the start of the study where coded utterances for cognitive learning activities totalled 72% (see Figure 5.7).

The highest number of utterances at the start of the study were coded under CIR – repeating information without drawing a conclusion or interpreting that information at 33.3% in comparison to 1% by the end of the study. In comparison, by the end of study 1, the highest number of utterances were coded under AC – chatting or social talks, contributions that are not relevant to solve the task, totalling 16.6% (see Figure 5.10). This activity totalled 3.2% of utterances at the start of the study. This shows how activity within the virtual world evolved from the participants asking questions to the learning activities developing into a more social experience which may suggest signs of a learning culture and community of practice emerging.

Affective learning activities totalled 29% by the end of the study, compared to 19% at the start. 6.2% of utterances were coded AA – Asking for feedback, responses or opinions (9.9% at the start of the study) and 5.9% were coded AM – reacting emotionally (positive, negative or neutral) to notes of fellow participants without directly reacting to the content of that note, which remained similar to the start of the study (5.3%).

> "*I feel very present like I exist in the virtual world. It's nothing like using social networking sites like Facebook and Twitter. I feel much more real here*".
>
> ***(Participant 02463)***

Another participant made a comparison between the virtual world and Facebook:

> "*It's more social than clicking a like on Facebook. It's more active and engaging. It's more like a social experience and you often forget you're actually at work, whilst you're focused within the activity*".
>
> ***(Participant 05132)***

By the end of the study, participants were self-organising and collaboratively working together on tasks. They were teaching each other skills. Staff were working through problems and discussing ideas that the new processes were presenting.

Like at the start of Study 1, the largest number of coded utterances at the end of Study 1 were cognitive learning activities totalling 36%. However, this was half the number from the start of the study, which showed 72% of utterances coded were in relation to cognitive learning activities. There was however, much more of distribution of learning activities taking place by the end of the study.

Debating activities totalled 9% of utterances at the end of the study, compared to 21% at the start. This suggests learning within the virtual world was less confrontational with everything being questioned to a more collaborative way of working. At the start of study 1, the cognitive learning activity of using external information and experiences made up 11% of the utterances, in comparison, at the end of the study, this was nearly double at 20%. This 20% was broken down as 9.3% coded CREE – Referring to earlier experiences; 6.3% CCEI – contributing new information found in other information sources than the discourse; 4.5% coded as CREI – referring to information found in other information sources than the discourse and 0.4% CSEI – Summarising or evaluating information found in other information sources than the discourse.

Meta-cognitive activities had increased from 9% at the start of Study 1 to 35% by the end. This was made up of 14% of utterances coded as activities for keeping clarity (4% at the start); 13% coded as planning activities (4% at the start) and 9% as monitoring (2% at the start). There was a marked change with participants

answering each other's questions (MGE 8%) which was a shift from the start of the study where the emphasis was on the trainer answering the questions. There was also a marked shift from the start of the study to the end with a change from staff asking questions to staff applying their own experiences to the learning material and training activities. They drew upon each other's collective knowledge to develop their abilities and achieve in their work.

## *5.4 A useful substitution for real life*

The question "Do you think working in the virtual world environment can be a useful substitution for real life?" was included in the questionnaire in order to gain an insight into what the research participants found as useful examples when working in the virtual world was advantageous. The question was structured as a free-text question in order to capture the full range of possible responses rather than constraining the choices to a selection chosen by the researcher. The questionnaire asked the participant to provide examples if they answered yes. Of the 77 participants who completed the questionnaire, 73 answered this question. 65 people (84%) answered yes, 10% answered no and 6% were unknown. As the data was free text, the questionnaires often had recorded a few reasons why the virtual world was a useful substitution for real life, for example:

> "*It's much easier to learn in Second Life ® because you're disguised as an avatar, so the roleplay is not embarrassing. It's a lot more fun than classroom training. It's safe to make mistakes and you can keep practising as much as you need to. It's a lot more fun and interactive than real life".*
>
> ***(Participant 10489)***
>
> *"Using the virtual world is a lot more fun and you can keep repeating the processes to build your confidence. You get a lot more feedback from the other avatars and it's more interesting seeing everyone working as an avatar."*

***(Participant 07734)***

*"You have a lot more opportunity to practise skills and learn because it's in the virtual world. It's a lot more fun because it's more easy and informal to learn what we what need to know."*

***(Participant 10142)***

"*There's much more of a community which makes it fun, otherwise we'd just be in Ayr in our little outbase. It's more fun being able to mix with others and learn."*

***(Participant 10692)***

### 5.4.1 Researching Culture

My starting point for this thesis was to review and learn from existing theory. When exploring how virtual environments allow SMEs to work in ways they cannot in real life, it is important to explore the development of culture in the virtual world.

After studying the literature on culture (Wells and Claxton, 2002, Gray, 2003 and Wagner, 1993), it allowed me to view my research in a wider context. Wagner's (1993) findings identified the variable nature of different cultures when carrying out research into learning in communities in Morocco. It was identified that social and cultural factors both influenced attitudes to learning and training. This is significant because it cannot be assumed that all cultures in all communities operate in the same way. Wagner recommended within-culture comparisons, rather than between communities because of community variations. Wagner's research combined ideas of culture, learning and community and so was relevant to this research study. He also demonstrates characteristics of learning cultures and shares methodologies on interpreting and studying communities' culture.

After considering the viewpoints of theorists, I decided on a plan for a research design which consisted of a series of data collection activities within each

organisation. The data collection was designed to suit the research participants working within each organisation and tailored to how they worked.

I also referred to the work of Carey (1992) and Biesta (1994) who describe culture as communication with interaction and transmission. Other relevant research included the work of Bourdieu (1986) who uses the term 'culture' to refer to the community's outlook on the world, the community's way of life, it's code of conduct, interests and preferences. Freeman (1993) views collective and individual memories as significant in shaping aspects of culture.

The literature suggests that for culture to exist in the virtual world, examples of customs, values, practices, attitudes and communication with interaction and transmission must be evident.

The data collected during study 1 suggests that a community did develop and exist in the virtual world and had both individual and collective dimensions across the courier staff population working across the United Kingdom.

Research findings indicate that the Courier staff developed a community of practice in Second Life ® with a distinct culture for their working way of life. The research data revealed distinct customs, unwritten rules which regulated their working day, shared practices and values (see sections 5.4.2-5.4.4 which follow). The Courier staff had a culture and that revolved around working well, roleplaying and just casually having fun and joking around with each. The staff are a community who became more and more cohesive and better at what they did over time. Staff within the virtual world exhibited Wenger's (2008) key characteristics of joint enterprise, a shared repertoire and mutual engagement. This also included peripheral participation from the assessors who observed but did not always say anything.

### 5.4.2 Social Order

The data showed evidence of an informal social hierarchy operating in the virtual community of practice in Second Life ®. There was a strong sense of

social order. Figure 5.16 shows staff informally talking, sat on sofas, following a training session, whilst another training session takes place in the background.

***Figure 5.16: Samedel Staff talk socially in the virtual space, whilst a training session takes place in the background.***

This sense of social order affected people's place in the social space of the community. It was evident that there was strong internal regulation in the community, with unwritten rules and codes that governed behaviour and the way of working life in the virtual world.

*"The sofa area is like the second portacabin. It has rules like clocking in on your shift and the usual banter goes on. You make sure you're around to know what's happening and learn things from the others."*

***(Participant 04511)***

Such unwritten codes of practice help the staff to manage their everyday working day in the virtual world. They've become accustomed to when to log in and be around to find out what is going on and learn from more experienced members and to enjoy social aspects within their working day. The community regulates itself through its own social processes with more experienced members of staff leading the way and apprentices negotiating to reach agreements:

*"It works well and that's sort of what it's like. We have an unwritten agreement that if we can manage to finish, then we can cover end of shift briefing in the virtual world and then we don't have to do it back at the outbase and can clock off early."*

***(Participant 08981)***

### 5.4.3 Social Networks

The term 'social networks' included collective social networks of apprentices, experienced staff, outbases, regional groups of staff and individuals – and their interactions. The networks acted like large satellite dishes, transmitting messages that embedded the culture. Some of the data showed networks at an individual level and others at a collective level. Staff spoke to others from other outbases and regions and had close relationships with people they had worked with for years.

*"We always speak to each other 'cos it's a family here. There's always new people coming and going but there's always the diehards that will always be here. We like to bring the newbies into the fold and show them the ropes".*

***(Participant 12402)***

Social networks operated as part of everyday working life. One staff member talked in the focus group about how he had grown up through the company. He was now 47 and had started with the organisation aged 16. He said he continued to have close friendships with other colleagues and that anyone would do anything for anyone. If you needed help, there was always someone to call upon. He described how they were using the virtual world to help each other out where outbase boundaries ran alongside each other and sometimes it made sense for another outbase to do the return collection. He explained how the transport planning system didn't always know best because of the roads and one-way systems etc.

> *"It's a great place to work because of the people. They're a great bunch of mates. Anyone will do owt for you. We let them above think they are running the show, but we know how it really works".*
>
> ***(Participant 10151)***

### 5.4.4 Shared Experiences

The research participants were confident in using the virtual space as their own. Through social networks, there were opportunities for staff to come together and tell stories and share their day. The virtual space was used more frequently as the weeks progressed.

> *"It takes away the boredom when you're sat in the layby for driving rest time and see who is online. It's good to catch up with others you don't normally see often anymore because they've moved onto other out-base areas".*
>
> ***(Participant 03615)***

The sharing of life experiences and memories is an important aspect of the development of identity and culture (Freeman, 1993). The sharing of experience and historical incidences became an important aspect of learning within the virtual world. This was an unexpected outcome during the training and often was as a result of the virtual world's inability to be able to replicate everything in

the real world. It's inefficiency to replace the real world entirely, actually became a benefit to the learning experience because it triggered staff to explain and talk about things to the apprentices whilst the training was taking place. Figure 5.17 shows a training session taking place at the start of shift.

> *"Some of the more experienced members of staff and some who were more cynical of the new way of training kept pointing out how the system did not reflect reality, for example, it wasn't showing weather conditions or contours of the driveway, steps and other delivery hazards that were part of working conditions. These interjections sparked discussion and helped the less experienced staff to learn more. It also broke the training up with interesting insight and stories which brought the training to life. In a way, I was glad the system could not replicate everything, because we would not have heard a lot of the stories that were shared by staff and their humorous recollections of things that had happened on the job".*
>
> ***(Participant 04440)***


***Figure 5.17: Courier staff members being trained in the doorstep customer experience***

There was evidence of additional learning taking place during social conversation in the virtual world. Figure 5.18 shows two staff members are re-enacting a role play from the training, in front of their team leader, whilst their peers watch over and are learning from the demonstration. Another training session is taking place in the background.

***Figure 5.18: Staff practising their role play scenarios from an earlier training session in the social chat area of the virtual world***

Other routines developed in the community including managers and assessors logging into the virtual world to monitor progress and carry out reviews. They also made valuable contributions by providing feedback and making recommendations on what the apprentices needed to focus on. It also provided a boost of confidence for the apprentices who were receiving much more feedback from a range of people. A unique partnership developed in the virtual world between apprentice, education assessors and managers and other staff members. Working in the virtual world providing a valuable way for everyone to view progress and demonstrate learning.

> *"There's a lot more opportunity to practice and check things. You can quickly repeat things and check you're understanding things right. There's a lot more discussion that takes place with my assessor".*
>
> ***(Participant 06681)***

Such rituals may provide the opportunity for greater learning to take place and for issues and work experiences to be shared. The virtual world provided an area where people could help each other out and this occurred through a variety of ways – peer to peer, through formal training, through social time, via feedback from accessors, managers and more experienced members of staff.

As discussed in this chapter, evidence of learning cultures is demonstrable in the virtual world and was clearly present in study 1's community. One participant (09765) in the focus group mentioned how online learning was the future and a key priority for the Conservative government.

## *5.5 Challenges and Disadvantages*

As in the pilot study, there were times when the system would crash or avatars would get stuck in walls when moving around. There was sometimes issues with avatars loading and there would be some time lag for avatars to reach their destination and fully appear correctly.

Using the virtual world for practical training also provided challenges, which the participants naturally began to work together to problem solve. Restrictions within the virtual world proved to be beneficial, as staff recognised how the system could not depict a variety of situations that the staff had to work within, such as weather conditions. This provided lively debates and added to the effectiveness of the training, as staff talked about situations that were not being provided within the system.

## *5.6 Conclusion*

This study shows how virtual environments allow SMEs to work in ways they cannot in real life and how they are a useful analogue and in some cases, a better substitution of the real world. It was not possible for the SME to implement the training it did across the whole organisation in the same time period without the organisation closing down. Delivering training in the virtual world, allowed for the business operations to continue and customer service deliveries not to be impacted. The training was also extremely cost effective to deliver with no additional costs incurred and allowed the staff to access the training from their remote out-bases. No additional equipment was required, other than the use of laptops and access to the internet connection, which is already provided to staff.

A key benefit identified from the management was the way in which apprentices and staff were able to develop soft skills they needed to progress within their career, which is difficult to teach in a formal training room scenario. Through informal situations using the virtual world, apprentices could understand better what is required to be work ready, from listening, discussing and shadowing other colleagues. The ability for all staff to collaborate in a virtual space was beneficial to share knowledge and collaborate, which would not otherwise be possible. A situation may have arisen at one out-base which another may have not experienced yet and these experiences were informally shared so that others could be prepared and learn from others' issues and workarounds. Some sites had only a small team and being able to collaborate with other staff members across the country helped build skills. The use of the virtual world leant itself to discussions taking place and staff trying things out because of the informality of

the space and use of avatars. The virtual world empowered staff to collaborate and create their own learning experiences without realising, through informal discussions, that they were building and managing their personal knowledge.

Delivering training in the virtual world proved more effective than face-to-face training in this study, from the data collected. Staff were able to repeatedly practise role plays and become confident in the delivery of customer service procedures at the doorstep. It would not have been possible for staff to practise as much as they did in a face-to-face training session or receive the additional support and mentoring from their peers and more experienced staff.

The delivery of training through the virtual world enabled a three-way partnership of support to be provided for the apprenticeships with apprentices, staff members, peers, management and the learning provider working together to manage the apprentice's learning, monitor and track progression and provide instant feedback. It allowed for the learning provider and manager to see first-hand the apprentice in action which would not have been as easily possible, on such a frequent basis without incurring significant cost and time.

This study showed how a culture developed within the virtual world. There was an identifiable working life that developed in the community of practice and agreed values. Social networks amongst colleagues, assessors, management and staff grew and were an important conduit in the development of the community of practice's culture.

The use of the virtual world has helped staff be better prepared for uncertainty in their world of work through sharing of experiences and stories. No two days are the same, no two customers or delivery locations are the same and unexpected issues arise all the time. It has also enabled staff to feel less isolated whilst working alone in an outbase. The organisation has made a shift from thinking the only way to train staff was in a classroom setting to realising that knowing everything is an obsolete idea, as every day the staff work in a world full of surprises. Staff can now visit the virtual world to find information by asking others, for example, how to assemble a particular piece of equipment in the customer's home or to resolve glitches in using their handheld terminals.

This method of working means management does not need to provide all the answers, as staff develop their learning ongoing. Training is not about conveying content anymore. Staff find out things for themselves will retain the information better. Training is no longer limited to what management can tell staff or limited from a training manual, as content is available to everyone within the virtual world through their own community. All the staff, apprentices and their education providers are connected outside the workplace, whilst on the road carrying out the work and can gain access to a lot of information, exchange ideas, talk about more things and become more confident.

Study 1 findings indicate that the courier company had developed a distinct culture that influenced the everyday activities and learning that took place in the virtual world. Cultural influences on learning operated through the social networks of the working community, at both collective and individual levels and this impacted on the success of the virtual world's usage. What developed from the study, was much more than just the completion of the customer service training, but something greater that grew beyond the study, in that the use of virtual reality enabled staff to maximise the benefits of virtual working to carry out their job role. The study showed that staff developed skills and attributes to be lifelong learners for the future and making use of the technology to support them in their professional development and learning. The use of virtual reality was embraced by Samedel and enabled staff to develop their learning skills through collaboration and helped them develop skills to build their confidence and engage in discussion that would aid their work and synthesise information through informal discussion that they would potentially encounter in their future work. This would not have been possible on the scale without the use of the technology.

To conclude, in some cases virtual worlds did allow the SME to work in ways it cannot in real life and in some circumstances were a useful analogue and a better substitution for the real world. The use of the virtual world overcame practical problems, for example, enabling staff to collaborate whilst working remotely in small out-base sites around the UK and staff enjoyed the immediacy of the interaction taking place in real time. The use of Second Life® helped staff develop a social experience of learning and supported their development of

knowledge management through informal learning that they often found fun and enjoyable. The use of avatars to carry out role plays was a beneficial way for staff to build their confidence and broke down barriers. A greater level of flexibility for apprentices and staff to learn informally whilst working remotely and dispersed, was evident.

The next chapter explores and analyses how virtual worlds develop identity, motivation and professional development within the Langdel organisation.

# Chapter 6: Identity, Motivation and Professional Development

## *6.1 Introduction*

The previous chapter 5 explored how the virtual environment may allow SMEs to work in ways they cannot in real life and how they differ from the real world. It discussed how virtual worlds can be a useful analogue and in some cases a substitution of the real world. Chapter 6 discusses participant identity formation and development, associated with 3D usage and the professional development of those working in 3D communities. The purpose of Study 2 was to collect data that helped to explore and analyse how virtual worlds develop identity, support motivation and encourage professional development within the Langdel organisation. Langdel taking part in study 2, also took part in the pilot study detailed in chapter 4. An overview of study 2 is provided in table 6.1.

I relate the research findings to current discussion about the impact of work-based learning to answer the **Research Question 2:** *To what extent do virtual worlds develop identity, motivation and professional development?*

Section 6.2 discusses how the research was conducted within Langdel for study 2.

Section 6.3 describes study 2's data collection, results and relevance. Key themes emerged around connectivity, skills development, failure and autonomy in building motivation and identity and supporting professional development.

Section 6.4 discusses the key findings from the data analysis.

## Study 2: Langdel - Disciplinary and Absence Management Training

### Description

There is a high level of absenteeism at Langdel that needs addressing, but there is a lack of action in tackling the issue by management. Classroom training has been held in the past, which the HR manager said was not as effective as it could be because people hate to role play. She said that a young management team need to practise how they will handle difficult situations such as managing absenteeism and carrying out disciplinary meetings, but they did not enjoy the role play.

The HR Manager feels that using the virtual world to carry out the training and for staff to use to practise a variety of situations and conversations, will be very effective. She advised that staff will be able to build their confidence in dealing with difficult situations and practising what to say and carrying out role plays will allow other staff members to pretend to be staff members being interviewed or disciplined, which will help them practise how to respond back.

### What it solves

The HR Manager was very keen to use the virtual world as a training tool to address the difficult conversations that were required between management and staff. She reported that nobody likes having to deal with absenteeism and disciplinary and have uncomfortable conversations with those people they work with, but they needed to practise how to confront the issues head on.

The Bradford Factor scores were showing series levels of absence and issues that required further investigation. The HR Manager felt that training in the virtual world would be more effective and a better replacement for training in the classroom. The skills learned in the virtual world could then be transferred into the real world.

### Who

**HR Manager**

Carrying out the training in the virtual world

**8 Managers**

Responsible for managing absenteeism

**14 Apprentices**

Being trained about the Bradford Factor and managing their absenteeism

### Benefits?

Using avatars to overcome the embarrassment of roleplay and practise scenarios from the real world in the virtual world and receive 360-degree feedback.

Staff have the opportunity to create numerous situations to practise and have the safety net of being able to work in the virtual world before transferring skills into the real world.

The environment allowed staff to learn through reflection, collaborate and discuss how to handle situations and provide feedback on how they had dealt with particular roleplays.

### Issues?

There is not the same visual communication and non-verbal cues that there are in real life. People cannot make eye contact, which is important, particularly when being trained in carrying out sensitive disciplinary scenarios.

### Scenario

**Who**

Managers and Team Leaders to manage absence. Apprentices and Staff to respond to absence issues.

**Problem**

Absence rate is high and needs managing. Management need to be trained on how to manage staff and have absence management and disciplinary meetings to resolve the issues. They need to be able to practise the content of discussions and also practise how to respond to what might be said by the recipient of the information.

**Situation**

The HR Manager reported training is not as effective as it could be because people are embarrassed to practice how to manage absence and tackle difficult conversations. Role play is needed to practice skills both in managing and responding to being managed on absence management and disciplinary.

**Virtual World Activity**

Staff carry out role plays in Second Life. Staff are not embarrassed and enjoy working through their avatars. It's a real opportunity to be able to practise how to tackle difficult situations and rehearse how absence management and disciplinary meetings will be handled and what will be discussed.

**Result**

The HR Manager advised that feedback received was that managers were much more confident in managing absence effectively and informed staff who understand the impact of absence on the organisation. As a result, the HR Manager advised absence has greatly reduced according to absence statistics captured internally and is no longer a concern, falling within their key performance indicator tolerance level This result however, could not be directly evidenced from the study data, but was considered interesting feedback to note from the employer.

***Table 6.1: Overview of Study 2***

## *6.2 Conduct of Research*

### 6.2.1 Research Participants

For Study 2, 8 Managers and 14 apprentices from Langdel, took part in the research, with a spread of age ranges from 18 to 55. All participants took part in disciplinary and absence management training within Second Life ®. All staff attended 8 hours of training in the virtual world, split over two sessions.

For demographic information about the participants, collected from questionnaire data, please refer back to section 4.2.1.

The eight managers who took part were asked to write a mini essay of 250 – 400 words on their experiences of using the virtual world (see Appendix K). Additionally, all the participants completed questionnaires (see Appendix E), live text chat was analysed, focus groups were transcribed and analysed and, as for study 1, all participants carried out the card storyboard sort (as discussed in section 5.3.1). The data collected has been coded using the Veldhuis-Diermanse Schema for Learning Processes Coding (Veldhuis-Diermanse, 2002) – see Appendix J.

### 6.2.2 Rationale for Study 2

The rationale for study 2 was to explore how virtual worlds could develop identity, motivation and professional development with a particular focus on helping to improve the high level of absenteeism being experienced within the organisation. Study 2 also makes a comparison between the data collected in the pilot study which was carried out eight months ago, to see whether the participants use the virtual world differently to when they first started using the virtual space.

The HR Manager wanted to utilise virtual reality to carry out a number of training sessions for staff and management to better understand the implications of both being absent and failing to manage absenteeism effectively. The virtual world was to be utilised to explore ways to manage difficult issues in relation to

absenteeism, including effectively using the disciplinary process to manage absenteeism.

Langdel operates with a high level of seasonal workers to pick fruit and vegetables in season. There are critical windows in the growing season where the workforce increases 400%. A number of apprentices are recruited, who are nominated a lead apprentice from the previous year's recruitment to support new apprentices and the HR Manager wanted to utilise the virtual world for both managers and apprentices to work together to learn from each other on the most effective ways to manage absenteeism.

## *6.3 Data Collection and Results*

In this section, I present findings from Study 2, which analyses the results from the mini essays, card story boards, questionnaire results, focus group discussion and dialogue during the training. All participants are referred to by their code name. The same methods as used in the pilot study were repeated for all three studies (see section 4.2.3) and the card story-boards (see section 5.3.1). A copy of the questionnaire is shown in Appendix E. The data collected has been coded using the Veldhuis-Diermanse Schema for Learning Processes Coding (Veldhuis-Diermanse, 2002) – see Appendix J, as used in the pilot study.

### 6.3.1 Study 2 Virtual World Card Story-Boards

The results from the storyboard activity are shown in tables 6.2 – 6.5.

| QA - PROFESSIONAL DEVELOPMENT | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Communication Skills | Lifelong Learning | Wider understanding of cross sectors and industry | Technical Knowledge | Practical Knowledge | Experience in Subject Specialism | Team Work | Confidence and Proficiency | Professional Skills and Development | Leadership Skills | Collaborative Working | Problem Solving and Critical Thinking |
| Group 1 | 7 | 1 | 5 | 2 | 6 | 12 | 11 | 4 | 8 | 3 | 9 | 10 |
| Group 2 | 7 | 1 | 2 | 9 | 6 | 10 | 12 | 8 | 4 | 3 | 5 | 11 |
| Group 3 | 8 | 1 | 6 | 3 | 10 | 5 | 4 | 12 | 11 | 9 | 7 | 2 |
| Group 4 | 12 | 3 | 7 | 5 | 6 | 2 | 9 | 8 | 10 | 1 | 11 | 4 |
| Group 5 | 9 | 1 | 12 | 11 | 5 | 4 | 2 | 7 | 8 | 3 | 10 | 6 |
| **Totals** | **43** | **7** | **32** | **30** | **33** | **33** | **38** | **39** | **41** | **19** | **42** | **33** |
| **390** | 11.0% | 1.8% | 8.2% | 7.7% | 8.5% | 8.5% | 9.7% | 10.0% | 10.5% | 4.9% | 10.8% | 8.5% |
| **12's** | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| | 20% | 0% | 20% | 0% | 0% | 20% | 20% | 20% | 0% | 0% | 0% | 0% |

***Table 6.2: How the Research Participants from Langdel ranked each answer for professional development in the Story Board Activity (see table 5.4 for full description of the questions and answers).***

The research participants were asked to rank in order their experiences for professional development in the virtual world (see Figure. 6.1). The results were fairly evenly spread, with communication skills, c ranked top at 11%, followed closely by Collaborative Working (10.8%) and Skills and Development (10.5%). Staff rated gaining confidence and proficiency the next highest (10%) and

improving team (9.7%%). Problem solving, gaining experience in their subject area and gaining practical knowledge all ranked equally (8.5%).

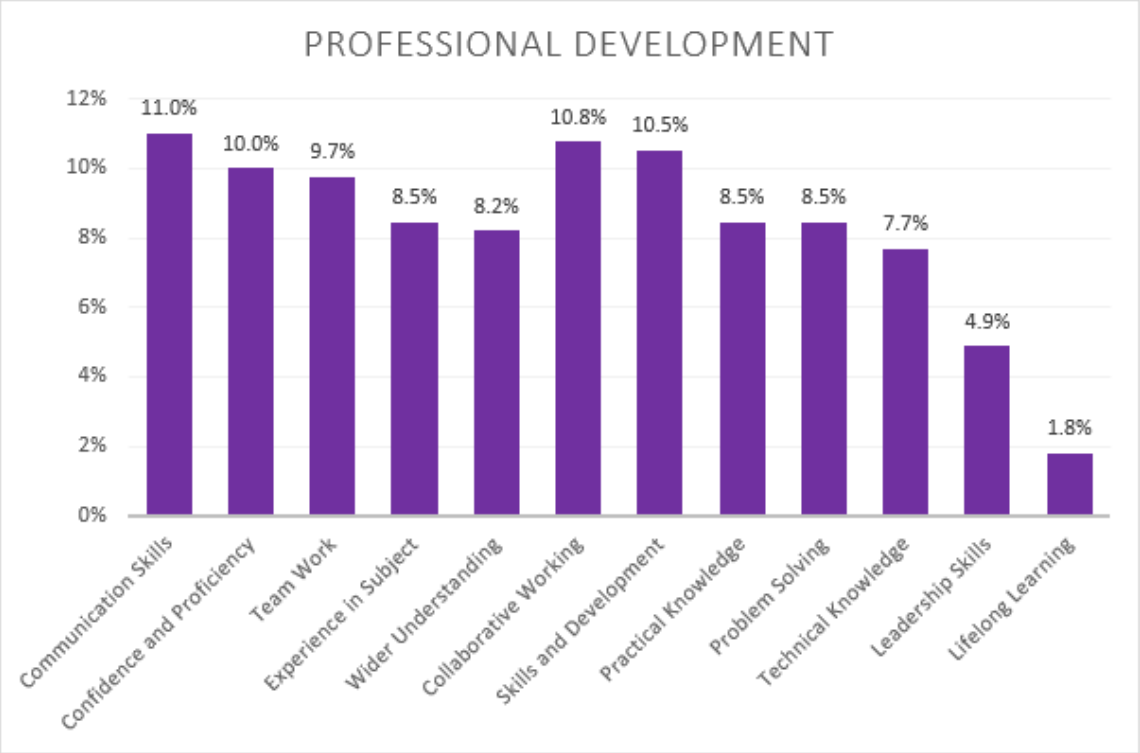



***Figure 6.1: Card Story-Board Results for Professional Development for Langdel***

| QB - ANALOGUE FOR THE REAL WORLD | | | | | | |
|---|---|---|---|---|---|---|
| | It was easier to learn under the guise of an avatar than in the real world. | Learning through informal, social interaction | Develop skills quicker, working in the virtual world | Less distracting and more effective than the real world | Working with people you would not otherwise have been able to do | Access to work experiences and projects that you would not otherwise have been involved in |
| Group 1 | 6 | 3 | 2 | 5 | 4 | 1 |
| Group 2 | 4 | 3 | 5 | 6 | 2 | 1 |
| Group 3 | 6 | 3 | 4 | 5 | 2 | 1 |
| Group 4 | 5 | 2 | 6 | 4 | 1 | 3 |
| Group 5 | 6 | 3 | 2 | 5 | 4 | 1 |
| **Totals** | **27** | **14** | **19** | **25** | **13** | **7** |
| **105** | 25.7% | 13.3% | 18.1% | 23.8% | 12.4% | 6.7% |
| **6's** | 3 | 0 | 1 | 1 | 0 | 0 |
| | 60% | 0% | 20% | 20% | 0% | 0% |

***Table 6.3: How the Research Participants from Langdel ranked each answer on analogue of the real world in the Story Board Activity***

The virtual space does not replace the physical workplace, but can enhance staff ability through communication and building confidence. There is something tremendous about getting people together in a place where serendipitous interactions can happen, where you can have face to face mentoring both in and out of the virtual world and where staff and apprentices can talk together and create together and learn to debate ideas. Staff learned from more experienced staff but also from staff who were less experienced by seeing a different perspective and viewpoint and learning what they needed to be supported.

Langdel participants rated how they experienced the virtual world to be a useful analogue for the real world (see Figure 6.2). Participants found working in the

virtual world easier to learn under the guise of an avatar (25.7%). They also rated that it was less distracting and more effective to learn in the virtual world (23.8%) and that they developed their skills quicker (18.1%). A key reason for this was the ability to fail. Participant 01680 said:

> "*Staff are not afraid to fail in the virtual world. They fail repeatedly until they find what works. I think this is an important benefit of working in the virtual world, over real life. Failure is encouraged in the virtual world, because it's everybody's chance to get all the mistakes out so that they aren't made in real life*".
>
> ***(Participant 01680)***

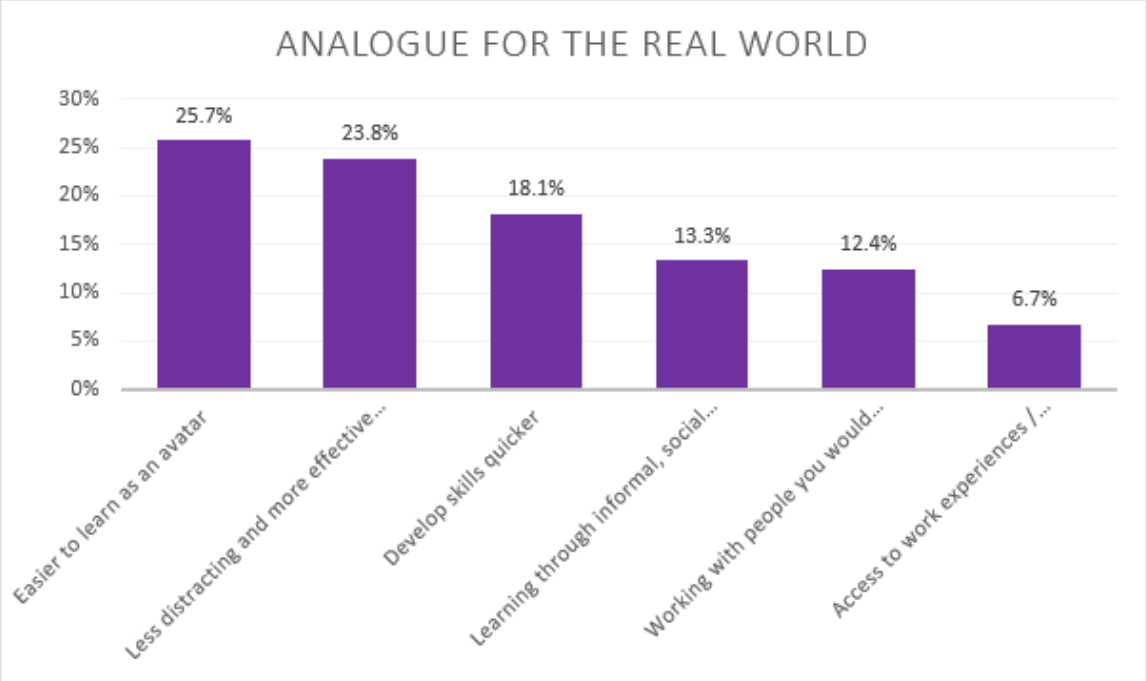



***Figure 6.2: Card Story-Board Results for an analogue of the real world for Langdel***

The ability to be able to freely fail in the virtual world is advantageous for SMEs. Failure is what often leads to innovation and learning within organisations. The consequences of failing in the virtual world are manageable and will eventually lead to success. People are often in fear of failure and managers often are afraid to let their staff fail. The ability to fail repeatedly was found to be rewarding by

staff who through failing at processes learned to improve and gained real satisfaction from the reward of success. Participant 10219 advised:

> *"In moving into the virtual world and adopting my virtual avatar, I've gone from being me to being a virtual version of myself. Through this transformation, I've learned so much about myself. Seeing my avatar do well, makes me smile and makes me realise that I can do this in the real world. I've learned how to learn and I enjoy working as part of the avatar community. I have learned how to embrace failure and it motivates me to do better".*
>
> ***(Participant 10219)***

| QC - IDENTITY AND AGENCY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Builds my self-confidence | Develops my abilities and achieve in my work | Builds my self-esteem | Helps motivate me in my work | Helps me work with people more effectively | Helps me monitor my progress | Develops a sense of how I learn best in the workplace | Gives me direction in my work |
| Group 1 | 8 | 5 | 7 | 3 | 6 | 2 | 1 | 4 |
| Group 2 | 6 | 4 | 5 | 7 | 8 | 2 | 1 | 3 |
| Group 3 | 8 | 7 | 6 | 4 | 5 | 3 | 1 | 2 |
| Group 4 | 8 | 2 | 6 | 1 | 7 | 5 | 4 | 3 |
| Group 5 | 7 | 6 | 8 | 2 | 1 | 3 | 4 | 5 |
| **Totals** | **37** | **24** | **32** | **17** | **27** | **15** | **11** | **17** |
| **180** | 20.6% | 13.3% | 17.8% | 9.4% | 15.0% | 8.3% | 6.1% | 9.4% |
| **8's** | 3 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| | 60% | 0% | 20% | 0% | 20% | 0% | 0% | 0% |

***Table 6.4: How the Research Participants from Langdel ranked each answer for identity and agency in the Story Board Activity***

When rating the virtual world for the development of identity and agency (see Figure 6.3), building self-confidence was the top-rated attribute (20.6% of the results), followed by building self-esteem (17.8% of the results). Staff gained confidence working in teams within the virtual world. Working with people that they would not otherwise have been able to do, scored high too (15% of the results and 13.3% of the results reflected that staff felt the virtual world helped them develop their abilities and achieve in work. Utilising the virtual world allowed for a varied and broad way for participants to use the virtual space and learn. It went beyond formal training and participants saw the advantage of utilising the support amongst themselves to build valued relationships and develop their knowledge and skillset.

Through practice and role play within the virtual world, staff developed a sense of self-efficacy. The card sorting results support the research of Jaarsma et al (2011) who discussed how the building of self-confidence was critical for learning in the workplace. Staff have to have a belief that they are capable of being successful. The virtual world helped staff see other colleagues experience success which was motivating for them to realise they could also be successful.

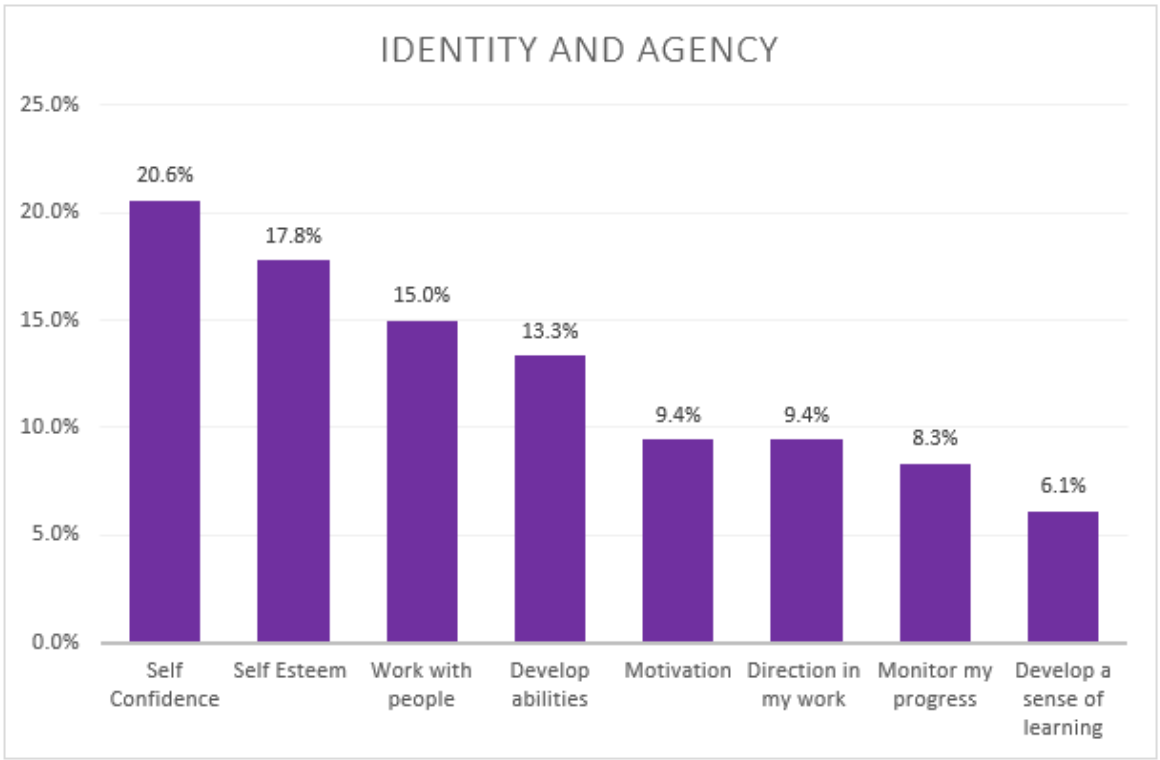



***Figure 6.3: Card Story-Board Results for identify and agency, for Langdel***

| QD - COMMUNITY OF PRACTICE AND INFORMAL LEARNING | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Learning through roleplay | Learning through collaboration | Learning by imitating best practice | Learning through coaching and mentoring | Learning through social interaction | Learning through conversation | Learning through practising |
| Group 1 | 6 | 3 | 5 | 1 | 2 | 4 | 7 |
| Group 2 | 7 | 2 | 6 | 3 | 4 | 1 | 5 |
| Group 3 | 7 | 1 | 2 | 4 | 3 | 5 | 6 |
| Group 4 | 4 | 3 | 2 | 1 | 5 | 7 | 6 |
| Group 5 | 7 | 3 | 2 | 6 | 1 | 4 | 5 |
| **Totals** | **31** | **12** | **17** | **15** | **15** | **21** | **29** |
| **140** | 22.1% | 8.6% | 12.1% | 10.7% | 10.7% | 15.0% | 20.7% |
| **7's** | 3 | 0 | 0 | 0 | 0 | 1 | 1 |
| | 60% | 0% | 0% | 0% | 0% | 20% | 20% |

***Table 6.5: How the Research Participants from Langdel ranked each answer for community of practice and informal learning in the Story Board Activity***

Figure 6.4 shows how staff rated using the virtual world for the development of informal learning and the formation of a community of practice. The use of role play was rated top (22.1% of the results). Being able to practise and imitate others also scored the second highest (20.7%). Conversation was the third highest benefit from working in the virtual world (15%). During the training, staff carried out role plays to explore various scenarios and work as a group to find approaches to different issues and problem solve. The space was utilised for staff to watch each other acting out various scenarios and receiving feedback from the group as a whole on what worked well and what did not work so well. It

was a relaxed environment that developed creativity and staff would work out innovative solutions to problems presented to them, which potentially could help them in approaching similar situations in real life.

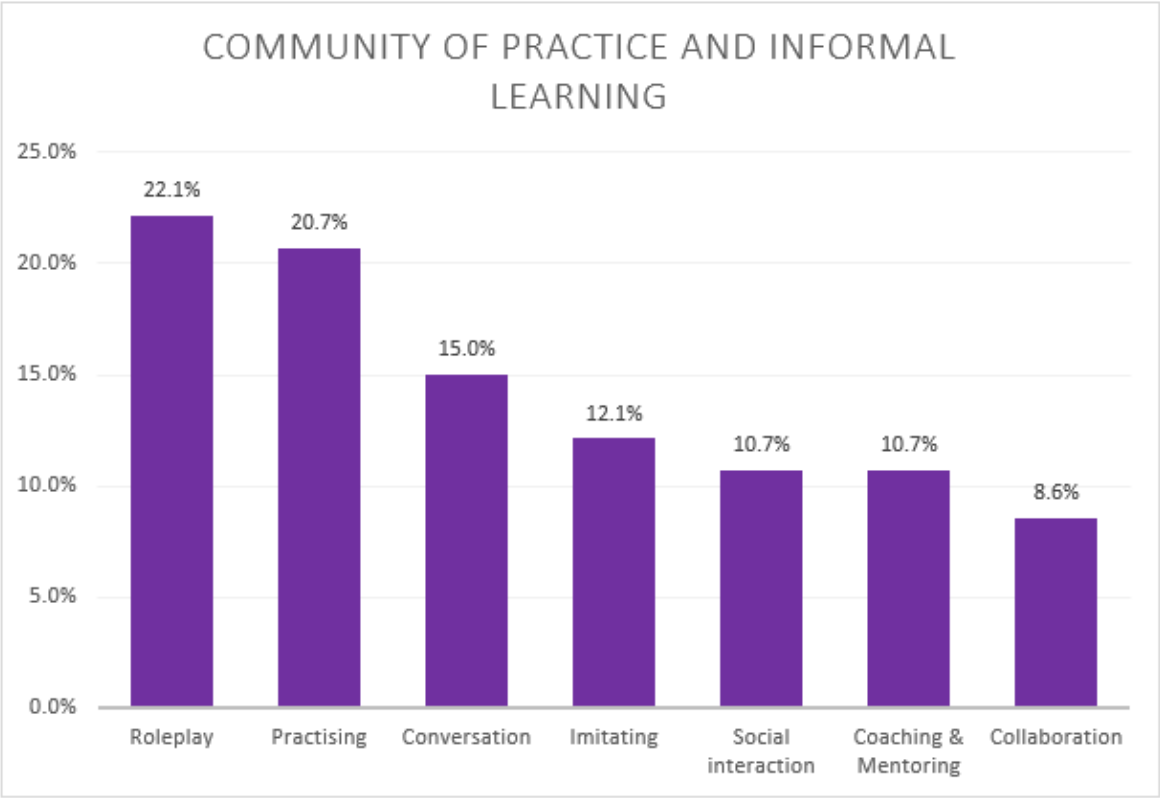



***Figure 6.4: Card Story-Board Results for a community of practice and informal learning, for Langdel***

### 6.3.2 Evolution of Virtual World Activity in Study 2

In this section, I present the data analysis from study 2. I also compare the data from study 2 with the initial pilot study carried out with Langdel.

Table 6.6 shows the number of utterances coded for each category, for all participants taking part in 4-hours of virtual world activity and a focus group at Langdel.

The nature of the training and activity taking place in the virtual world is reflective of the results. Table 6.6 shows how cognitive activities were the most prominent at 61% in the Langdel Study 2.

| Research Participant | Codes (See Appendix H) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cognitive Learning Activities | | | | | | | | | | |
| | *Debating* | | | | | *Using external information and experiences* | | | | *Linking or repeating internal information* | |
| | ***CDPF*** | ***CDPNF*** | ***CDAF*** | ***CDANF*** | ***CDAQ*** | ***CCEI*** | ***CREI*** | ***CSEI*** | ***CREE*** | ***CIL*** | ***CIR*** |
| 03244 | 24 | 5 | 18 | 0 | 26 | 31 | 22 | 14 | 24 | 14 | 22 |
| 05662 | 25 | 9 | 24 | 1 | 21 | 19 | 34 | 16 | 18 | 31 | 50 |
| 09261 | 26 | 11 | 26 | 0 | 18 | 23 | 17 | 18 | 26 | 22 | 26 |
| 02201 | 27 | 6 | 33 | 0 | 25 | 19 | 21 | 18 | 24 | 17 | 22 |
| 02688 | 24 | 18 | 25 | 0 | 22 | 24 | 18 | 14 | 10 | 21 | 12 |
| 10219 | 23 | 8 | 22 | 0 | 23 | 25 | 19 | 22 | 11 | 22 | 14 |
| 03688 | 24 | 6 | 25 | 2 | 24 | 20 | 15 | 26 | 28 | 18 | 28 |
| 05671 | 26 | 7 | 17 | 0 | 22 | 17 | 17 | 14 | 18 | 27 | 55 |
| 12448 | 34 | 19 | 32 | 0 | 33 | 25 | 22 | 36 | 37 | 31 | 23 |
| 08694 | 23 | 11 | 12 | 0 | 21 | 20 | 21 | 18 | 36 | 22 | 21 |
| 09928 | 26 | 12 | 11 | 1 | 19 | 9 | 9 | 23 | 34 | 29 | 26 |
| 12777 | 25 | 11 | 21 | 0 | 28 | 11 | 11 | 25 | 51 | 28 | 13 |
| 11803 | 22 | 10 | 13 | 0 | 22 | 22 | 13 | 38 | 28 | 26 | 23 |
| 01306 | 23 | 9 | 26 | 0 | 23 | 12 | 17 | 22 | 25 | 17 | 18 |
| 04122 | 24 | 7 | 13 | 0 | 21 | 18 | 16 | 15 | 47 | 38 | 30 |
| 06717 | 25 | 21 | 17 | 0 | 26 | 33 | 11 | 21 | 39 | 16 | 20 |
| 01240 | 27 | 11 | 24 | 0 | 14 | 20 | 12 | 26 | 29 | 14 | 27 |
| 07751 | 33 | 23 | 31 | 2 | 23 | 26 | 16 | 34 | 34 | 28 | 47 |
| 08231 | 28 | 16 | 11 | 1 | 17 | 15 | 11 | 27 | 19 | 19 | 11 |
| 01680 | 25 | 12 | 14 | 1 | 32 | 21 | 20 | 24 | 11 | 21 | 25 |
| 01688 | 28 | 10 | 27 | 1 | 20 | 19 | 14 | 25 | 35 | 32 | 14 |
| 06261 | 26 | 19 | 31 | 1 | 14 | 17 | 17 | 31 | 26 | 26 | 9 |
| **Totals** | **568** | **261** | **473** | **10** | **494** | **446** | **373** | **507** | **610** | **519** | **536** |
| | 7.2% | 3.3% | 6.0% | 0.1% | 6.3% | 5.6% | 4.7% | 6.4% | 7.7% | 6.6% | 6.8% |
| | 22.9% | | | | | 24.5% | | | | 13.4% | |
| | 60.7% | | | | | | | | | | |

| Research Participant | Codes (See Appendix H) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Affective Learning Activities | | | Metacognitive Learning Activities | | | | | | | | Rest Activities | |
| | *Affective Learning Activities* | | | *Planning* | | | *Keeping clarity* | | | *Monitoring* | | | |
| | ***AM*** | ***AA*** | ***AC*** | ***MPA*** | ***MAA*** | ***MEA*** | ***MSD*** | ***MAC*** | ***MGE*** | ***MKW*** | ***MRP*** | ***RNE*** | ***TOTALS*** |
| 03244 | 36 | 24 | 44 | 7 | 3 | 6 | 0 | 19 | 0 | 2 | 4 | 0 | 345 |
| 05662 | 28 | 39 | 24 | 11 | 2 | 4 | 0 | 11 | 0 | 0 | 11 | 0 | 378 |
| 09261 | 35 | 49 | 36 | 5 | 9 | 5 | 0 | 9 | 0 | 0 | 8 | 0 | 369 |
| 02201 | 38 | 27 | 26 | 6 | 4 | 2 | 0 | 4 | 0 | 3 | 5 | 0 | 327 |
| 02688 | 37 | 35 | 18 | 8 | 3 | 8 | 0 | 7 | 1 | 0 | 8 | 0 | 313 |
| 10219 | 32 | 39 | 22 | 6 | 8 | 2 | 0 | 9 | 0 | 1 | 13 | 0 | 321 |
| 03688 | 29 | 31 | 21 | 5 | 9 | 7 | 0 | 5 | 0 | 0 | 9 | 0 | 332 |
| 05671 | 21 | 36 | 22 | 13 | 5 | 0 | 0 | 6 | 1 | 3 | 12 | 0 | 339 |
| 12448 | 39 | 33 | 37 | 17 | 13 | 19 | 0 | 12 | 0 | 0 | 15 | 0 | 477 |
| 08694 | 35 | 31 | 22 | 7 | 11 | 2 | 0 | 2 | 2 | 1 | 7 | 0 | 325 |
| 09928 | 31 | 29 | 24 | 9 | 14 | 6 | 0 | 5 | 0 | 2 | 8 | 0 | 327 |
| 12777 | 26 | 38 | 33 | 7 | 7 | 4 | 0 | 8 | 0 | 0 | 2 | 0 | 349 |
| 11803 | 29 | 26 | 38 | 5 | 8 | 2 | 0 | 9 | 0 | 1 | 10 | 0 | 345 |
| 01306 | 41 | 21 | 47 | 8 | 1 | 1 | 0 | 5 | 1 | 0 | 6 | 0 | 323 |
| 04122 | 29 | 29 | 43 | 13 | 1 | 5 | 0 | 6 | 0 | 1 | 11 | 0 | 367 |
| 06717 | 33 | 34 | 49 | 9 | 1 | 2 | 0 | 5 | 1 | 0 | 9 | 0 | 372 |
| 01240 | 29 | 44 | 37 | 5 | 13 | 4 | 0 | 4 | 2 | 1 | 6 | 0 | 349 |
| 07751 | 44 | 62 | 49 | 15 | 19 | 13 | 0 | 13 | 0 | 1 | 13 | 0 | 526 |
| 08231 | 37 | 41 | 42 | 6 | 7 | 3 | 0 | 11 | 3 | 0 | 9 | 0 | 334 |
| 01680 | 38 | 36 | 47 | 9 | 12 | 3 | 0 | 14 | 1 | 2 | 6 | 0 | 374 |
| 01688 | 39 | 27 | 31 | 6 | 9 | 1 | 0 | 8 | 0 | 1 | 9 | 0 | 356 |
| 06261 | 33 | 32 | 35 | 4 | 6 | 2 | 0 | 10 | 1 | 1 | 11 | 0 | 352 |
| **Totals** | **739** | **763** | **747** | **181** | **165** | **101** | **0** | **182** | **13** | **20** | **192** | **0** | **7900** |
| | 9.4% | 9.7% | 9.5% | 2.3% | 2.1% | 1.3% | 0.0% | 2.3% | 0.2% | 0.3% | 2.4% | 0.0% | |
| | 28.5% | | | 5.7% | | | 2.5% | | | 2.7% | | | |
| | 28.5% | | | 10.8% | | | | | | | | | |

***Table 6.6: Coded Utterance Values for 4 Hours Virtual World Activity at Langdel during Study 2***

Figure 6.5 is a graphical representation of the coded utterance values from table 6.7, for Study 2 virtual world activity at Langdel.

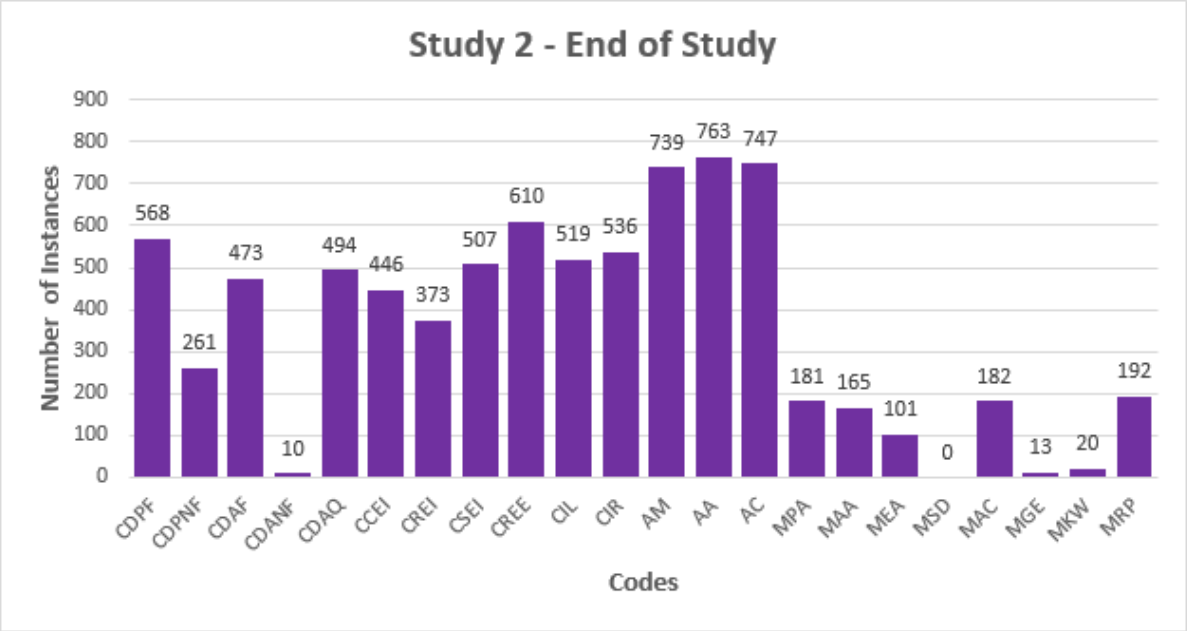



***Figure 6.5: Coded utterance totals for all participants in 4-hours activity in the virtual world at Langdel during Study 2.***

Figure 6.6 is a graphical representation of the coded utterance values from table 6.7, as a percentage of the total number of utterances, for 4-hours of virtual world activity at Langdel over Study 2.

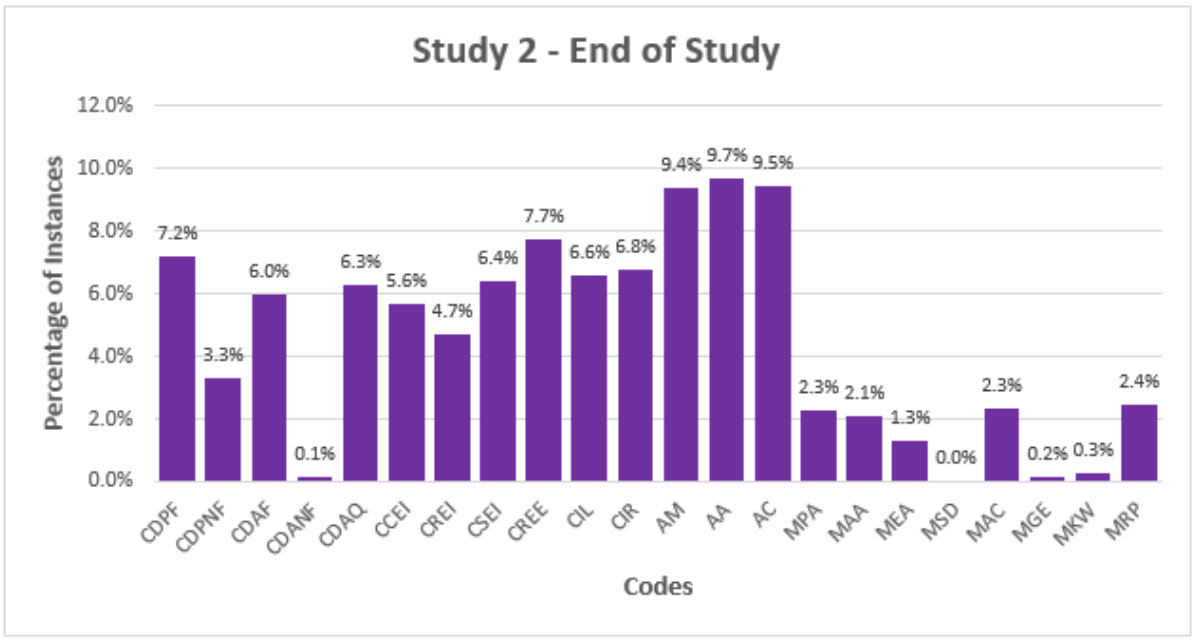



***Figure 6.6: Coded utterance percentages for all participants in 4-hours of activity in the virtual world at Langdel over Study 2.***

Figure 6.7 shows a pie chart summarising the split of utterances across cognitive, meta-cognitive and affective learning for study 2, utilising Veldhuis-Diermanse Schema for Learning Process Coding (2002), as shown in Appendix J.

Figure 6.8 shows the same data again from Figure 6.7, broken down by activity utterance code within the categories of cognitive, meta-cognitive and affective.

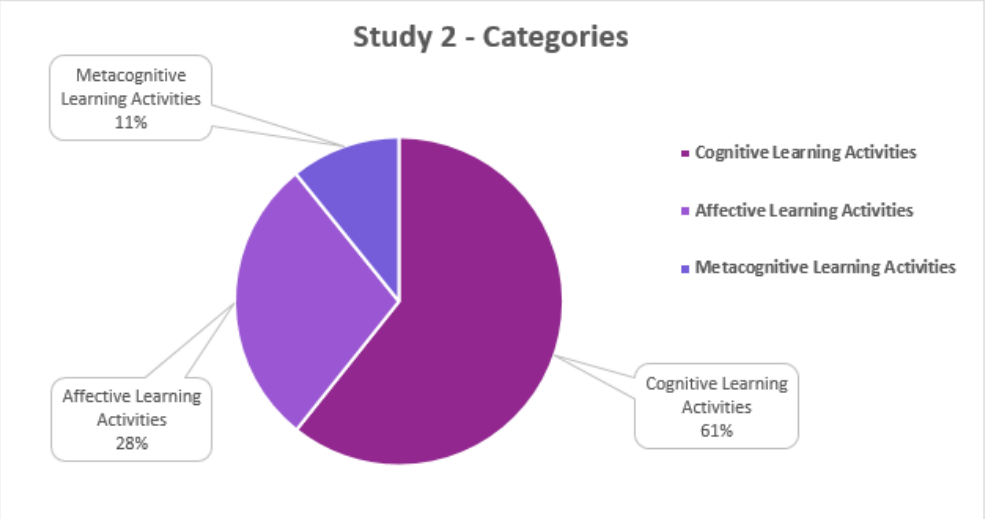



***Figure 6.7: A pie chart showing cognitive, meta-cognitive and affective learning taking place in the virtual world during Study 2.***

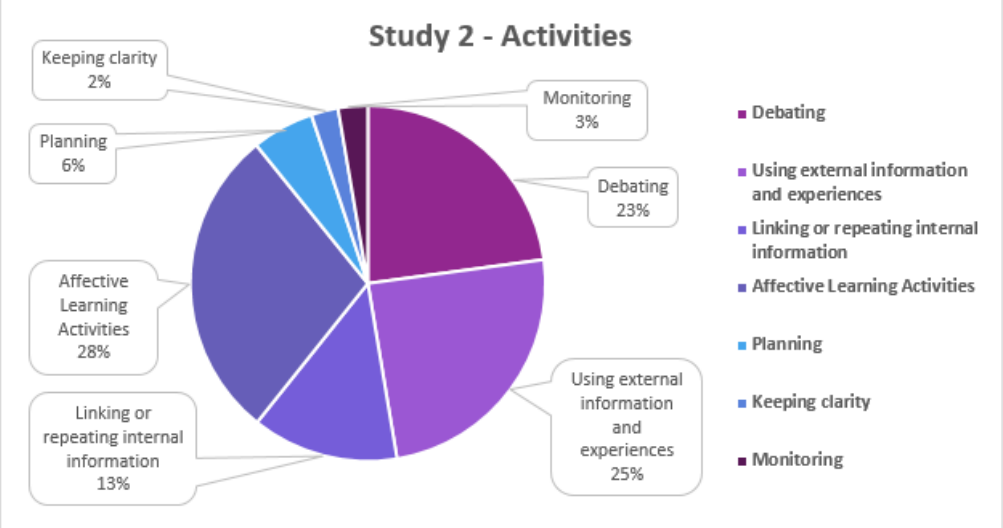



***Figure 6.8: A pie chart showing the breakdown of activities coded within the categories of cognitive, meta-cognitive and affective learning taking place in the virtual world during Study 2.***

Using external information and experiences were most evident with 25% of all utterances coded CCEI, CREI, CSEI and CREE. The organisation was addressing difficult subjects about disciplinary and absenteeism and how to reduce the high level of staff absence. Debating utterances totalled 23% as staff and apprentices shared their views, reflected on past experiences and debated about how best the subject should be approached. Linking or repeating internal information featured in 13% of all the coded utterances, as staff worked through training scripts and repeating processes around disciplinary and return to work interviews.

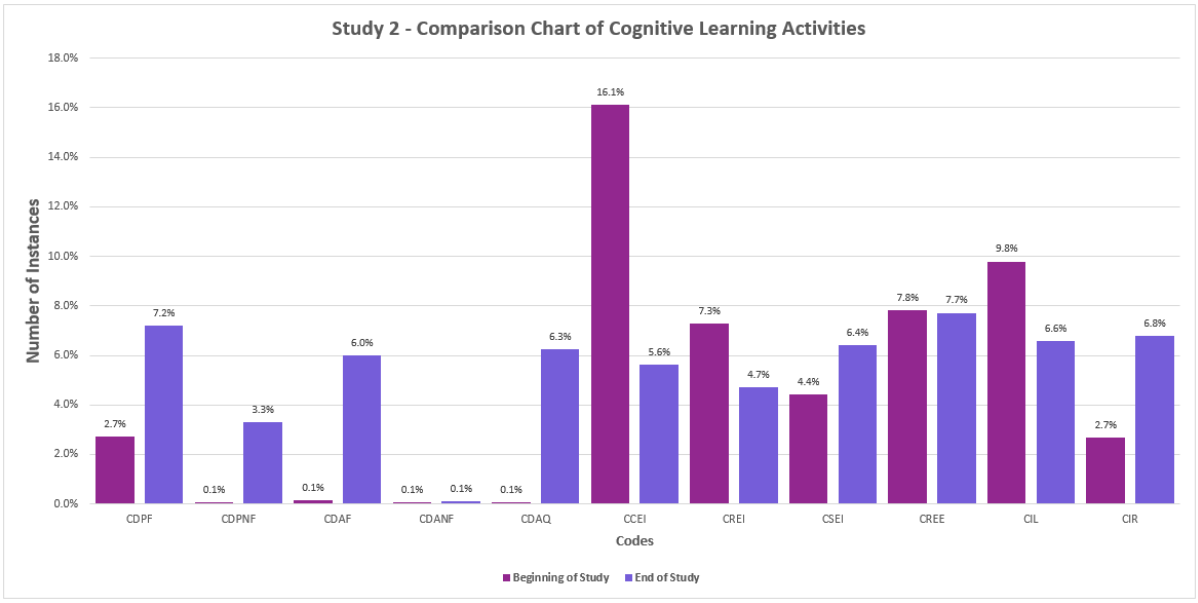
Study 2's activity in the virtual world showed 11% of all the utterances were related to meta-cognitive activities (see Figure 6.7). Langdel did not show evidence of using the virtual world for as much meta-cognitive activity in comparison to cognitive and affective learning activities. 9.1% of utterances were coded for planning activities, 7.6% for monitoring activities and 4.4% for keeping clarity. What is important for work-based learning in often complex environments, is to identify, select and collaboratively work with technology to suit a particular outcome.

Affective learning activities totalled 28% of coded utterances. The utterances coded showed an even spread of affective learning activities: AM made up 9.4% of utterances coded which recorded emotional reactions to notes of fellow-colleagues, without directly reacting to the content of that note. 9.7% of utterances were coded AA – Asking for general feedback and 9.5% were coded AC for social talk and chat (see figure 6.6). The fairly high level of affective learning activities reflected how staff were developing their curiosity and insightful thinking to learn more deeply and develop their abilities.

> *"Working in the virtual world has added a new dimension to my work by being able to talk to people I would not easily be able to speak to in the workplace, due to location. I feel connected in a way I did not before"*
>
> ***(Participant 06717)***

The virtual world was an opportunity for colleagues to ask for feedback from those they did not normally see or work with and it was reported during the focus group that this helped give them direction in their work and develop their abilities to achieve more.

Figure 6.9 compares the data from Study 2 against the data analysed at the end of the pilot study. Both studies took place at Langdel.



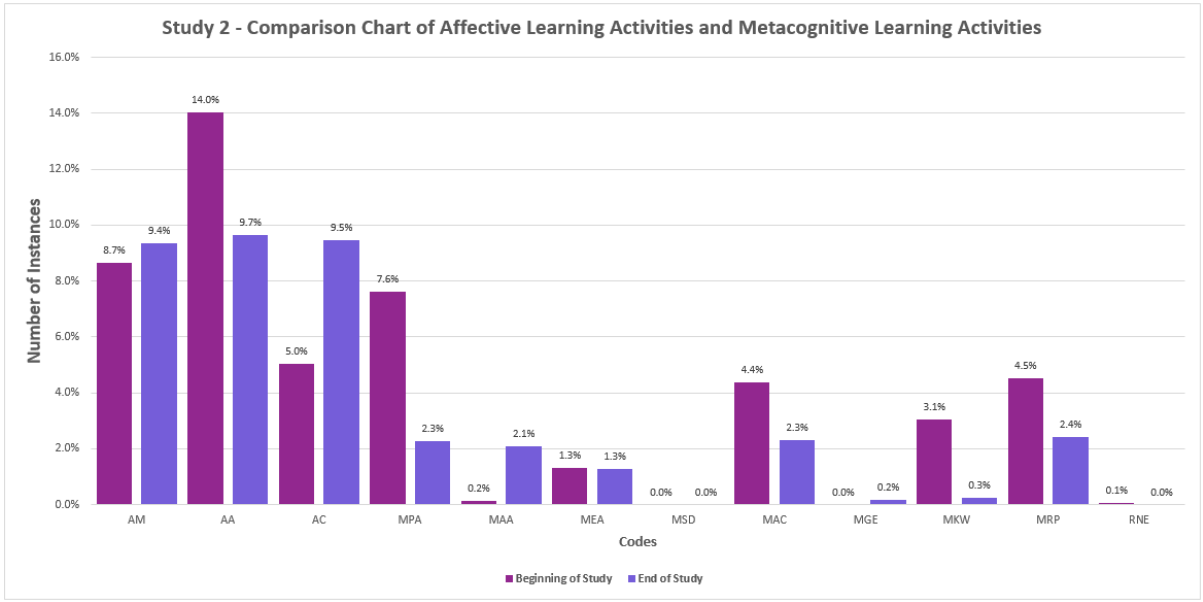
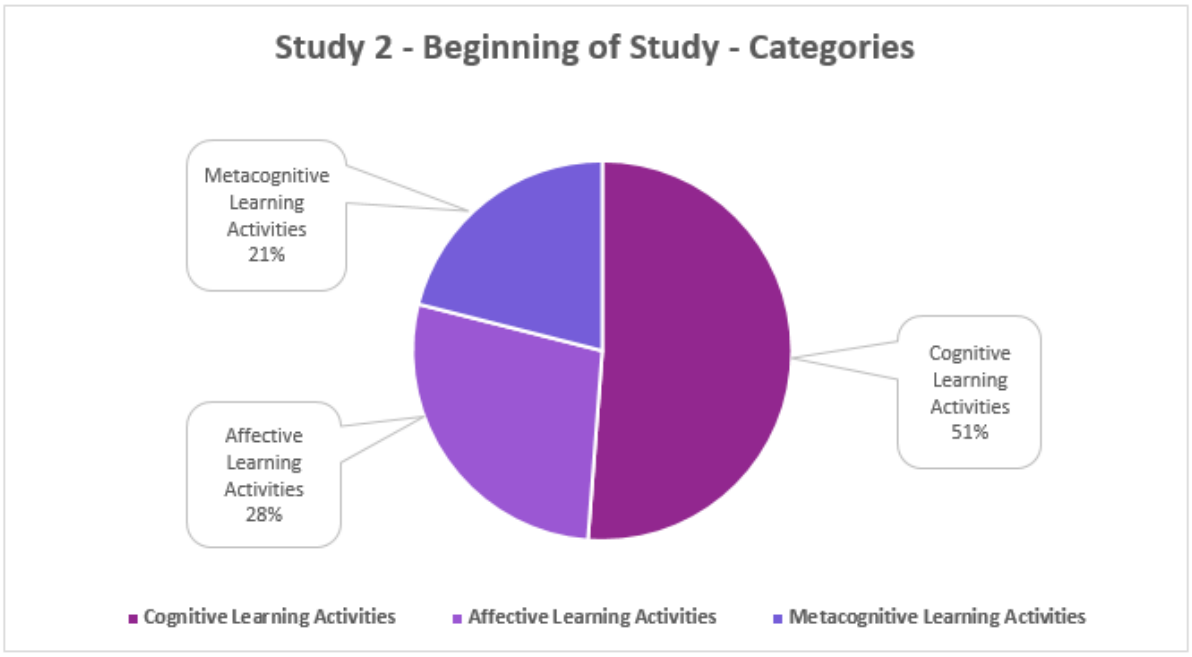




***Figure 6.9: A comparison of coded utterances during virtual world activity from the end of the Pilot Study against Study 2***

Figure 6.10 shows a graphical representation of the categories and activities within the categories for both sets of data.



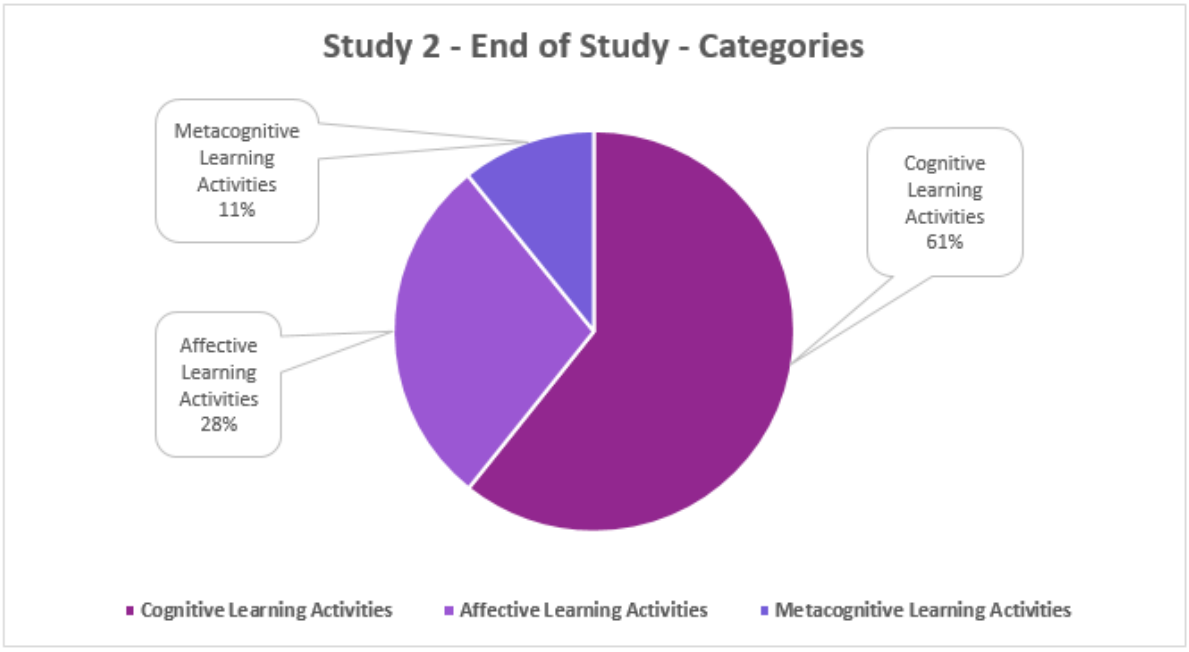
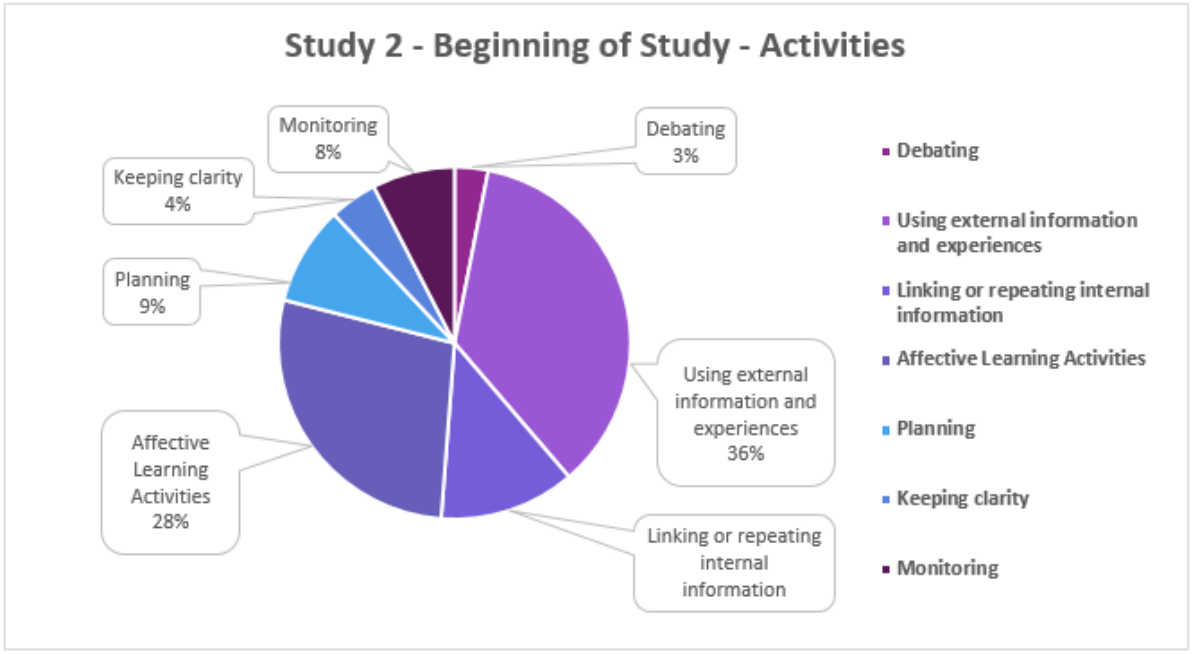




***Figure 6.10 (continued overleaf): A comparison of coded utterances during virtual world activity from the end of the Pilot Study against Study 2 shown by categories and activities***



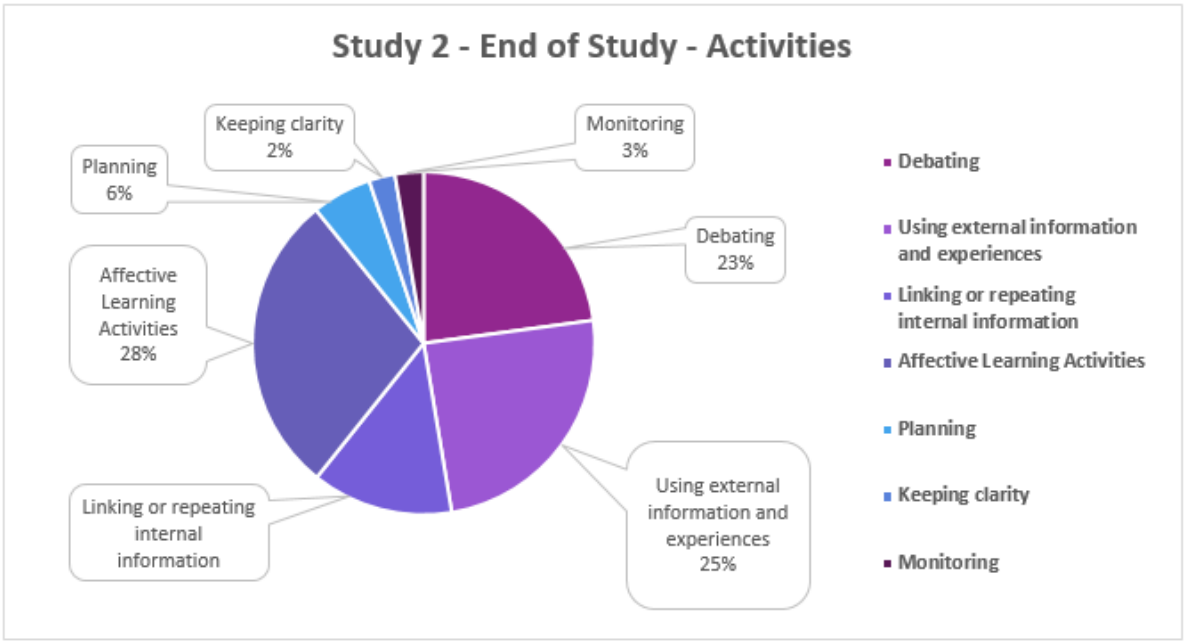




***Figure 6.10: A comparison of coded utterances during virtual world activity from the end of the Pilot Study against Study 2 shown by categories and activities***

It was interesting to review how Langdel had used the virtual world in study 2 in comparison to the end of the pilot study. It showed that the way participants had progressed to use the virtual world had continued.

Affective learning activities accounted for 28% of utterances in both studies, although the weighting of the learning activities had changed. Utterances in Study 2 were evenly spread within the affective learning activities category, whereas in the pilot study there was a spike against AA – asking for feedback. At the end of the pilot study, utterances coded AA accounted for 14%, whereas in Study 2, AA accounted for 9.7%. The change in distribution of affective learning activities in Study 2 suggest that the participants were more confident in using the virtual world and had developed skills in working collaboratively. It marks a sign that the participants were more relaxed and at ease in using the virtual world, as there was an approximate equal rating in study 2 for chatting, asking for feedback and general reactions to other participants.

Utterances relating to meta-cognitive learning activities had reduced in study 2 to 11% from 21% at the end of the pilot and cognitive activities increased by 10% to 61% in Study 2 in comparison from the end of the pilot study. Again, this reflected the style of working within the virtual world. In study 2, discussions and work within the virtual world focused more on cognitive learning activities – linking information, drawing on experience, asking questions, discussions and debating.

In the pilot study, there were less learning activities that were coded debating (3%), this had increased to 23% in study 2 with an emphasis on problem solving and asking questions.

The study suggests Langdel is on a learning journey. When the research study began, training was taking place in a training classroom with an instructor stood talking at the front of the room. What has been seen, is a change from this traditional approach that emerged from Fordism, Taylorism and scientific management (Taylor, 1967) and instead informal learning is taking place on demand, any time and from any place that the staff member may be working by logging into Second Life ®.

Langdel have reported that since the first training session in Second Life ®, they have moved away from a traditional way of training staff and involvement in the research study has been leading them into a self-development competency programme through the virtual world so that informal learning is facilitated through the virtual world to allow for peer to peer and staff centred learning. It was reported by Langdel that staff are continuously professionally developing; training and development is constant and continuously reviewed by assessors and managers who observe in the virtual world and provide instant feedback. Although, this feedback cannot be evidenced from this study's data.

What seems to be emerging at Langdel is a learning organisation (Cooper et al, 2010) where staff are choosing how to learn. Using the virtual world, they are able to try things out and practice skills first before enacting them in the real world. Virtual reality has real benefits for staff to learn the hazards of workplace procedures, problem solve and address issues before experiencing them in the workplace for real.

Within the virtual world, the trainer moved away from the Fordist style of teaching (Lee et al, 2004) and became more of a facilitator of collaborative group learning (Johnson and Johnson 1985). The study provided evidence of Fischer and Scharff's arguments (1998) for new technologies to change the way we work and learn. Work-based learning is experiential and flexible. Learning is on-the-job, informal and taking place amongst work colleagues interacting with each other (Bandura, 1977).

Working within Second Life ® has helped staff at Langdel develop a digital backpack. The virtual world contains most things that they need to learn in the workplace through the knowledge of others. The coding has discussed above, shows that through using virtual reality, some staff have learned how to learn and how to develop a range of employability skills and how to be independent learners that seek out information when required drawing upon their peer to peer network. They have an opportunity to interact in the workplace with other professionals and build their knowledge.

## *6.4 Identity*

Working in the virtual world provided mechanisms that allowed managers to examine their own performance and the performance of others around them in the virtual world. One said:

> *"Learning is everywhere within the virtual world, which is another reason why I like it. People participate to accomplish something in a different environment in a different way. You develop interpersonal skills and become motivated by working in a special space that is unique to you and those you are working with. I like the way the virtual world is low risk. It's a safe environment to try things out, be someone different to your real life self and see whether things work."*
>
> **(Participant 03244)**

There was evidence of leadership skills and performance metrics being developed that were used to improve both their own individual performance and that of the group's as a whole. Regular review and reflection is important in the real world, in order, to improve, organise and creatively problem solve (Gruber and Voneche, 1995). The space was often used by people to reflect back on what they had worked on (see Figure 6.11). Another said:

> *"I started working in the virtual world for the simple reason that I was intrigued about its possibility in creating an online community and building a knowledge management organisation. One of things that I've noticed is that we are friendly in the online world, people tend to be much more tolerant and willing to explain things and listen more than in the real world I find. Dare I also say that I find it exciting and I know others do too. By exciting I mean like going to the cinema to watch a really good film, you want to see what is going to happen next and you stay until the end of the film. As I use the virtual world more, I find it is a really good way to take a break and de-stress away from the hectic day to day goings on in the office. I*

*can log in and immediately feel better as I find a nice place to sit down. It's a good way to escape for a few minutes."*

***(Participant 03688)***

***Figure 6.11: Two managers reflect on the training that has taken place***

The study also provided evidence of the transfer of skills. One participant said:

*"Working in the virtual world has taught me how to participate in an evolving online peer to peer community. I have adapted this to set up an informal group within my own team for a project we are working on to review processes. I also use it at home with my teenagers to help them with difficult aspects of their study. I've found that if they can adopt a different persona, it helps them to look at things differently."*

**(Participant 04122)**

Over time, participants' identities were influenced by the activity and interactions taking place in the virtual world. Staff were aware of the impact that involvement in the virtual world was having on their understanding of their work.

> "Carrying out imaginary role play in the virtual world helped improve my ability to learn and build my confidence to carry out my work more effectively in real life. I find it a much more active way of learning than sitting in a training room".
>
> ***(Participant 09928)***

The virtual space facilitated interaction of staff and apprentices to ask questions and discuss better learning and work experiences through social and peer learning in a social community. Utilising the virtual world enabled staff to develop thinking skills, problem solving skills and engender a passion for collaborative learning. Staff recognised themselves changing as a result of working in the virtual world. Lee and Hoadley's (2007) research found how roleplaying can be a way for participants to test out various identities and ways to portray themselves. Another said:

> *"I like working as my avatar and being part of a roleplaying group most of all. The interactions with the avatar, the humour and banter is what's good. That and also being able to explore how best to be. I like adapting different versions of me in the virtual world and adopting different hats to see what works and when I get good responses from the other avatars".*
>
> ***(Participant 09261)***

Working in this way during the research study made Langdel find more creative ways to improve the staff experience for learning and professional development. It has helped to improve both online and face-to-face offerings of staff development by providing a more personalised approach to training and feedback.

*"At first, it was a way to keep in touch with colleagues that drew me to working in the virtual world, as I work from home. To me, the virtual world is all about exploring, trying new things out and discussing with others and sharing ideas. I can't think of any other way that would allow us to work in this way other than through the virtual world, when we're often all over the place and travelling and in different locations on the road."*

***(Participant 11803)***

The use of virtual world working, enabled apprenticeship staff to work with their employers on-site and with staff from the institutions working remotely to the workplace, to de-construct assessments within the training and deepen understanding. By taking on a role in a fictional situation, it's a useful way to provide an experience to staff and develop a more tacit understanding of study content and work based processes. As part of the training, staff and apprentices were set challenges and problems to solve which further bolstered their skills set and built confidence for assessment. Time was also scheduled for apprentices to come together at the end of the training session within the virtual world, to socialise and chat about challenges and new discoveries. In addition to the training activity within this research study, Langdel organized social events for team building and tasks were assigned to apprentices to discuss their course work and share problems. Designated times were set for virtual discussions, which provided apprentice/tutor/manager contact around specific topics, allowing apprentices to request and receive support from the right people to discuss their employability skills development and study.

## *6.5 Motivation*

The virtual world for Langdel served as a problem-solving learning environment, where staff could enter and work together to test out different ways of approaching their work. The Langdel HR Manager reported staff were intrinsically motivated to engage in the training because they found it satisfying work and rewarding, although this could not be evidenced from data within Langdel. The social connections provided intrinsic rewards and staff felt a

belonging to something and enjoyed participating in something that encompassed many parts and levels of the organisation. This supports McGonigal's (2011) work on gaming and how doing hard things and succeeding at them makes people happy and this leads to the activity being repeated for the experiences to take place again. A participant said:

> *"I couldn't stop giggling when I we first started using the virtual world. It was funny seeing us all as avatars and how people had chosen something completely different to what you thought of them as. The details, the designs, the features, the views are all great and the feeling of being inside a real world that is virtual in proper 3D is impossible for me to describe. At first, I thought it was just for kids. I think people's motivations on why they enjoy working in the virtual world varies but for me it is because of three things, which are all related. 1. I'm a trainer, 2. I'm a community and team builder and 3. I enjoy helping people to be better. I have spent all of my working life, as well as, outside of work when I think about it, bringing people together and helping them organise and form a team and community. That's why I enjoyed working in the virtual world because you can get more out of people because it is a safe environment to work in and practise skills before they try them out in the real world."*
>
> ***(Participant 03244)***

The ability to keep repeating processes until staff were confident built motivation. The benefit of repetition and having a safe environment to continuously practice and carry out role play was evident across all the studies. This supports findings in the literature review on brain science and the research work of Rivero (2013) who said by taking part in video games and repeating, you can ensure you retain 100% of what you learn.

Apprentices reported that they did not feel afraid to fail assessment tasks during the training, whilst in the virtual world, unlike in the real world. It helped that they were able to repeatedly practice processes under the guidance of an expert to lead them to success, prior to assessments in the live work environment. 92%

of the apprentices reported that in the real world they are often afraid to fail, but in the virtual world when they failed, it led to real satisfaction when they overcame the problem they'd first encountered.

One participant said:

> *"What I found was as I could not always do things in real life or feel confident enough to do so, it helped to be able to do it in the virtual world and helped how I felt about it."*
>
> **(Participant 12777)**

The kind of personalised and supportive learning that took place in the virtual world stopped many staff and apprentices from feeling alienated, bored or frustrated, because they had a network of support within the workplace. This could benefit more advanced staff who can unlock their potential and work at a faster pace and work with more experienced staff in more stimulating material. Staff who need to work at a lesser pace can do so and fulfil their potential. It allows all staff to have a path to success. The environment for being able to work things out at a person's own pace was motivating for staff.

Another said:

> *"I find it motivating to work in the virtual world because of personal achievement. I am the kind of person that likes to explore options and different ways of approaching things, so being able to do this in the virtual world is extremely rewarding for me. I find it motivating to work something out in the virtual world and then personally achieve it in real life. With access to the virtual world, I get to try challenging things out and draw upon a wide range of people to problem solve. I know there can be a stigma attached with video gamers and this kind of environment to work in, but I see it much more beneficial than for example, some staff who spend all their time on Facebook or Twitter. Given how others spend their time, I think spending time problem solving and socialising with others in the*

*workplace is good thing and improves relationships in the real workplace."*

**(Participant 09928)**

Another potential benefit is apprentices being able to see other staff working through procedures and discussing their experiences in the workplace which is motivating for apprentices to hear and learn from and to aspire to what the future may hold in the kind of work they may do.

Through the virtual world, Langdel has created a learning culture and improved its working practices. In the virtual world, the social connections provided intrinsic rewards. From the data, it can be seen that some staff are intrinsically motivated to engage, build solutions and debate, in order, to improve their performance in the virtual world because a community of practice has developed. The study has looked at how virtual worlds build identity, motivation and professional development. The study has examined learning in the virtual world to see what kinds of practices can be adopted specifically in SMEs for virtual working that will encourage community formation, motivation, identity and professional development. The results of the study can be related to Brown and Adler (2008) who showed that one of the strongest determinants of success is the ability for people to form or participate in small groups. They argue this is more important than the details of the instructors' teaching styles. Pedagogy is important, but much more important is how people learn to work together to share knowledge and practice.

## *6.6 Professional Development*

The study showed how people naturally form groups and work together to collaborate in order, to provide and receive advice, training and instruction. The virtual world proved a useful mechanism for apprentices during the training to learn from more experienced staff who had already encountered particular issues and situations and knew how to deal with them. The apprentices then in turn, shared it with other apprentices and passed their knowledge on. It's a just-in-time form of transferring knowledge, which was evident also in Study 1.

During the training, staff had to carry out a number of activities within the virtual world. Figure 6.3 shows the trainer outlining the course objectives for the training.

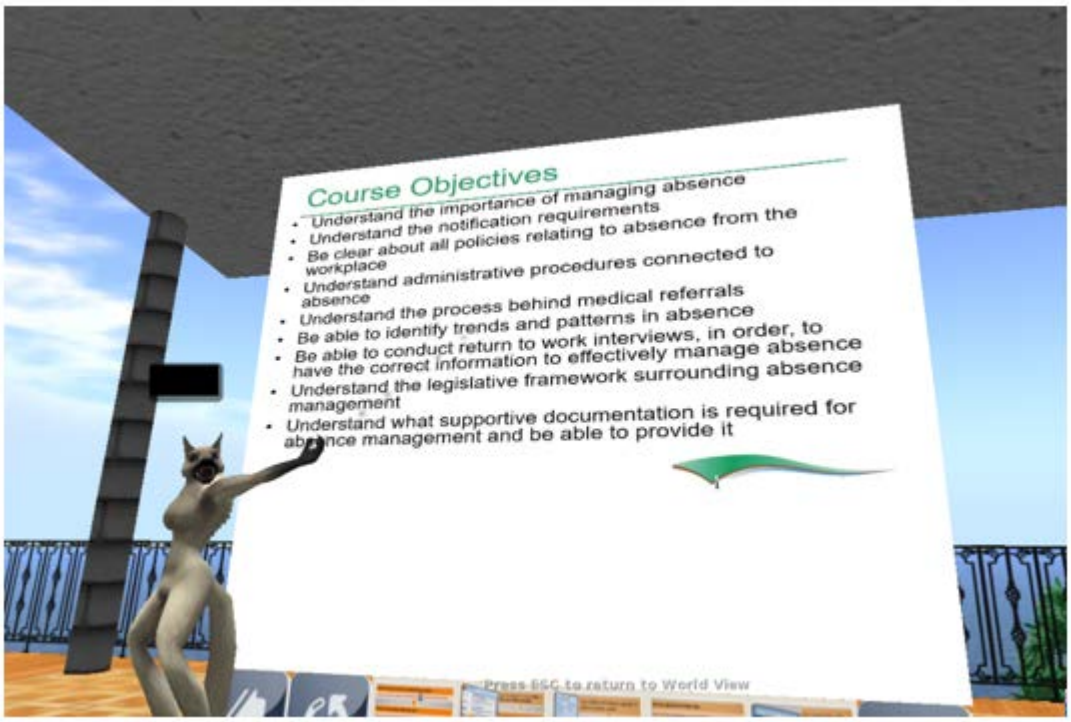



***Figure 6.12: The trainer discusses the course objectives for the absence management training, taking place within the virtual world***

When the participants did not already have knowledge of what needed to be done, the virtual world was useful for scenarios to be played out. Participants were seen roleplaying situations, developing theories and solutions together and testing out what might happen together. Figure 6.13 shows role plays taking place and overseen by an Assessor. One evident way in which the virtual world aids the real world, is that those same participants can come together outside the virtual world and build a community of knowledge.

A participant said:

> *"The virtual world allows relationships to develop amongst all the staff from management to apprentice and to work together to improve knowledge within the organisation and continuously improve. It is more than the sum of its part and is a very powerful platform for a highly effective and learning community to develop. For many, it's now become embedded in the culture to use the virtual world. It's become a way of doing things. It's like putting a different hat on, when you put on your avatar, to think things through from a different perspective, to find out how best to approach something in the real world."*
>
> **(Participant 01680)**

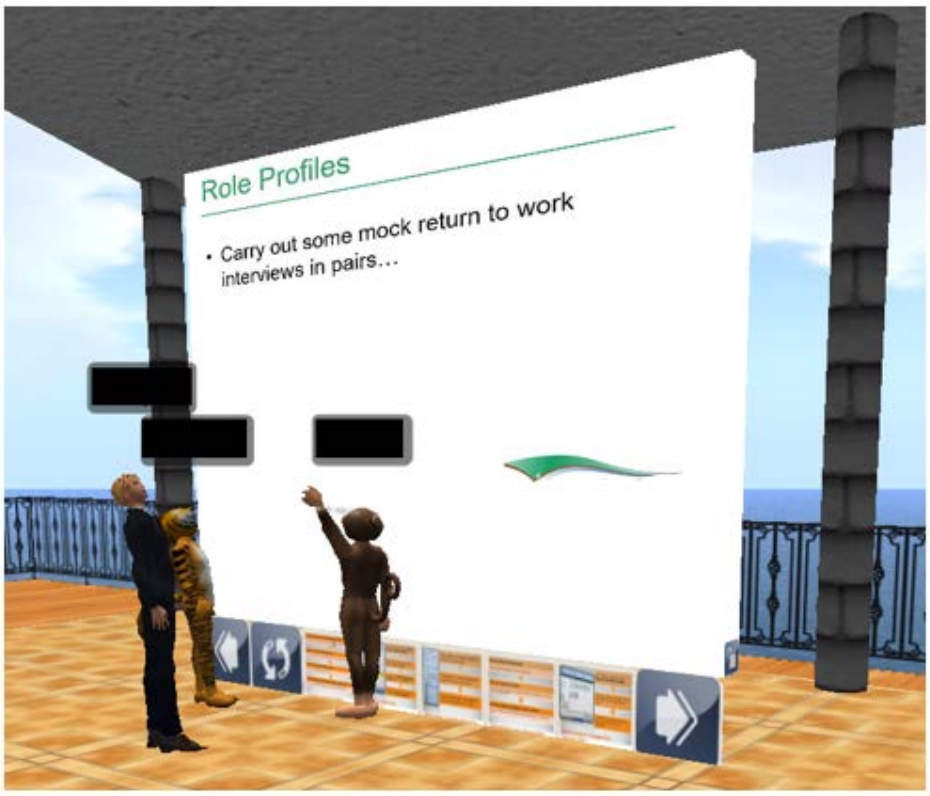



***Figure 6.13: Role plays of mock return to work interviews taking place in the virtual worlds overseen by an Assessor***

What often happens in education systems and in the work place is that autonomy is taken away or independence is only permitted in small doses within

constraints and rules. Instead of staff at Langdel being consumers of training, the use of the virtual world has broken them out of that mindset of being told everything. Staff are not saying to their managers "tell me what to do and how to do it" but instead entering the virtual world to work things out amongst themselves.

> "Staff are agents of their own professional development and how they learn is flexible, they define their own pathway. Sometimes it can look chaotic with everything going on and all the different avatars but learning is taking place and staff are having fun and managers too!"
>
> ***(Participant 12448)***

Langdel have equipped their staff with the tools to make them part of a learning organisation (Marsick and Watkins, 2002), citizens of virtual reality and they are creating their own world and building their own rule book. Staff are motivated to work because it is consultative. Staff are asked directed questions and discussions and there's a focus on how they want to develop their skills for the workplace, which is leading to transformative work-based learning.

87% of apprentices reported that working in the virtual world allowed them more access to assessment opportunities through both their host institution and within the workplace, through easier access to communicate with peers, instructors and more experienced staff. It reduced the barriers previously encountered from working off campus. 78% reported they felt less isolated as a result of using the virtual world and 84% of the apprentices reported that their communication and feedback was a lot more personalised and immediate, due to the sharing of support across the organisation, together with support from the tutor.

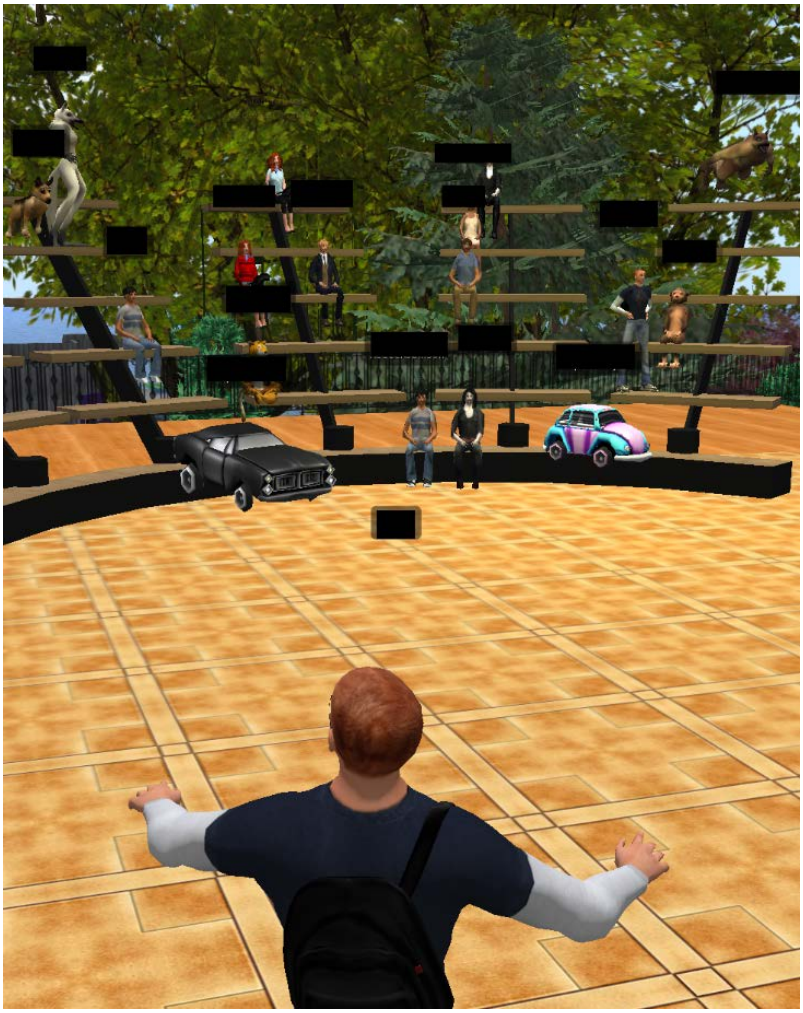


***Figure 6.14: An Assessor reviews progress with the apprentices at Langdel within the virtual world involving them in directed discussion and asking directed questions***

A participant said:

> *"Working with staff in the virtual world has been extremely rewarding and motivating. It has also enabled me to gain a better understanding of the challenges involved in implementing customer partnerships."*
>
> ***(Participant 11803)***

The virtual world has enabled engagement at all levels. Relationships have developed and there is support available when staff need it. Within the SME,

employees, apprentices and learning providers who all share the virtual space, work collaboratively together.

## *6.7 Challenges and Disadvantages*

As working in virtual reality was a new initiative for Langdel, the project required a considerable amount of championing both internally and externally. The HR manager acted as project manager and was responsible for establishing the network as a leading influence for apprentice-staff-employer partnerships. This was achieved through firstly inviting key partners to join in the virtual reality activity. This resulted in having a strategic group who could champion their experiences and the use of virtual reality through their networks and thus placing the use of the virtual world in a strong position to receive support and identify synergies for other work that would benefit from utilising virtual reality.

> *"We have effectively integrated the seamless use of technology using the virtual world to support informal learning and mirrored best practice so that we can promote the benefits of technology in support of successful staff development."*
>
> ***(Participant 02688)***

One of the weaknesses of the system highlighted by the staff was not being able to respond to non-verbal communication in the virtual world. This was seen as a critical downside when dealing with the sensitive nature of discussing absenteeism and approaching disciplinary with staff. Staff missed being able to see facial expressions and physical gestures, although staff did incorporate nuances of non-verbal communication, such as sitting down or standing up and using the controls to turn away or look directly at other avatars.

> *"There are many benefits of working in the virtual world, but I still miss seeing the whites of eyes."*
>
> ***(Participant 10219)***

There were concerns about the effects that working in the virtual world may have for staff and in particular with the apprentices. Also, an assumption that staff would want real life training but as the study progressed, their initial views and attitudes changed. Staff reported that they benefitted from learning within the virtual world:

> *"If we are making a positive impact in our organisation, it doesn't matter that it is a virtual world. The people behind the avatars are real and that's what matters".*
>
> ***(Participant 09261)***

> *"Real life is constrained. In the virtual world, we are not restricted and the virtual space plays a role in motivating and engaging staff in work".*
>
> ***(Participant 11803)***

An extract from one of the essays said:

> "When working in the virtual world, what people soon get their heads around is that they are interacting with real people. It's no different to the real world, except that we have been provided with a space and a safe opportunity to learn and try things out. Every avatar you see in the virtual world is a real human working in the organisation with the same feelings and emotions, likes and dislikes. I think using the virtual world has a huge professional development advantage and lifelong learning value for our staff. For all it is a virtual world, it is not a game in any shape or form. It's real, it's just that it uses a three-dimensional platform."
>
> ***(Participant 05662)***

## *6.8 Conclusion*

Conclusions show how virtual worlds are not about providing a replication of the classroom training for work-based learning but rather a new emphasis on the development of skills. The use of virtual reality can encourage employees to be passionate and excited about learning. Emotional interaction increases motivation and learning. The use of an avatar and working in the virtual world was fun for many of the participants and made working a sort of game which made some staff interact more emotionally within an environment in which they learned and where failure was desirable. Staff utilised the virtual world as a safety net, where they could try things out and didn't mind if it didn't work. It is better to fail within the virtual world than in the real world. Working together, managers and apprentices could discover what were the most effective ways to manage absenteeism and to discuss with individuals about sensitive disciplinary issues, in relation to high absenteeism.

Using the virtual world allowed staff a level of autonomy to develop their own preferences for learning and working through the training activities and they could adjust the way they worked to suit their preferences, for example, some individuals worked independently first of all to repeatedly practise processes before feeling confident to work with others, whereas others liked to watch others and then replicate what they saw and others worked in groups to work things out. The virtual world was useful in enabling staff to differentiate how they learned and they were able to utilise their strengths in learning styles and behaviours and do what suited them. This supports the findings from the literature review on heutagogy (Canning and Callen, 2010; Hase and Kenyon, 2007; Kenyon and Hase, 2010 and Mezirow, 1997) which is all about autonomy. The virtual world empowered some people and enabled participants to have choices about how to learn. This level of autonomy motivated staff to continue using the virtual space. The virtual world and activities taking place within the virtual reality can continue to be adapted and adjusted to improve the level of staff, as people's skills increase.

It is unclear what the full impact of all the use of working in the virtual world has on the future landscape for SMEs. This was one case study in one context and

may vary from organisation to organisation, however, it does raise the debate about using virtual reality in the workplace . Through the use of virtual reality, it has opened the opportunity for more openness as a driver for innovation, equity and access. The virtual world has provided a mechanism for staff to work together to develop their identity, strengthen their motivation and have access to professional development. This kind of learning in the workplace could have great advantages financially too, by developing a new way for staff to learn in the workplace, rather than attending off-site training.

The two studies carried out at Langdel have provided management with an opportunity to review how they work with their staff, with their apprentices and with third party learning providers to rethink their values and delivery of learning, which can only be a good thing. A new kind of way to work and learn has developed at Langdel providing work-based learning, which is centrally coordinated through the virtual world, which acts as a central learning hub for a wide variety of work-based learning opportunities.

The next chapter discusses study 3 which took place at Qiadel. It explores and analyses how virtual worlds build communities of practice and develop informal learning.

# Chapter 7: Communities of Practice and Informal Learning

## *7.1 Introduction*

Chapter 6 described how virtual worlds help in building identity, motivation and professional development. The study showed how staff took control of their own learning, developing digital skills to collaborate, communicate and problem solve. The virtual world was utilised for staff to choose the way in which they wanted to learn.

This chapter describes study 3 which took place at Qiadel, a life sciences and pharma company, based in Manchester in the UK. Qiadel also has sister sites in Germany and the United States of America. The importance of study 3 is to bring forward new research to inform policy and provision, to develop more skilled and engaged learning organisations (Eisenberg, 2010 and Senge, 2006). This is an important subject; firstly, because the research is about informal learning and improving the effectiveness and impact of learning in an organisation between apprentices, employers, employees and learning providers; which is a specific area that is under researched. Secondly, it connects with concerns about ensuring effective work-based learning within an apprenticeship and thirdly; the findings question assumptions about informal learning in the workplace and coordinated training.

The data collected and analysed in study 3 was used to answer **Research Question 3:** *In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning*? The social context of learning and communities of practice are revealed. The chapter discusses what employers can do to support informal learning and how it can be evaluated.

Section 7.2 discusses how the research was conducted with Qiadel and the composition of the research sample.

Section 7.3 describes the data collected, analysis, results and relevance. Key themes emerged around learning through informal, social interaction;

developing a community through shared common interests and goals and knowledge management through coaching and mentoring. The social context of learning and communities of practice are revealed. The chapter discusses what employers can do to support informal learning and how it can be evaluated. Vavoula (2004) describes unintentional informal learning where the learning goals are unspecified and intentional informal learning there the learners define their own learning goals. This chapter uses the data to explore whether the research participants had intentionally set out to learn or if learning was an unintentional outcome of participating in the virtual world.

Section 7.4 discusses the key learnings and findings from study 3. Qiadel recognised a number of benefits from working in the virtual world and replicated these in real world forms. As a result of working in the virtual world, a number of changes and improvements were made to working practices at Qiadel to embed the benefits in both virtual and real world working.

Section 7.5 presents the main challenges and disadvantages experienced by Qiadel when working in the virtual world.

Section 7.6 summarises the key findings demonstrating how using virtual reality has changed the way the organisation carries out certain tasks.

An overview of the Study 3 is provided in Table 7.1.

## Study 3: Qiadel - Sales Training and Meetings at Qiadel

### Description

Qiadel has grown relatively quickly across Germany, the United States of America (USA) and the United Kingdom (UK). The UK Manchester site was bought by Qiadel from another company and there's little consistency or sharing of best practice. Countries do not communicate together on a regular basis because there's no easy, readily available mechanism to do this.

The UK are currently seeking to be Food and Drug Administration (FDA) regulated, which is something the USA have been through, so there's a real business need to collaborate and learn from experience in the USA.

Working together across the countries and time zones has been met with difficulties and costs and Qiadel are keen to find workable solutions to work more closely together across the business.

### What it solves

Qiadel wants to use working in the virtual world to improve its culture across the world so that sites work as a community together and cross site learning and collaboration takes place. They want to break down the 'them and us' culture between the UK and the other established Qiadel sites around the world.

The virtual world is to be used as a place where people can socialise at break times and communicate with each other across time zones to build a culture of learning and sharing.

It solves the issue of people being unable to work together and learn from what others are doing in different locations.

Using the virtual world will make it easier for people to work together across different parts of the world without having to book a flight on an aeroplane.

### Who

- **10 Managers and Staff**
- **7 Apprentices**

### Benefits?

The Manchester team are keen to seek FDA approval to sell drugs in America and therefore, will be able to greatly benefit from collaborating with the US team to understand the requirements and lessons learned.

The virtual world is being used to learn from experienced sales staff in the US and Germany to help the newly taken over Qiadel site in Manchester to learn how to learn the features of products and sell the benefits.

### Issues?

Qiadel report staff have little opportunity to collaborate and talk informally about their work. When they do meet it is only for set meetings and rarely with others across the globe. The Manchester operation has recently been bought by Qiadel and there is little integration with the rest of Qiadel around the world. Due to geography, it is difficult for Manchester to feel part of the organisation and also to learn how other sites operate. Staff talk of a Manchester way and a Qiadel way because culture is very different.

### Scenario

**Who**

Managers and Staff.

**Problem**

Sites are all over the world but staff have little opportunity to collaborate and talk informally about their work – only in set meetings and never with others across the globe.

| |
|---|
| **Situation**<br>Qiadel have tried in the past with skype, but it kept crashing. It couldn't handle large numbers.<br>**Virtual World Activity**<br>Large collaborative training and networking can take place in the virtual world.<br>**Result**<br>Qiadel reported that working in virtual reality has led to deep discussion, chat and sharing of ideas. Best practice is shared and prevents inefficiencies and duplication of work, however, the detail of this cannot be evidenced as part of this study. |

***Table 7.1: Overview of Study 3***

## *7.2 Study 3 Conduct of Research*

### 7.2.1 Study 3 Research Participants

For Study 3, 10 staff members and 7 apprentices from Qiadel, took part in the research, with a spread of ages from 25 – 55 with a mean age of 33.5. All participants took part in twenty-one-hour sessions in Second Life ® totalling twenty hours, which consisted of daily meetings and training (see table 7.2 for demographic information about the participants, collected from questionnaire data). In addition, staff were encouraged to continue using Second Life ® outside of the research study activity, to suit their needs. This activity was captured by staff keeping a log and capturing their activity by storyboarding a day in the life of, which is discussed in more detail in section 7.4.

| What is your age? | | |
|---|---|---|
| Population | 17 | |
| Minimum | 25 | |
| Maximum | 55 | |
| Range | 30 | |
| Mode(s) | 26, 28, 30, 32 | |
| Mean | 33.5 | |
| Median | 30 | |
| Lower Quartile | 27.5 | |
| Upper Quartile | 37 | |
| Standard Deviation | 8.69 | |
| **What is your gender?** | | |
| Male | 10 | 58.8% |
| Female | 7 | 41.2% |
| **Total** | **17** | **100%** |
| **Is English your 1st Language** | | |
| Yes | 15 | 88.2% |
| No | 2 | 11.8% |
| **Total** | **17** | **100%** |
| **Do you have any disabilities?** | | |
| No | 15 | 88.2% |
| Yes | 2 | 11.8% |
| **Total** | **17** | **100%** |
| ***Summary of disabilities*** | | |
| Learning difficulty | 1 | 5.9% |
| Autistic Spectrum Disorder / Asperger Syndrome | 0 | 0.0% |
| Blind or partially sighted | 0 | 0.0% |
| Deaf or hard of hearing | 0 | 0.0% |
| Wheelchair user or mobility difficulties | 0 | 0.0% |
| Mental health difficulties | 1 | 5.9% |
| Other | 0 | 0.0% |

***Table 7.2: Questionnaire results from Study 3 showing information about the research participants.***

All the research participants in Study 3 used a computer and the internet every day. All the participants used the computer for research, communication and sharing ideas. 23.5% of the participants also used a computer for online training, meetings and collaborative work. No participants from Qiadel had ever used Second Life ® prior to Study 3 (See table 7.3 for questionnaire results from Study 3 showing information about the research participants' use of technology at work and experience of using Second Life ® for work-based learning).

### 7.2.2 Rationale for Study 3

The rationale of study 3 was to evaluate the effects of working in virtual worlds for work activity. In particular, it looked for evidence of the ways that virtual worlds might build communities of practice and trigger informal learning. The manager at Qiadel said that one of the biggest skills she wanted employees to develop was collaborative learning and the study was to explore if the virtual world could help develop these skills within the workplace. The Manchester site in the UK, has recently been bought by Qiadel from another organisation and the take-over has resulted in a 'them and us' culture. The Manchester site is seen as the poor man's relation to the head offices in Germany and the United States of America. The Human Resources manager at Qiadel discussed how she wanted to see work-based learning improved so that staff could do their job better, knowing where to go for information, being more creative in trying out new solutions and making a difference by working collaboratively within the Qiadel community across all sites around the world and not just siloed in the UK.

| How often do you use a computer? | | |
|---|---|---|
| Everyday | 17 | 100.0% |
| A few times a week | 0 | 0.0% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **17** | **100%** |

| Do you have access to a computer connected to the internet? | | |
|---|---|---|
| Yes | 17 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **17** | **100%** |

| How often do you use the internet? | | |
|---|---|---|
| Everyday | 17 | 100.0% |
| A few times a week | 0 | 0.0% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **17** | **100%** |

| Do you have access to mobile devices with internet access? | | |
|---|---|---|
| Yes | 17 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **17** | **100%** |

| In what ways do you use computers for learning? | | |
|---|---|---|
| Research | 17 | 100.0% |
| Collaborative work | 4 | 23.5% |
| Meetings | 4 | 23.5% |
| Online training | 4 | 23.5% |
| Communication | 17 | 100.0% |
| Networking | 0 | 0.0% |
| Sharing ideas | 17 | 100.0% |
| Other | 0 | 0.0% |

| How do you normally take part in Training? | | |
|---|---|---|
| Distance Learning | 6 | 35.3% |
| Face to Face Training | 17 | 100.0% |
| Placement | 6 | 35.3% |
| Workplace - On the Job | 17 | 100.0% |
| Self Study | 3 | 17.6% |
| Social Networking / Virtual Worlds | 0 | 0.0% |
| Other | 0 | 0.0% |

| Have you used second life before? | | |
|---|---|---|
| Yes | 0 | 0.0% |
| No | 17 | 100.0% |
| **Total** | **17** | **100%** |

***Table 7.3: Questionnaire results from Study 3 showing information about the research participants' use of technology at work and experience of using Second Life ® for work-based learning.***

## *7.3 Data Collection and Results*

In this section, I present findings from study 3, which analyses the results from the card story boards, questionnaire results, focus group discussion and dialogue during the training. All participants are referred to by their code name. The same methods as used in the pilot study were repeated for all three studies (see section 4.2.3) and the card story-boards (see section 5.3.1). A copy of the questionnaire is shown in Appendix E. The data collected has been coded using the Veldhuis-Diermanse Schema for Learning Processes Coding (Veldhuis-Diermanse, 2002) – see Appendix J, as used in the pilot study.

In addition to the training and daily meetings which captured 20 hours of use in the virtual world, Qiadel staff were using the virtual world over a longer period of time and in a variety of different ways and therefore, it was felt that a diary log would be an appropriate data collection method for this set of research participants to produce 'a day in the life of..'. Staff captured their daily experiences through a diary log, which provided a rich data set about how virtual worlds were being used and how staff felt about virtual activities close to the time that they happened. This data method suited the staff at Qiadel because it was quick and easy to log their time with a few supporting notes, if appropriate. One staff member storyboarded how changes have been made in the real world to implement benefits from working in the virtual world.

### 7.3.1 Study 3 Virtual World Card Story-Boards

The results from the storyboard activity are shown in tables 7.4 – 7.7.

| | QA - PROFESSIONAL DEVELOPMENT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Communication Skills | Lifelong Learning | Wider understanding of cross sectors and industry | Technical Knowledge | Practical Knowledge | Experience in Subject Specialism | Team Work | Confidence and Proficiency | Professional Skills and Development | Leadership Skills | Collaborative Working | Problem Solving and Critical Thinking |
| Group 1 | 12 | 1 | 4 | 2 | 9 | 5 | 6 | 11 | 8 | 3 | 10 | 7 |
| Group 2 | 12 | 1 | 4 | 10 | 7 | 8 | 5 | 9 | 11 | 2 | 6 | 3 |
| Group 3 | 6 | 1 | 3 | 5 | 7 | 2 | 8 | 12 | 11 | 4 | 9 | 10 |
| Group 4 | 7 | 1 | 5 | 2 | 6 | 12 | 11 | 4 | 8 | 3 | 9 | 10 |
| **Totals** | **37** | **4** | **16** | **19** | **29** | **27** | **30** | **36** | **38** | **12** | **34** | **30** |
| **312** | 11.9% | 1.3% | 5.1% | 6.1% | 9.3% | 8.7% | 9.6% | 11.5% | 12.2% | 3.8% | 10.9% | 9.6% |

***Table 7.4: How the Research Participants from Qiadel ranked each answer for professional development in the Story Board Activity.***

The research participants were asked to rank in order their experiences of professional development in the virtual world (see Figure. 7.1) and which personal skills and attributes they gained from working in the virtual world. Communication skills; gaining confidence and proficiency and Professional skills and development ranked the most important at 12.2%, followed by communication skills (11.9%) and Confidence and Proficiency (11.5%). Problem solving and team work both gained 9.6% of the results.

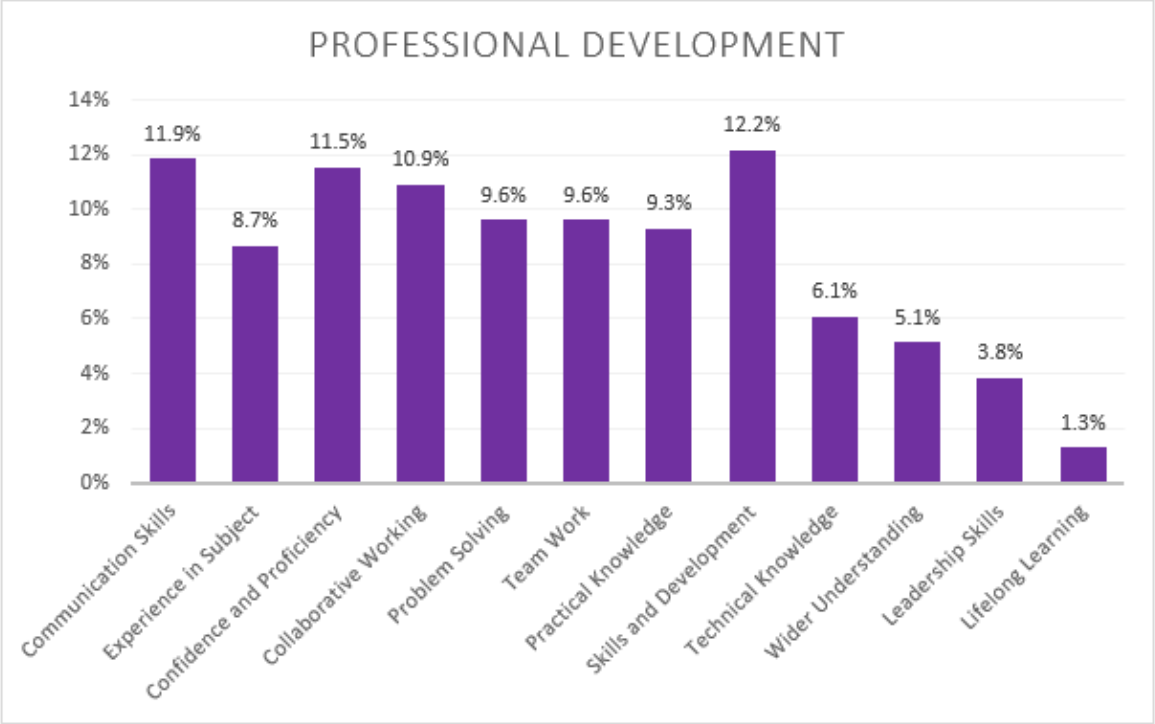



***Figure 7.1: Card Story-Board Results for Professional Development for Qiagen***

A key success factor that was reported by the research participants in study 3 was the active participation in the virtual world by the research participants. Lack of participation can lead to communities failing (Beenen et al, 2004).

Staff frequently reported that if they found using the virtual world useful and got something out of using it, then they would continue to use it. If they found it wasn't beneficial or a useful way to spend their time, then they would stop participating. The research participants did gain a lot from working in the virtual world and this contributed to the success. One participant said:

> *"I wanted to use the virtual world to improved my skills virtually first and work with my colleague (one who is good at the skills I want to develop) in the virtual world to trial out some procedures and roleplays. I particularly want to build my interpersonal skills by chatting in the virtual world and my colleague is helping me along – as are others as I encounter them in Second Life ®."*
>
> ***(Participant 04548)***

| QB - ANALOGUE FOR THE REAL WORLD | | | | | | |
|---|---|---|---|---|---|---|
| | It was easier to learn under the guise of an avatar than in the real world. | Learning through informal, social interaction | Develop skills quicker, working in the virtual world | Less distracting and more effective than the real world | Working with people you would not otherwise have been able to do | Access to work experiences and projects that you would not otherwise have been involved in |
| Group 1 | 5 | 1 | 6 | 3 | 2 | 4 |
| Group 2 | 5 | 3 | 6 | 4 | 1 | 2 |
| Group 3 | 6 | 2 | 5 | 4 | 1 | 3 |
| Group 4 | 6 | 2 | 4 | 5 | 1 | 3 |
| **Totals** | **22** | **8** | **21** | **16** | **5** | **12** |
| **84** | 26.2% | 9.5% | 25.0% | 19.0% | 6.0% | 14.3% |

***Table 7.5: How the Research Participants from Qiadel ranked each answer on analogue for the real world in the Story Board Activity.***

When participants were asked to rate whether they found working in the virtual world a useful analogue or replacement for the real world (see Figure 7.2); 26.2% of the results recognised it was easier to learn under the guise of an avatar. 25% of the results rated developing skills quicker in the virtual world as a close second in rank because of the ability to repeat and practise tasks. A participant said:

> *"I find the virtual world the same thing as the real world. It's about my progression. By progressing my avatar in new skills, I'm improving my skills, trying out different ways of doing things, comparing with others, watching how others do things differently and learning how to improve."*
>
> **(Participant 01707)**

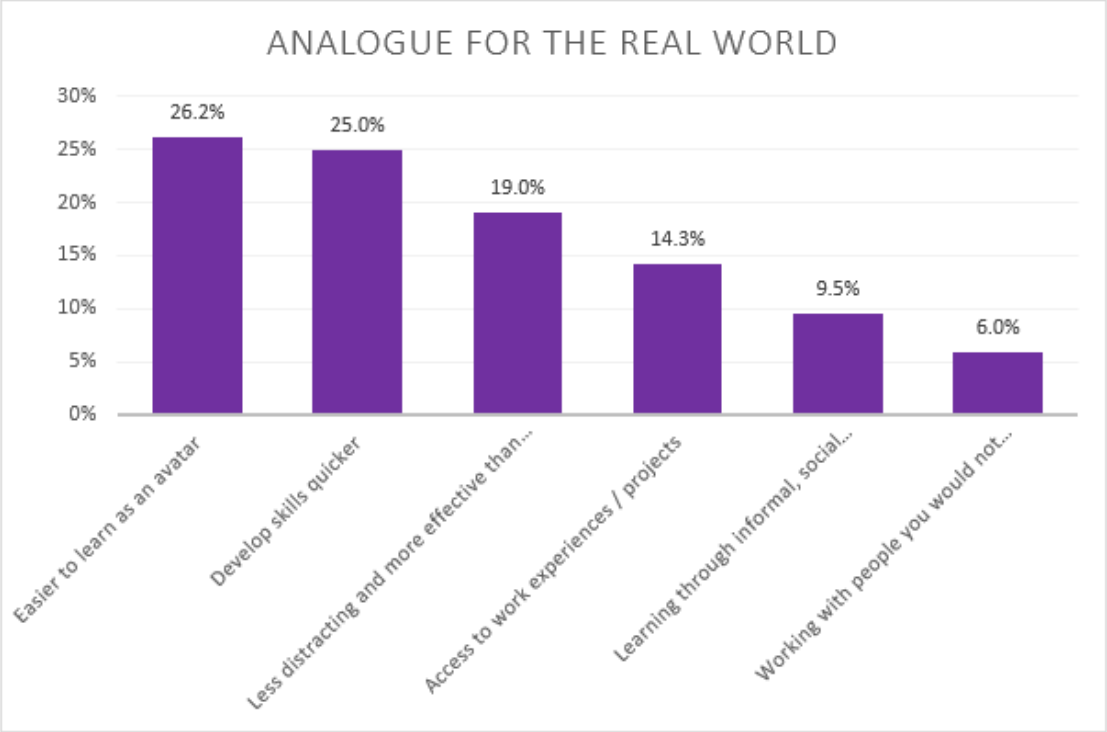



***Figure 7.2: Card Story-Board Results for an analogue of the real world for Qiagen***

| QC - IDENTITY AND AGENCY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Builds my self-confidence | Develops my abilities and achieve in my work | Builds my self-esteem | Helps motivate me in my work | Helps me work with people more effectively | Helps me monitor my progress | Develops a sense of how I learn best in the workplace | Gives me direction in my work |
| Group 1 | 6 | 7 | 4 | 3 | 5 | 8 | 2 | 1 |
| Group 2 | 8 | 6 | 1 | 4 | 2 | 7 | 5 | 3 |
| Group 3 | 8 | 5 | 7 | 6 | 1 | 4 | 2 | 3 |
| Group 4 | 8 | 7 | 6 | 4 | 1 | 5 | 2 | 3 |
| **Totals** | **30** | **25** | **18** | **17** | **9** | **24** | **11** | **10** |
| **144** | 20.8% | 17.4% | 12.5% | 11.8% | 6.3% | 16.7% | 7.6% | 6.9% |

***Table 7.6: How the Research Participants from Qiadel ranked each answer identity and agency in the Story Board Activity.***

Qiagen staff were asked to rate which affective factors they developed whilst working in the virtual world. Affective factors include belief systems, emotions and attitudes. They rated top the way in which working in the virtual world helped build their self-confidence, with 20.8% of the results. They rated second with 17.4% of the results, being able to develop their abilities and the third most rated benefit was monitoring progress (16.7%). Building self-esteem also rated highly (12.5% of the results) and helping improve motivation (11.8%).

One participant said:

> *"I enjoy the sense of achievement of building up my confidence, picking myself up when I don't do things right, developing my skills and completing the training activities in the virtual world. Trying to work out what my avatar should do next and how I should react to different scenarios is what motivates me."*
>
> **(Participant 09645)**

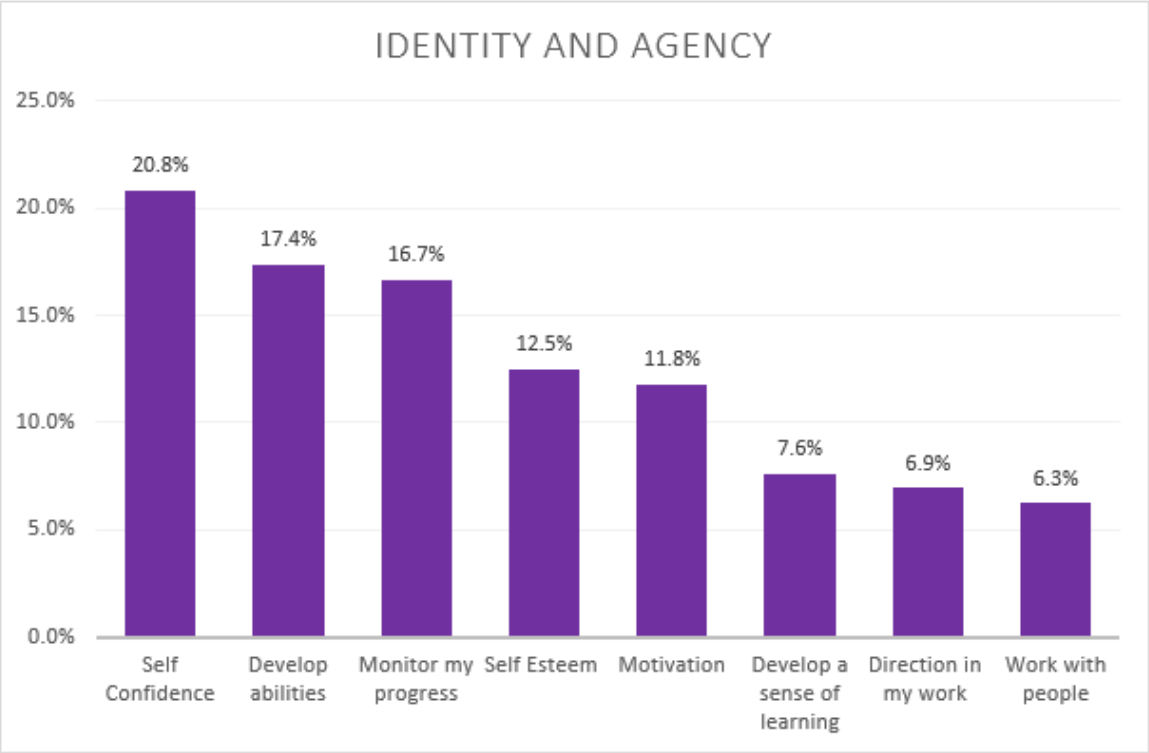



***Figure 7.3: Card Story-Board Results for identify and agency, for Qiagen***

> "I have built confidence I wouldn't have had if it wasn't for working in the virtual world first before transferring what I've learned into real life work."
>
> ***(Participant 06219)***

| QD - COMMUNITY OF PRACTICE AND INFORMAL LEARNING | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Learning through roleplay | Learning through collaboration | Learning by imitating best practice | Learning through coaching and mentoring | Learning through social interaction | Learning through conversation | Learning through practising |
| Group 1 | 7 | 4 | 3 | 1 | 2 | 6 | 5 |
| Group 2 | 6 | 2 | 5 | 4 | 1 | 3 | 7 |
| Group 3 | 6 | 1 | 3 | 4 | 5 | 2 | 7 |
| Group 4 | 6 | 5 | 4 | 1 | 3 | 2 | 7 |
| **Totals** | **25** | **12** | **15** | **10** | **11** | **13** | **26** |
| **112** | 22.3% | 10.7% | 13.4% | 8.9% | 9.8% | 11.6% | 23.2% |

***Table 7.7: How the Research Participants from Qiadel ranked each answer for community of practice and informal learning in the Story Board Activity***

Participants were asked the ways in which they learn in the virtual world. 22% of the results ranked the ability to practise the highest (23.2%). Roleplay was the second ranked benefit at 22.3%. Learning by imitating best practice was the third most important use of working in Second Life ® ranked by the research participants (13.4%). Learning through conversation accounted for 11.6% of the results.

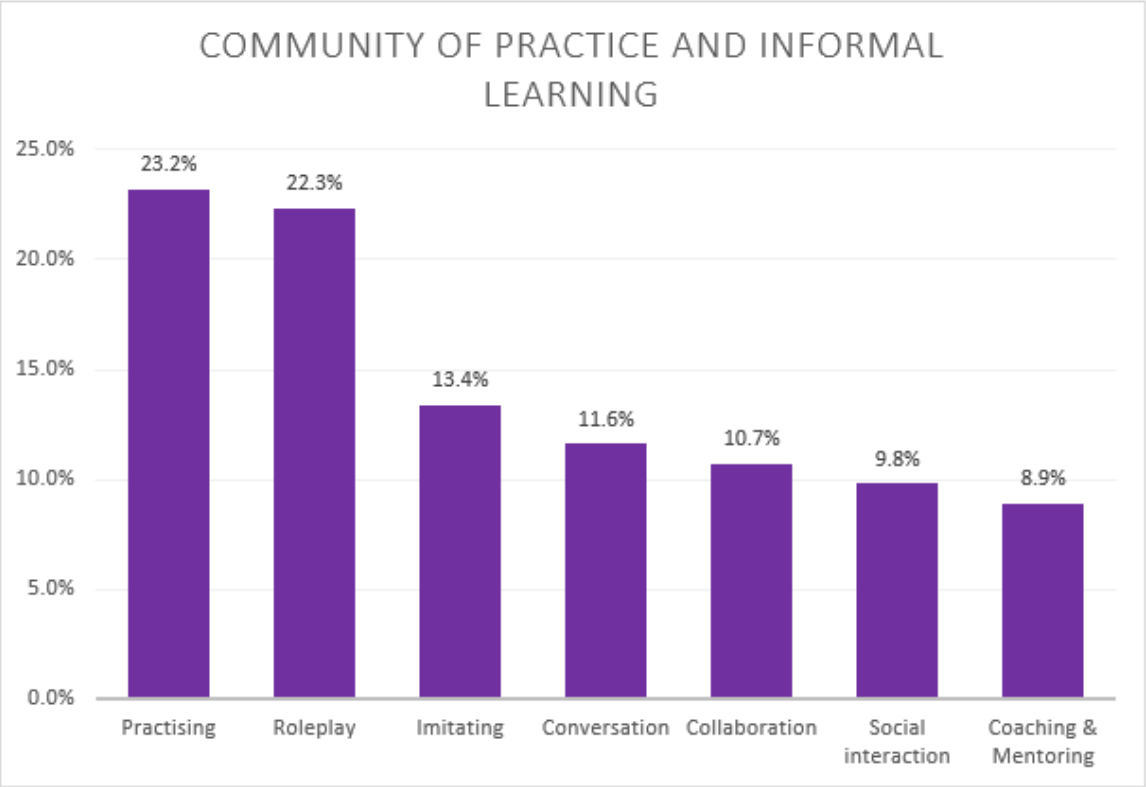



***Figure 7.4: Card Story-Board Results for a community of practice and informal learning, for Qiadel***

### 7.3.2 Evolution of Virtual World Activity in Study 3

In this section, I present a comparison between activity that takes place within the virtual world at the start of the study and one at the end of the study. Table 7.8 shows the number of utterances coded for each category, for all participants for a 60-minute activity within the virtual world at Qiadel, taking place at the start of Study 3.

| Research Participant | Codes (See Appendix H) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Affective Learning | | | Metacognitive Learning Activities | | | | | | | | Rest Activities | |
| | *Affective Learning Activities* | | | *Planning* | | | *Keeping clarity* | | | *Monitoring* | | | |
| | ***AM*** | ***AA*** | ***AC*** | ***MPA*** | ***MAA*** | ***MEA*** | ***MSD*** | ***MAC*** | ***MGE*** | ***MKW*** | ***MRP*** | ***RNE*** | ***TOTALS*** |
| 06727 | 4 | 7 | 1 | 23 | 0 | 28 | 0 | 16 | 3 | 11 | 8 | 0 | 214 |
| 11261 | 3 | 5 | 2 | 45 | 1 | 49 | 0 | 11 | 7 | 5 | 5 | 0 | 260 |
| 04548 | 5 | 9 | 1 | 25 | 0 | 36 | 0 | 9 | 11 | 7 | 4 | 0 | 234 |
| 09415 | 8 | 6 | 1 | 14 | 0 | 21 | 0 | 15 | 5 | 4 | 7 | 0 | 191 |
| 01707 | 7 | 9 | 1 | 19 | 0 | 27 | 0 | 12 | 4 | 1 | 6 | 0 | 204 |
| 12145 | 4 | 5 | 2 | 22 | 2 | 43 | 0 | 11 | 5 | 6 | 8 | 0 | 218 |
| 05576 | 11 | 6 | 3 | 20 | 1 | 33 | 0 | 10 | 7 | 2 | 1 | 0 | 226 |
| 03700 | 5 | 2 | 2 | 21 | 0 | 49 | 0 | 7 | 11 | 9 | 4 | 0 | 218 |
| 04289 | 11 | 5 | 1 | 41 | 2 | 31 | 0 | 19 | 9 | 1 | 2 | 0 | 236 |
| 10217 | 8 | 9 | 2 | 25 | 1 | 22 | 0 | 6 | 6 | 7 | 1 | 0 | 207 |
| 08549 | 6 | 8 | 2 | 28 | 0 | 32 | 0 | 19 | 13 | 5 | 1 | 0 | 220 |
| 02685 | 10 | 5 | 3 | 19 | 0 | 15 | 0 | 9 | 13 | 3 | 1 | 0 | 188 |
| 06219 | 7 | 7 | 1 | 11 | 0 | 36 | 0 | 13 | 7 | 4 | 3 | 0 | 169 |
| 08505 | 8 | 6 | 2 | 41 | 3 | 21 | 0 | 24 | 19 | 5 | 1 | 0 | 230 |
| 09665 | 2 | 6 | 5 | 36 | 0 | 62 | 0 | 6 | 10 | 8 | 4 | 0 | 247 |
| 07261 | 10 | 11 | 3 | 52 | 1 | 52 | 0 | 11 | 6 | 11 | 5 | 0 | 257 |
| 09645 | 3 | 8 | 4 | 17 | 0 | 68 | 0 | 21 | 9 | 10 | 7 | 0 | 255 |
| **Totals** | **112** | **114** | **36** | **459** | **11** | **625** | **0** | **219** | **145** | **99** | **68** | **0** | **3774** |
| | 3.0% | 3.0% | 1.0% | 12.2% | 0.3% | 16.6% | 0.0% | 5.8% | 3.8% | 2.6% | 1.8% | 0.0% | |
| | 6.9% | | | 29.0% | | | 9.6% | | | 4.4% | | | |
| | 6.9% | | | 43.1% | | | | | | | | | |

| Research Participant | Codes (See Appendix H) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cognitive Learning Activities | | | | | | | | | | |
| | *Debating* | | | | | *Using external information and experiences* | | | | *Linking or repeating internal information* | |
| | ***CDPF*** | ***CDPNF*** | ***CDAF*** | ***CDANF*** | ***CDAQ*** | ***CCEI*** | ***CREI*** | ***CSEI*** | ***CREE*** | ***CIL*** | ***CIR*** |
| 06727 | 6 | 14 | 3 | 1 | 9 | 12 | 9 | 7 | 8 | 41 | 3 |
| 11261 | 11 | 13 | 0 | 2 | 13 | 5 | 9 | 2 | 11 | 56 | 5 |
| 04548 | 11 | 11 | 1 | 1 | 7 | 8 | 5 | 8 | 11 | 62 | 2 |
| 09415 | 11 | 22 | 3 | 1 | 8 | 7 | 11 | 7 | 6 | 33 | 1 |
| 01707 | 6 | 32 | 2 | 0 | 17 | 7 | 9 | 5 | 1 | 37 | 2 |
| 12145 | 5 | 15 | 5 | 0 | 12 | 9 | 8 | 7 | 2 | 46 | 1 |
| 05576 | 9 | 21 | 6 | 3 | 11 | 11 | 4 | 5 | 10 | 51 | 1 |
| 03700 | 4 | 8 | 8 | 1 | 19 | 12 | 5 | 6 | 9 | 35 | 1 |
| 04289 | 9 | 11 | 9 | 1 | 8 | 8 | 10 | 9 | 8 | 38 | 3 |
| 10217 | 7 | 10 | 11 | 1 | 21 | 6 | 2 | 2 | 9 | 46 | 5 |
| 08549 | 11 | 8 | 7 | 4 | 7 | 8 | 8 | 7 | 7 | 36 | 3 |
| 02685 | 11 | 18 | 14 | 3 | 11 | 6 | 7 | 2 | 4 | 32 | 2 |
| 06219 | 8 | 10 | 9 | 2 | 6 | 2 | 1 | 1 | 9 | 31 | 1 |
| 08505 | 12 | 14 | 11 | 1 | 3 | 9 | 5 | 4 | 4 | 36 | 1 |
| 09665 | 3 | 11 | 11 | 0 | 8 | 8 | 9 | 3 | 5 | 48 | 2 |
| 07261 | 9 | 13 | 3 | 0 | 9 | 7 | 5 | 4 | 2 | 41 | 2 |
| 09645 | 11 | 15 | 13 | 0 | 5 | 9 | 8 | 7 | 8 | 30 | 2 |
| **Totals** | **144** | **246** | **116** | **21** | **174** | **134** | **115** | **86** | **114** | **699** | **37** |
| | 3.8% | 6.5% | 3.1% | 0.6% | 4.6% | 3.6% | 3.0% | 2.3% | 3.0% | 18.5% | 1.0% |
| | 18.6% | | | | | 11.9% | | | | 19.5% | |
| | 50.0% | | | | | | | | | | |

***Table 7.8: Coded Utterance Values for 60 minutes Virtual World Activity at Qiadel at the start of Study 3.***

Figure 7.5 is a graphical representation of the coded utterance values from table 7.8, for the 60-minute virtual world activity at Qiadel.

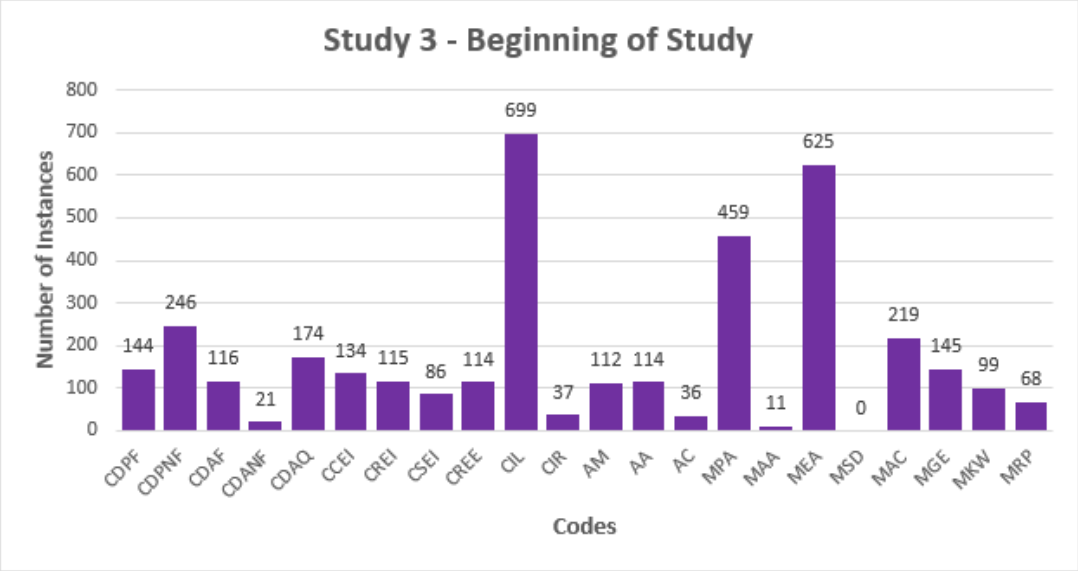



***Figure 7.5: Coded utterance totals for all participants in a 60-minute activity in the virtual world at Qiadel at the start of Study 3.***

Figure 7.6 is a graphical representation of the coded utterance values from table 7.8, as a percentage of the total number of utterances, for 60-minutes virtual world activity, at the start of the study.

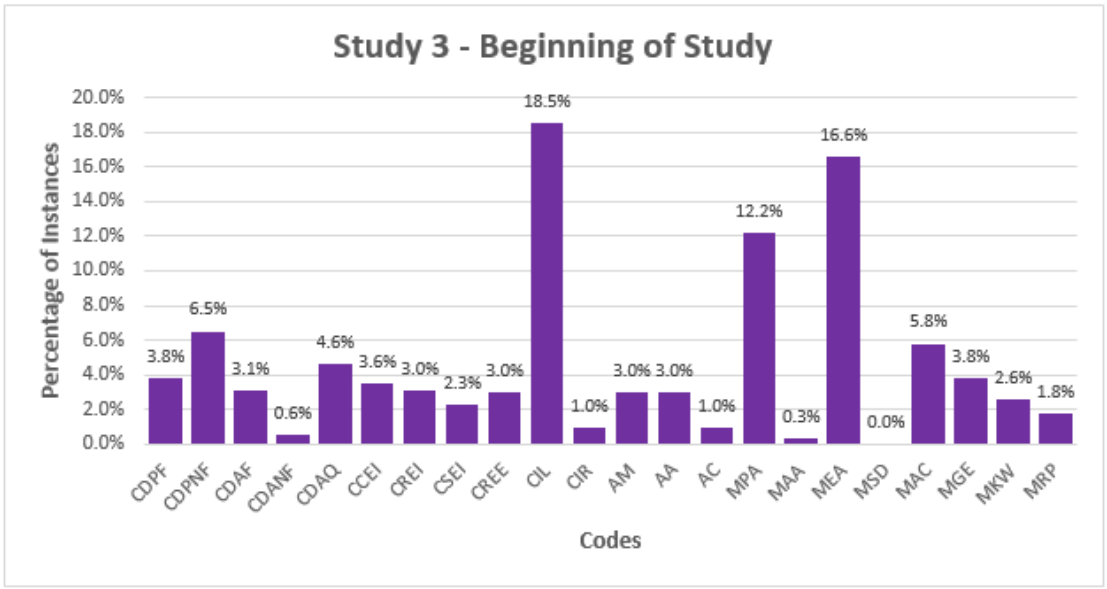



***Figure 7.6: Coded utterance percentages for all participants in a 60-minute activity in the virtual world at Qiadel at the start of Study 3.***

Figure 7.7 shows a pie chart summarising the split of utterances across cognitive, meta-cognitive and affective learning for the 60-minute activity take place within the virtual world, utilising Veldhuis-Diermanse Schema for Learning Process Coding (2002), as shown in Appendix J. Figure 7.8 shows the same data again from Figure 7.7, broken down by activity utterance code within the categories of cognitive, meta-cognitive and affective.

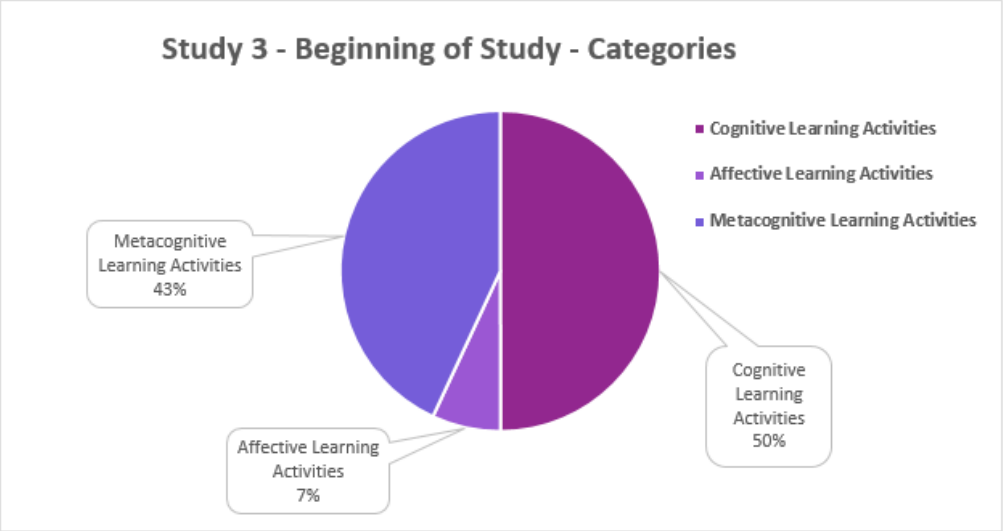



***Figure 7.7: A pie chart showing cognitive, meta-cognitive and affective learning taking place in the virtual world at the start of Study 3.***

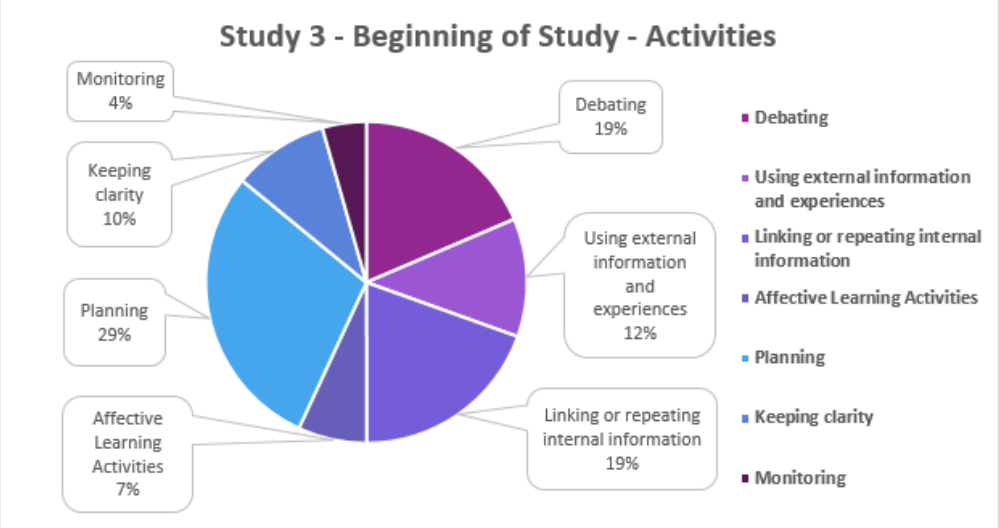



***Figure 7.8: A pie chart showing the breakdown of activities coded within the categories of cognitive, meta-cognitive and affective learning taking place in the virtual world at the start of Study 3.***

The nature of the work during this session focused on sales training being carried out for new products. The aim was for staff to learn the features of the new product range and be able to sell the benefits to customers. Staff carried out roleplays adopting sales advisor and customer to practice ways of communicating the product features and benefits. Apprentices paired up with more experienced staff members.

Cognitive activities accounted for 50% of all the utterances coded (see Figure 7.7). Meta-cognitive activities accounted for 43% of coded utterances and affective learning activities totalled 7%.

Cognitive activities were made up of 19% coded debating activities, which reflected how participants were using the system to get the most out of the training and debate issues around the training content. Of this 19%, 6.5% of utterances were problems being presented not followed by argumentation / illustration (see Figure 7.6). 4.6% of the cognitive learning activities were questions. 3.8% of the utterances coding for cognitive learning activities were problems, solutions and ideas being presented and followed by an illustration/argument. 3.1% were participants not agreeing and following this up with a backing. 19% linking or repeating internal information. 18.5% of the utterances were coded CIL – linking facts and ideas and referring explicitly to a contribution in the discourse. 12% using external information and experiences.

The virtual world was used to deliver more effective engagement activities by enabling staff to roleplay and discuss various scenarios and how best to meet the needs of the customer.

By pairing up more experienced staff with the apprentices, there is evidence that it engaged less experienced participants in active dialogue about their sales training.

> *"I found the training really engaging because it was different and fun, but also challenging. I think having another character helps me to have a bit more grit and determination to keep going. I think if I had had to do the same training in real life, I would have taken it*

*harder and felt more like giving up, but having a dog show you what to do, softens the blow when you do things wrong, especially as I'm a hard rocker in the virtual world!"*

***(Participant 09415)***

*"It is good to have space to spread out, explore ideas and practice processes. I like the way we are all in the same group, with the same role, talking the same language and able to have a safe place to practice without risk of losing a customer."*

***(Participant 07261)***

*"I like the way we are all working on issues can call upon experienced staff for help to learn from and watch demonstrations of how they effectively close a sale. What we do, say and learn reverberates once you leave your avatar behind and go back to real life."*

***(Participant 03700)***

Meta-cognitive activities were made up of 29% planning activities, 10% keeping clarity and 4% monitoring. Prominent results were 16.6% coded MEA – explaining or summarising approaches already adopted and 12.2% of utterances were coded MPA – presenting an approach to carry out the task.

*"I like the way there's an immediacy to everything you do, because everybody is in the space focused on the same thing. It was good to be able to watch others and keep track about your own progress. We did develop and grow as a group. It was different than training room training. I found it more intense, but in a good way because everyone was more focused and there was less distraction."*

***(Participant 02685)***

Table 7.9 shows the number of utterances coded for each category, for all participants for a 60-minute activity within the virtual world at Qiadel, taking place at the end of Study 3.

| Research Participant | Codes (See Appendix H) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Affective Learning Activities | | | Metacognitive Learning Activities | | | | | | | | Rest Activities | |
| | *Affective Learning Activities* | | | *Planning* | | | *Keeping clarity* | | | *Monitoring* | | | |
| | ***AM*** | ***AA*** | ***AC*** | ***MPA*** | ***MAA*** | ***MEA*** | ***MSD*** | ***MAC*** | ***MGE*** | ***MKW*** | ***MRP*** | ***RNE*** | ***TOTALS*** |
| 06727 | 32 | 27 | 42 | 10 | 13 | 14 | 0 | 28 | 22 | 38 | 27 | 0 | 303 |
| 11261 | 31 | 38 | 22 | 16 | 13 | 26 | 0 | 11 | 25 | 14 | 25 | 0 | 262 |
| 04548 | 28 | 31 | 35 | 15 | 20 | 18 | 0 | 9 | 28 | 52 | 24 | 0 | 317 |
| 09415 | 33 | 36 | 45 | 12 | 16 | 10 | 0 | 15 | 21 | 22 | 21 | 0 | 281 |
| 01707 | 24 | 27 | 39 | 14 | 15 | 19 | 0 | 12 | 22 | 10 | 33 | 0 | 257 |
| 12145 | 17 | 35 | 23 | 13 | 13 | 21 | 0 | 11 | 32 | 14 | 21 | 0 | 248 |
| 05576 | 34 | 28 | 42 | 19 | 16 | 15 | 0 | 10 | 52 | 20 | 31 | 0 | 315 |
| 03700 | 31 | 35 | 26 | 10 | 17 | 25 | 0 | 7 | 65 | 18 | 23 | 0 | 316 |
| 04289 | 28 | 39 | 28 | 15 | 18 | 16 | 0 | 19 | 36 | 10 | 34 | 0 | 299 |
| 10217 | 41 | 28 | 42 | 12 | 19 | 11 | 0 | 6 | 24 | 34 | 21 | 0 | 292 |
| 08549 | 38 | 28 | 51 | 13 | 10 | 18 | 0 | 19 | 58 | 32 | 25 | 0 | 345 |
| 02685 | 28 | 22 | 38 | 18 | 11 | 16 | 0 | 9 | 67 | 30 | 23 | 0 | 326 |
| 06219 | 39 | 38 | 53 | 20 | 16 | 18 | 0 | 13 | 43 | 22 | 27 | 0 | 340 |
| 08505 | 27 | 22 | 32 | 11 | 13 | 10 | 0 | 24 | 28 | 50 | 31 | 0 | 311 |
| 09665 | 35 | 38 | 27 | 19 | 15 | 31 | 0 | 6 | 31 | 26 | 34 | 0 | 334 |
| 07261 | 14 | 22 | 44 | 13 | 19 | 26 | 0 | 11 | 42 | 58 | 25 | 0 | 341 |
| 09645 | 26 | 32 | 26 | 12 | 14 | 34 | 0 | 21 | 36 | 28 | 39 | 0 | 321 |
| **Totals** | **506** | **526** | **615** | **242** | **258** | **328** | **0** | **231** | **632** | **478** | **464** | **0** | **5208** |
| | 9.7% | 10.1% | 11.8% | 4.6% | 5.0% | 6.3% | 0.0% | 4.4% | 12.1% | 9.2% | 8.9% | 0.0% | |
| | 31.6% | | | 15.9% | | | 16.6% | | | 18.1% | | | |
| | 31.6% | | | 50.6% | | | | | | | | | |

| Research Participant | Codes (See Appendix H) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cognitive Learning Activities | | | | | | | | | | |
| | *Debating* | | | | | *Using external information and experiences* | | | | *Linking or repeating internal information* | |
| | ***CDPF*** | ***CDPNF*** | ***CDAF*** | ***CDANF*** | ***CDAQ*** | ***CCEI*** | ***CREI*** | ***CSEI*** | ***CREE*** | ***CIL*** | ***CIR*** |
| 06727 | 9 | 5 | 5 | 1 | 2 | 9 | 2 | 2 | 11 | 3 | 1 |
| 11261 | 3 | 6 | 2 | 2 | 1 | 8 | 1 | 5 | 10 | 2 | 1 |
| 04548 | 2 | 2 | 3 | 1 | 3 | 11 | 3 | 8 | 10 | 12 | 2 |
| 09415 | 1 | 4 | 4 | 1 | 4 | 8 | 5 | 6 | 8 | 8 | 1 |
| 01707 | 3 | 7 | 2 | 2 | 2 | 8 | 2 | 4 | 4 | 6 | 2 |
| 12145 | 2 | 2 | 2 | 2 | 1 | 9 | 5 | 1 | 12 | 11 | 1 |
| 05576 | 7 | 5 | 3 | 2 | 2 | 10 | 3 | 6 | 8 | 1 | 1 |
| 03700 | 8 | 3 | 4 | 1 | 8 | 7 | 3 | 8 | 11 | 4 | 2 |
| 04289 | 2 | 7 | 5 | 1 | 4 | 10 | 5 | 7 | 10 | 4 | 1 |
| 10217 | 8 | 3 | 2 | 1 | 3 | 12 | 7 | 4 | 7 | 5 | 2 |
| 08549 | 6 | 2 | 2 | 2 | 2 | 8 | 4 | 5 | 10 | 9 | 3 |
| 02685 | 5 | 9 | 5 | 1 | 2 | 11 | 3 | 8 | 4 | 10 | 6 |
| 06219 | 2 | 1 | 2 | 1 | 8 | 4 | 5 | 3 | 9 | 11 | 5 |
| 08505 | 7 | 5 | 2 | 1 | 5 | 8 | 8 | 6 | 8 | 8 | 5 |
| 09665 | 9 | 2 | 3 | 1 | 7 | 11 | 11 | 9 | 11 | 6 | 2 |
| 07261 | 5 | 6 | 3 | 2 | 4 | 10 | 4 | 11 | 8 | 11 | 3 |
| 09645 | 3 | 4 | 2 | 1 | 1 | 11 | 8 | 8 | 9 | 5 | 1 |
| **Totals** | **82** | **73** | **51** | **23** | **59** | **155** | **79** | **101** | **150** | **116** | **39** |
| | 1.6% | 1.4% | 1.0% | 0.4% | 1.1% | 3.0% | 1.5% | 1.9% | 2.9% | 2.2% | 0.7% |
| | 5.5% | | | | | 9.3% | | | | 3.0% | |
| | 17.8% | | | | | | | | | | |

***Table 7.9: Coded Utterance Values for 60 minutes Virtual World Activity at Qiadel taking place at the end of Study 3.***

Figure 7.9 is a graphical representation of the coded utterance values from table 7.9, for a 60-minute virtual world activity at the end of study 3 and Figure 7.10 shows the same data as percentages.

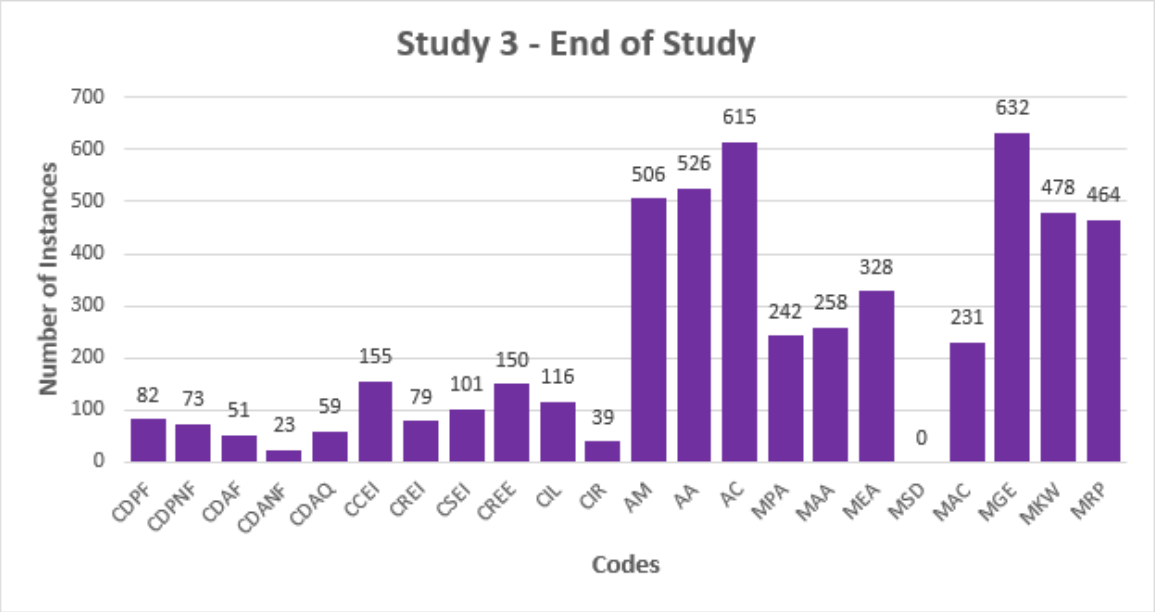



***Figure 7.9: Coded utterance totals for all participants in a 60-minute activity in the virtual world at Qiadel at the end of Study 3.***

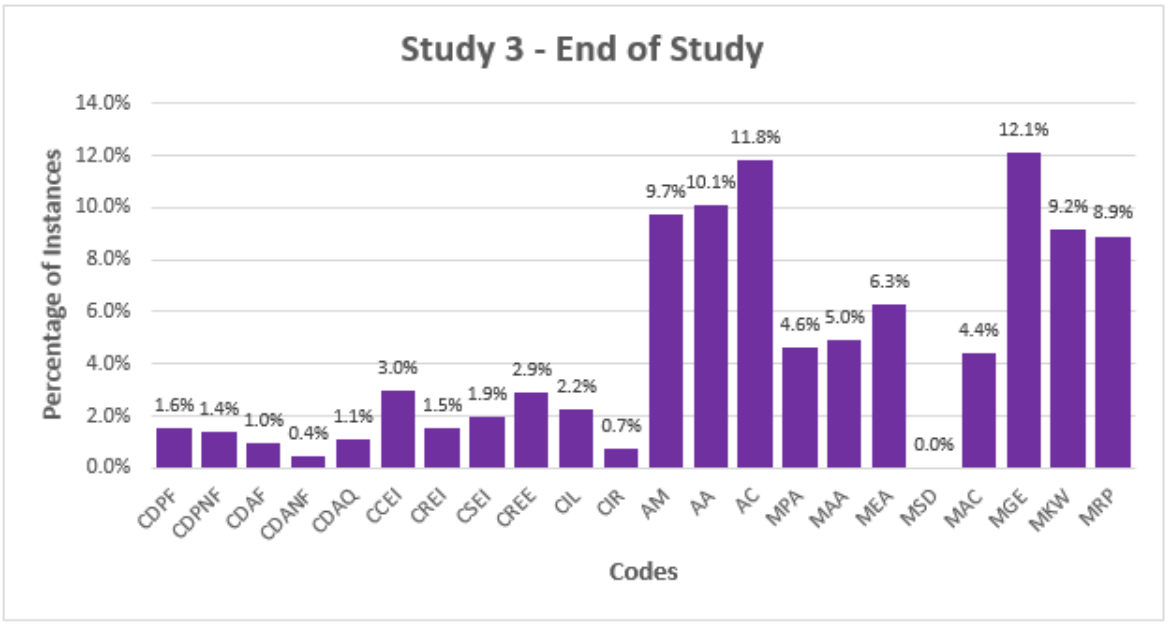



***Figure 7.10: Coded utterance percentages for all participants in a 60-minute activity in the virtual world at Qiadel at the end of Study 3.***

Figure 7.11 shows a pie chart summarising the split of utterances across cognitive, meta-cognitive and affective learning for a 20-minute activity take place within the virtual world at the end of study 3, utilising Veldhuis-Diermanse Schema for Learning Process Coding (2002), as shown in Appendix J.

Figure 7.12 shows the same data again from Figure 7.11, broken down by activity utterance code within the categories of cognitive, meta-cognitive and affective.

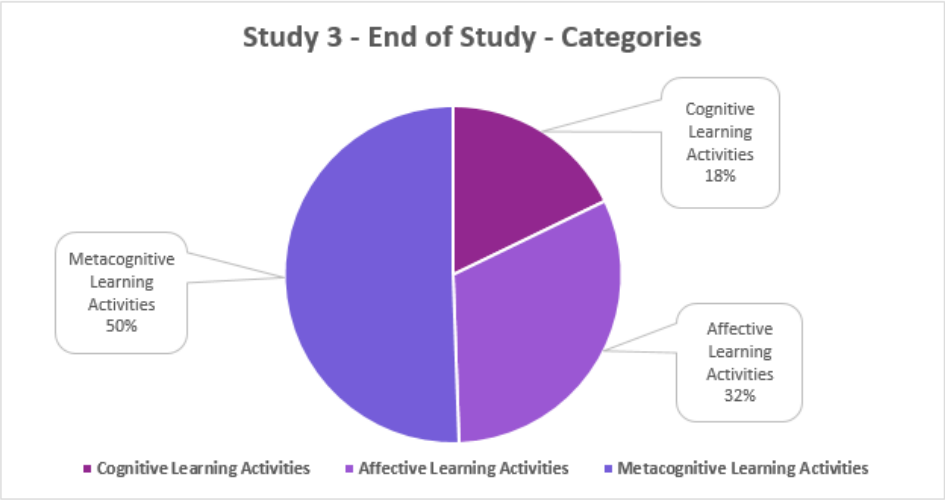



***Figure 7.11: A pie chart showing cognitive, meta-cognitive and affective learning taking place in the virtual world at the end of study 3.***

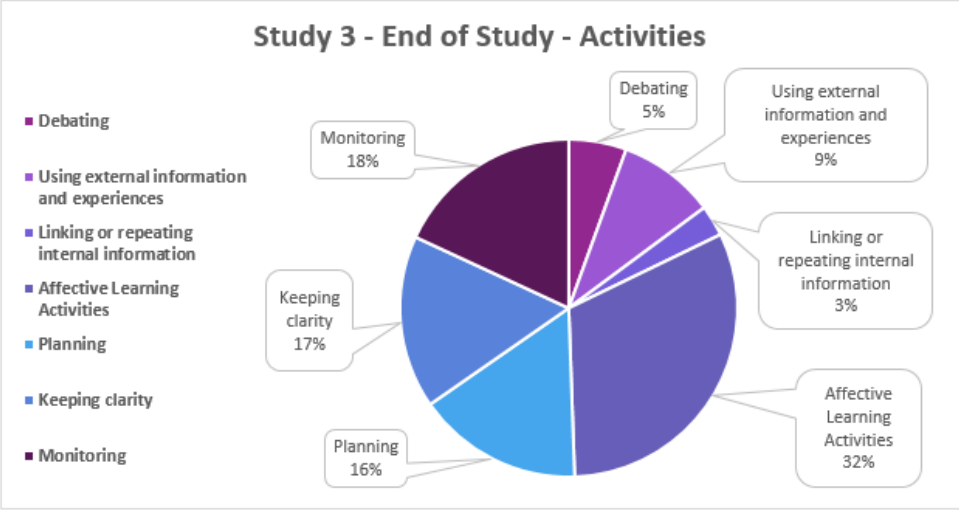



***Figure 7.12: A pie chart showing the breakdown of activities coded within the categories of cognitive, meta-cognitive and affective learning taking place in the virtual world at the start of Study 3.***

Figure 7.13 shows the two sets of data together, for a comparison to be made between activity taking place in the virtual world at the start and end of Study 3.

For ease of comparison, Figure 7.14 is a repeat of Figures 7.7, 7.8, 7.11 and 7.12 together, to show how activity within the virtual world evolved from the start to the end of Study 3.

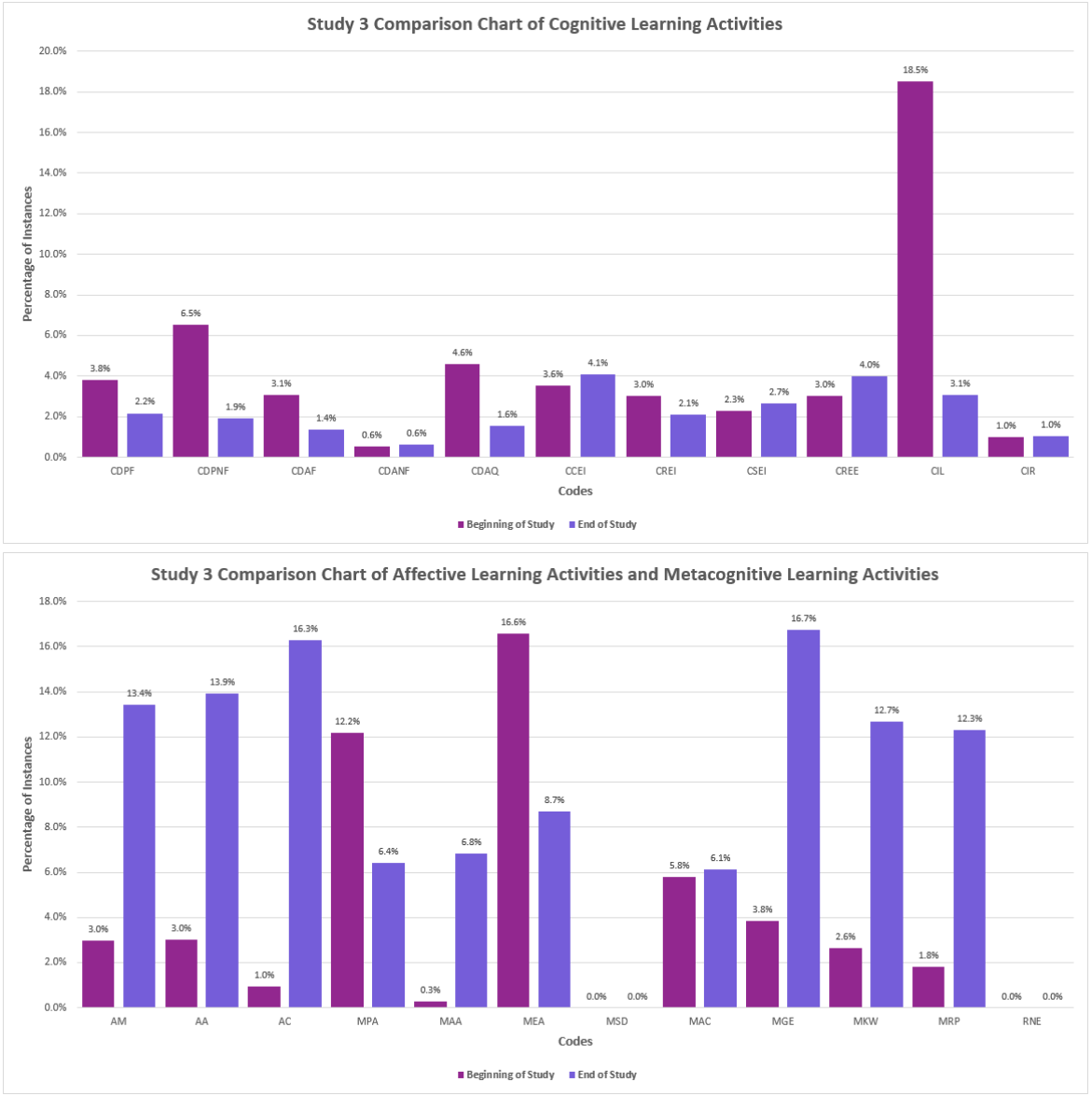
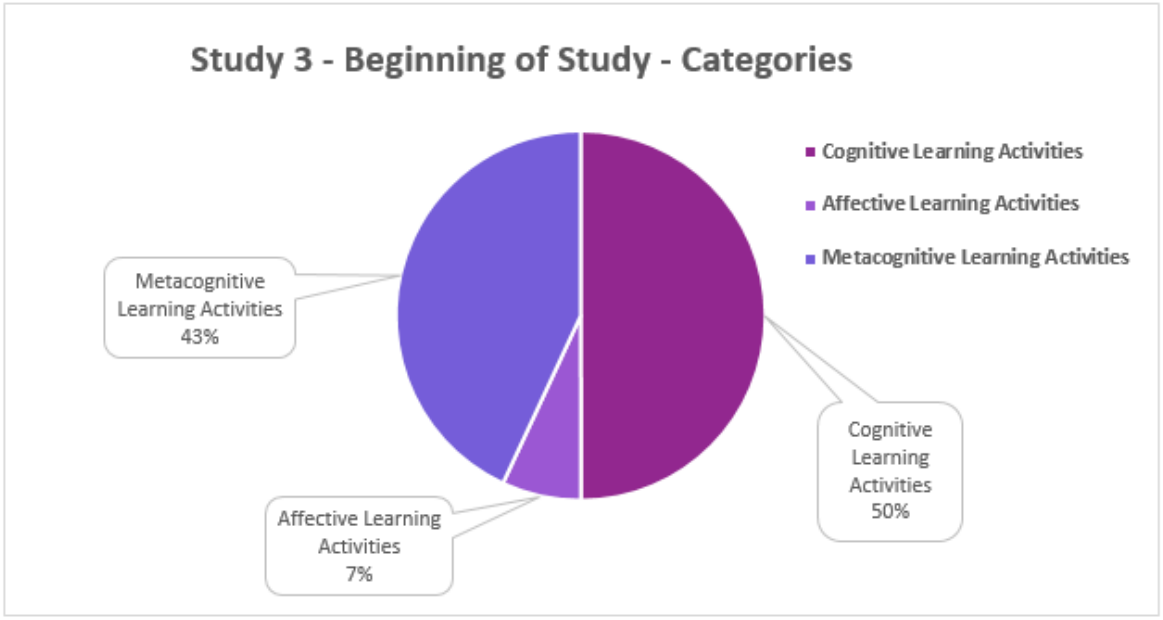



***Figure 7.13: A comparison of coded utterances during virtual world activity at the start and end of Study 3***



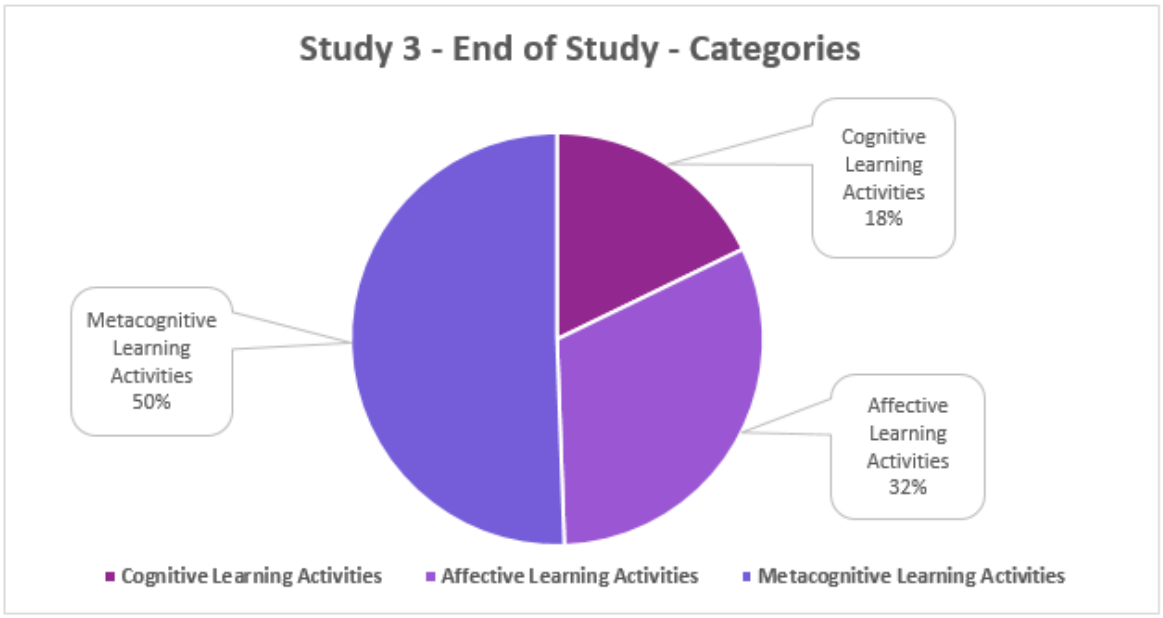
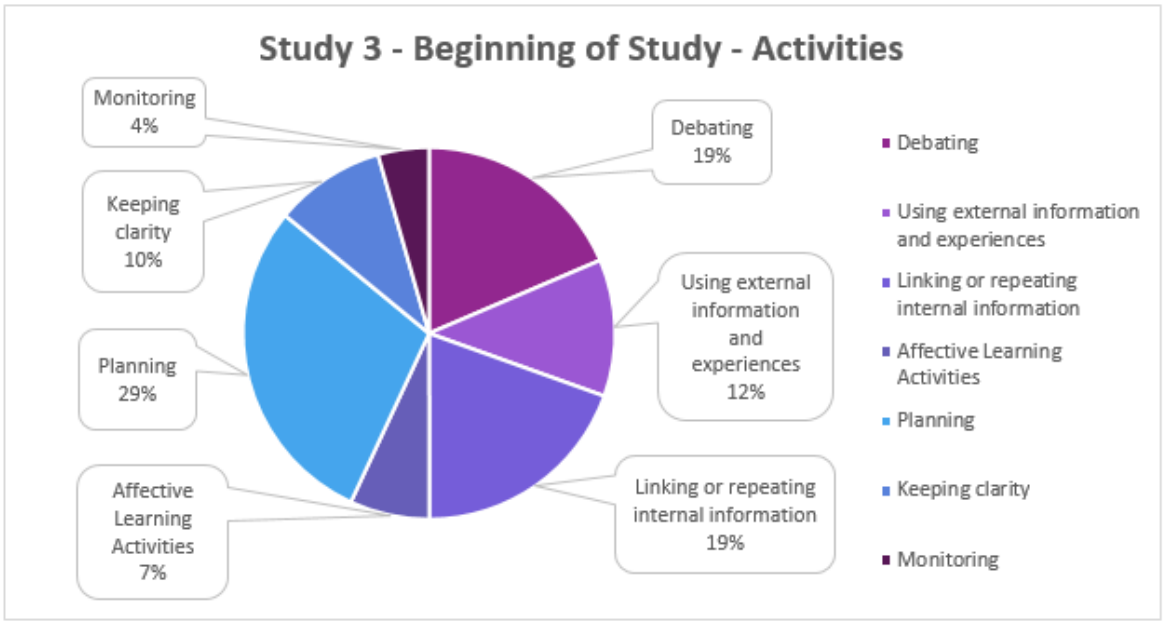




***Figure 7.14: A repeat of Figures 7.7, 7.8, 7.11 and 7.12 for ease of comparison, to show how activity within the virtual world evolved from the start to the end of Study 3 (Continued overleaf).***



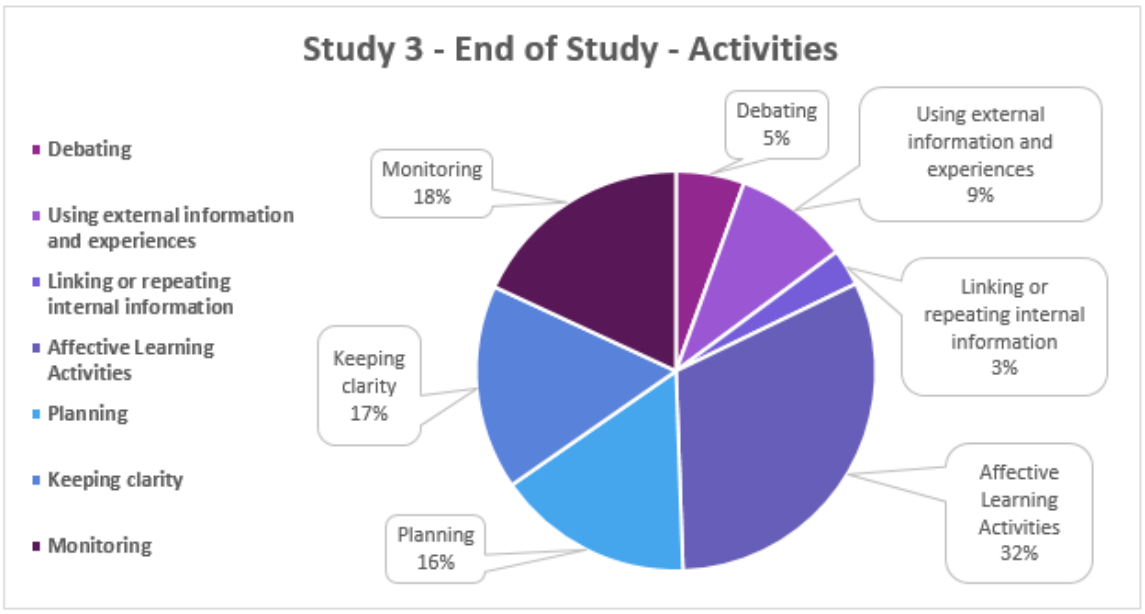




***Figure 7.14: A repeat of Figures 7.7, 7.8, 7.11 and 7.12 for ease of comparison, to show how activity within the virtual world evolved from the start to the end of Study 3.***

At the end of Study 3, the activity taking place within the virtual world had changed significantly. Cognitive activity had reduced from 50% to 18% and affective learning activities had increased from 7% at the start of the study to 32% by the end of Study 3. Utterances relating to meta-cognitive activity had increased from 43% to 50% (see Figure 7.14).

Utterances coded for affective learning activities had the biggest increase. 9.7% coded AM – general reactions to other participants without directly reacting to the content. 10.1% coded AA – asking for feedback from fellow participants.11.8% coded AC – social talk chat that is not relevant to the task.

The most utterances were coded MGE, a keeping clarity, meta-cognitive activity at 12.1% - explaining unclear information; answering a question asked by another participant. Keep clarity accounted for a total of 17% of all utterances.

Monitoring activities rated highly at 18% - utterances coded showed that participants were monitoring on the original planning and aim (code MKW totalling 9.2%) and reflecting on their own actions and certain contributions (MRP totalling 8.9%).

Planning activities totalled 16%. 6.3% of utterances relating to planning were coded MEA – explaining or summarising the approach already adopted. 5% of utterances were coded MAA – asking for an approach to carry out a task and 4.6% were coded MPA – presenting a procedure to carry out a task.

The results indicate that by the end of Study 3 staff were more relaxed and at ease in working within the virtual world through the high increase in affective learning activity taking place. At the beginning of the study, affective learning activities were 7%, but by the end of the study this was 32%. There was evidence of participants working much more collaboratively and there was much less confrontation and debate to reach solutions, but rather working collaboratively together to explain and understand and work through problems to an agreed solution. Staff reported being motivated to achieve and enjoyed their training and developed their skills through having responsibility in using the virtual space how they wanted and working through planned activities, as well as, meeting staff from other sites. Apprentices benefitted from working with highly skilled, experienced members of staff in the virtual space that would not be possible in the real world because of location.

## *7.4 Communities of Practice and Informal Learning*

The literature review highlighted the importance of collaboration and participation in the creation and consumption of learning (Lave and Wenger, 1991, Wenger, 2008). Second Life® and other web 2.0 tools enable individuals to collaborate with each other, regardless of geographical position, which has led to the emergence of learning communities (Lave and Wenger, 1991, Preece, 2001, Rheingold, 2000). These learning communities can be online and without any face-to-face interaction. The study showed characteristics for a community of practice, as Wenger (2008) describes, in terms of mutual engagement, joint enterprise and a shared repertoire. The sharing of work stories seen in Study 3 and in previous studies, helped to accomplish this. There was also mutual respect and mutual accountability amongst the participants, carrying out the activities within the virtual world. One participant said:

> *"The avatars are real people and real friends. We enjoy seeing each other in the virtual world and we miss the characters when they do not show for a meeting. We all show compassion and everyone helps everyone along, for example, when I find something difficult and there's someone to help you along. It's like a second support mechanism that makes you laugh and cheers you along."*
>
> **(Participant 10217)**

Research has been carried out on why people participate in online work-based communities of practice (Ardichvili et al, 2003; Sharratt and Usoro, 2003). Theories to explain how motivation is influenced have been researched by Issroff (1995) and McGonigal (2011). In Study 1, the courier company staff members were required to attend daily training in the virtual world, similar to the case study which Wenger (2008) writes of, where staff of the claims process department of Alinsu were required to participate in the workplace community of practice to learn and succeed in their work, in order, to be paid. In Study 3, although there were some set activities within the virtual world (staff attended the daily operational meeting in the virtual world – see Figure 7.15), staff were

left to develop their own use in the workplace and capture this activity by storyboarding a day in the life of (see tables 7.10-7.12)

Some participants have taken to making further activities and have shared links to other materials and questions and provided reflective discussion. These community artefacts suggest the beginnings of a loose-knit community of interest, as defined by Henri and Pudelko (2003) which might evolve further as the project progresses. Figure 7.15 shows a participant using the virtual world to present a review of key performance indicators.


***Figure 7.15: Qiadel Team Meeting taking place in Second Life ® to review key performance indicators***

Staff collaborated frequently and regularly in the virtual world to review, evaluate and plan learning activities. Some participants were keen to explore functions available to host meetings and other business activity. So, the technology triggered some interest in the technology itself. The use of a virtual world has enabled a personal learning environment to emerge, supported by the technology using Second Life ®, but wider than just the technology, utilising people, places and communities both online and face-to-face.

The use of virtual reality has provided an unremitting focus on the use of feedback. Utilising Second Life ® to host focus groups, Qiadel have used this as a mechanism for feedback to improve the assessment and feedback experience in the workplace. It has enabled effective strategies to keep all staff informed of the impact of feedback on management decision making. Apprentices used activities within the virtual world to build a log of employability skills they acquired whilst studying and managers could compare logs with their expectations and work requirements in reviews. This was also useful evidence for reviews with their assessor. The use of the virtual world provided a richer connection between staff and management, apprentices and the learning provider. The series of work-based learning scenarios built a portfolio of evidence for assessment and discussion.

Use of the virtual world is supporting training and learning in the workplace for the future, providing a space for a personalised kind of learning. When a member of staff is struggling with something in the workplace, they can pause and spend time in the virtual space to ask questions, practice, work out the way forward and build confidence.

Both assessors and trainers were able to ascertain what staff did and did not know when using the virtual world. Based on employee progress and knowledge, activities within the virtual world were adapted into the next session of training. Another interesting aspect of the Study was participants referring to learning languages. A participant advised:

> *"I don't have many opportunities to improve my English speaking and what was a great surprise to me was how much I've Improved my speaking skills. I'm not a native speaker, I'm Norwegian and the chat has helped me to make my English come alive."*
>
> **(Participant 06219)**

Another participant said:

> "Since I am German I also can practise my English which is a good thing."
>
> ***(Participant 09645)***

What worked well at Qiadel was that the learning provision was in a specific context, in terms of sales training and developing product knowledge. This provided a worthwhile meaning for staff to participate in the virtual world. They had something specific to focus on but also had a space in which they could use to informally use for chat and sharing ideas. One participant said:

> *"It's great to connect with people from any site and work with people in a different way. It's good to have a shared space to chat. I always feel I discover things I wouldn't in real life, through just chatting and looking around the virtual world with others."*
>
> **(Participant 09665)**

Findings show that the use of the virtual world was instrumental in the participants' learning and feeling part of a community of practice for support and encouragement. One participant said:

*"The most important things for me was being able to watch others to build my confidence and learn. I copied and practised what they did and then put what I learned back into my job in real life. I still need support in my work, but I find that the pressure is taken off having to rely on my mentor in the workplace and waiting for him to come around because I can get support in the virtual world. It's more flexible".*

**(Participant 04548)**

Henri and Pudelko (2003) discuss how part of the motivation for participating in a collective learning experience is related to feeling a sense of belong to a team or community that has a common goal. They call this a goal oriented community of interest and being able to feel a sense of community involvement and belonging.

Research shows that learning communities cannot be artificially created and do take time to form (Jelfs et al, 2007). It is hoped that the development monitored in the study, continues to build over time and becomes embedded in the culture of Qiadel. Some of the participants reported that they scheduled time for practising training scenarios in the virtual world and to also login to chat and explore other training areas. This follow up activity was not independent of the technology, as they said that it was the fact that they could adopt an avatar that made practising much easier and also enjoyable that they would do this in their spare time.

Table 7.10 shows quotes from 'a day in the life of…' by participant 04548 and shows their progress in learning and having the support of the online community. The diary log illustrates the impact of working in the virtual world by participant 04548. The account shows how engaging in the virtual world follows on into the real world. Adopting the avatar persona helped staff to play out the scenarios, have direction and forget their fear of failing. They know that in the virtual world it is safe to be a different person, they build confidence working informally and in turn bring that back into the workplace in real life.

| |
|---|
| **9:00** – "I am inexperienced as an apprentice. I'm shy and lack confidence. I need to practice speaking and dealing with customers in different scenarios and situations." |
| **10:00** – "I can soon lose confidence and become overwhelmed. Something will go wrong and I don't know what to say." |
| **11:00** – "I try to learn the procedures, but they make me drift. It's really difficult to concentrate and take everything in. I'm not being effective in my learning." |
| **12:00** – "When I use Second Life, it's really fun. Disguised as an avatar you forget about real life and just focus on being you in a game. Having the virtual world allows me to practice and share techniques with other apprentices and other staff. It's a much more fun way to learn and you learn without realising, from watching others, repeating and practising, getting feedback and support." |
| **14:00** – "By the afternoon, I'm feeling confident to carry out what I learned in Second Life in real life. I feel better skilled and knowledgeable as a result of having the virtual world to practise in. I feel I've progressed much further than if I would have done if I'd only worked in the real world." |

***Table 7.10: A Day in the Life of Participant 04548 using Second Life from Qiadel.***

As a result of working through second life, it's evident how when given the chance, staff learn from each other and that communities of practice develop and informal learning takes place. These benefits both employers and the business. The organisations involved are now allowing for this to happen both in Second Life ®, but also physical meetings of bringing people together. There's a

monthly community of practice for staff to present their projects and share best practice and ideas. Other people from other organisations are also invited to attend and share and learn too. It's also good marketing to share what the organisations are doing.

Study 3 evidences powerful results for SMEs on how virtual worlds can be utilised. What was powerful throughout all the studies was how when provided with a virtual space which was not tailored to their own organisation, participants developed their own way of working and utilised the virtual space for the benefit of knowledge building and professional development. Participant 11261 mapped out a typical working day and how the virtual world was utilised (see Table 7.11). Many of the changes that participants made to their working day by incorporating the virtual world showed an increase in their expectations of themselves and gaining interpersonal skills, problem-solving skills and displaying a T-shaped skillset (see Figure 1.3). Staff became motivated to help others in the virtual community and in particular the more experienced staff had the goal of helping apprentices. Young people developed their skills, values, beliefs and attitudes under the guidance of mentors both within the workplace and in the virtual world. Participant 04289 said:

> *"The way that we think now after being involved in the virtual world is different. We are always thinking about how to support others and have a way to help others in the virtual world. There's more of a network of support that has been developed now and it's good that the apprentices have somewhere to go now and don't have to wait for someone by them in real life to be available."*
>
> **(Participant 04289)**

**09:00** – "Working day starts. I attend an operations meeting in Second Life with colleagues from Germany and the UK. There's an increased sense of connection because of the virtual world."

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**10:00** – "Training in Second Life on how to sell medical kits to medical establishments. We practice scenarios and situations. I'm able to depict things visually that I wouldn't normally be able to do in a training room environment because I wouldn't try things out the same in real life."

---

**12:00** – "Lunch, I stay in second life and eat at my desk whilst chatting with colleagues. We mull over the training and carry out some test scenarios. We talk more than we normally would and I feel more present and engaged unlike say in using Twitter."

---

**13:00** – "The USA office is just starting work. Meeting over a virtual coffee takes place to discuss how they are progressing with the FDA inspection to note learnings for UK. It makes work more enriching because we have a place to congregate that doesn't seem like work."

---

**14:00** – "A meeting with a colleague in Germany. We meet in Second Life so that we don't feel like we're staying at our screens working in skype. We like being by the sea relaxing and we are focused and not distracted in the virtual world. It's a good place for reflection. I like to use the virtual world to feel connected with others and have outside support. I see the virtual world good for this, if not better than the real world."

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**15:30** – **"**Coffee Break – Check into Second Life to see if anyone is around. Meet a few colleagues from our German site. Chat about the weather and hear news about a new project they are launching. Interesting – it could be something I could do

here in the UK. I wouldn't have heard about it if I hadn't been in Second Life!"

**16:30** – **"**I meet with an apprentice in second life to discuss preparation for a presentation tomorrow with the assessor. Working in Second Life, puts the apprentice at ease and builds their confidence working in avatars. They feel less apprehensive and nervous, which reflects in their real life persona too."

***Table 7.11: A Day in the Life of Participant 11261 using Second Life from Qiadel***

Changes in confidence, skills and identity were key outcomes for those taking part in the virtual community of practice. Staff were able to iteratively move between blended elements, in order, to increase their knowledge and learning and manage their development needs for work. Participants developed a different mindset and aspirations.

> *"For me, playing in the virtual world has taught me that I can be better and improve in my work. It has given me a positive outlook on my future and that if something goes wrong, I have a place for support."*
>
> ***Participant 04548***
>
> *"I am going to strive more. It's just a case of re-programming my brain to think more like me in the virtual world. If I expect more of myself, then it will make me do it."*
>
> ***Participant 05576***

*"I feel more positive about completing my apprenticeship. My mentor sets me tasks to carry out with others and I feel clear about what we need to learn and achieve. I feel like I achieve when other staff give me feedback and share how they do things. Playing in the virtual world has taught me a lot from listening to others."*

***Participant 12145***

Working in the virtual world appears to have had a positive impact on real world working and changed perspectives. Both informal and formal learning is seen as positive and a way to progress. The value of learning in the virtual world is recognised by many of the participants who recognise the empowerment of working virtually has on their work in real life. Some participants reported the value of the use of virtual reality for a change in work environment and having a different context and different colleagues to communicate with and share ideas. Some staff have become more confident in knowing what they want and using the virtual world to find it out through their network of peers. The study has had an impact on well-being and changes have been made to the real-life work environment to implement benefits staff have experienced from working in the virtual world. Managers commented on the benefit of having space and time for reflection. Participant 06727 used their 'a day in the life of…' to describe changes that had taken place in the real world as a result of working in virtual reality (see table 7.12).

**Changes that have taken place in the real world as a result of working in virtual reality**

**Engagement** - An area with beanbags has been set up for staff to move away from their desks. Time for staff to share and for informal learning to take place is important and beneficial for business ideas.

---

**Reflection** - There's also been a group of ball chairs purchased that allow staff to sit in and reflect. It provides staff with a space to work things out and block out the busy office surroundings and some of the sound. It's a place where staff can self-reflect.

---

**Collaboration** – As a result of working in Second Life, we recognised the benefit of learning from what others do across the globe, not just within the UK. Time is now planned for global cross collaboration.

---

**Support Networks** – A community of practice has been established where staff present and share what they have been working on to learn from each other. We learned the benefits of this from Second Life.

---

**Team Building** – Working in the virtual world has shown the importance of team building for motivation and learning and so organisations are building this more into the real world.

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**Social Context of Learning** - Working in Second Life, we now recognise the importance of socialising for learning and sharing ideas. We encourage coffee shop meetings.

| |
|---|
| **Opportunity to practice and build confidence in a safe environment** - We have looked for ways to allow staff to practice new processes in a safe environment, having seen the advantages in Second Life. |
| **Make Work Fun** – Working in Second Life has been fun and it's made us find ways to make real life work fun too. |

***Table 7.12: Changes in the real world, as a result of working in virtual reality by Participant 06727***

Many outcomes identified by the research participants fall within confidence building, interpersonal skills and a greater resilience to fail and try again. They developed an approach within the virtual world to work with others in the community of practice to have the persistence to try things out and developed a resilience. Working as part of a community and working collaboratively were elements of improved work skills, a changed mindset and confidence, which supports the research from Black et al (2006). As the time progressed, participants expressed a closer and more supportive relations between their colleagues.

## *7.6 Challenges and Disadvantages*

There are always those individuals who feel unable or unwilling to participate within the virtual world for whatever reason. It is, therefore, necessary to take into account the differences and unique qualities of the learning participants and to facilitate a process of interaction which could create a set of shared values or identities necessary to the formation of a learning community.

One of the aims of the study was to explore the factors that contribute to the formation of an online learning community. Over the time of the study, the virtual world became a busy portal for sharing experiences and feelings about Second Life®.

Chat included questions and responses, participants expanding on information in previous sessions and requests for peer support in using Second Life® and also on how to use the technology beyond the training activity. One participant posted:

> "It's quite motivating to share how we feel about how things are going and encourages me to go back and try out more. I think the fact that we have shared interests helps a lot."
>
> ***(Participant 02685)***

The data collected through the questionnaires showed that what contributed to the success of participation and development of an online community and what kept people motivated was that the participants felt there was an incentive to be involved and they had a shared reason. Another key point that came across in answers was that the environment was a safe one and there was no external pressure. This openness helped participants to experiment more with ideas and to take part more frequently than they did in a classroom setting.

## *7.7 Conclusion*

A major issue that impacts upon learning in the virtual world is organisational culture. In this study, the continuous use of gathering in Second Life ® for daily meetings and training, in addition, to further activity carried out by staff helped not only embed change but also continuously enhance the way working in the virtual world was being used. Business fit is key, as well as, ensuring buy-in from the senior management team. What helped mitigate issues and avoid the study failing was the focus on context; as discussed in section 3.4 in the research construction, time was spent upfront, understanding the issues needed to be addressed and working together in a three-way partnership between employer, institution and learners, to design work-based learning activities within the virtual world to achieve objectives. It adopted a similar approach to trailblazer apprenticeships, where the employer worked as a group to ensure assessment activities were delivering the employability skills they were looking for. Apprentices regularly fed back on activities and tweaks were made to tailor it better for learning and assessment.

Using the virtual world in the workplace, enabled a lot more work activity to be incorporated into assessment tasks and closely relate assessment criteria to what was taking place in the workplace. Marketing is also critical to make learners and staff aware of the opportunities available to them in ways which will attract them to try out new ways of learning and working.

Innovative approaches to communication through Second Life® has helped apprentices receive feedback on the quality of their work and make more informed choices about what to focus on next for their learning and assessment. It has provided a way for apprentices to talk directly with staff, that they wouldn't normally come into contact with, to pose questions and make suggestions that receive timely responses. Senior managers also take part and are able to respond quickly to areas of concern. Learning providers and employers could informally observe, assess and feedback to apprentices and staff on their work and performance. Staff participants helped apprentices learn, demonstrated work to others and suggested responses to problems. More experienced staff were able to explain how to do something, provide information and feedback. Staff and apprentices worked collaboratively to aid assessment, feedback and feed-forward activities. These findings are also evident in the research by Lave and Wenger (1991) which showed when lecturers and students are interacting together and with others and integrating informal learning into their many environments, students gain a strong sense of a learning community. Furthermore, they showed how learners were also critiquing and collaborating in peer assessment.

Using virtual reality has allowed the organisation to change the way it looks at training and sharing of knowledge. Rather than relying on serendipity for knowledge to be shared, there's a space which ensures brilliance is not lost or remains dormant. Prior to using virtual reality in the organisation, there were few avenues available for sharing of knowledge, which tended to focus on specific training practices and courses.

The use of virtual reality has helped the organisation to look at knowledge and training and enabled anybody to become a trainer within the organisation. Instead of waiting for formal training sessions to take place, everybody has the

opportunity to enter the virtual world and add something to the collective brain of the organisation.

An organisation contains a wide range of talents shared across many experts with incredible knowledge and a pool of growing ideas. For most of the staff, what they have learned is from their experiences and from other people within the organisation sharing their knowledge. All staff in an organisation have something to give that is not necessarily applicable in a training course or in a formal setting or in a room full of people. Utilisation of the virtual world may allow individuals, local knowledge, personal reflections and specialist expertise to be captured and shared via virtual reality in informal learning settings.

Using the virtual world has provided lifelong networked learning for Qiadel. It has provided a way to connect and collaborate and for staff to develop their digital skills and engage in work-based learning without needing to change any work habits. Staff have had flexibility to choose what they wanted to use the virtual world for and found their own way to work and talk together, using virtual reality as a platform. The generated content has been engaging for everyone to learn from and share ideas. The collective partnership has created a networked forest of resources. There's been no right or single path to work within the space and this has promoted independence, whilst working in the space and engaging with others.

A key advantage of the virtual world for Qiadel has been the scale and access for building a community of practice and transferring knowledge across the organisation. I believe that a kind of Community of Practice for apprentices at a practitioner level which centrally draws in ideas from SMEs and learning providers may be just what the vocational sector needs to add some structure and cohesion to the great work being done all over the UK with apprentices in SMEs. This could create a central resource about using virtual reality that occurs specifically within SMEs with apprentices which is sourced and contributed to by a variety of industry experts and practitioners. Using virtual reality has helped join staff together from different parts of the organisation and sharing some kind of learning that they want others to be involved with and to know and be able to contribute to.

Another factor which contributed to the development of a learning community was critical mass. All participants were taking part in Second Life® activities and took part in using the virtual space regularly. Apprentices benefitted from regular reviews with their employer, other staff and assessors. They gained from having planned learning activities and the freedom to learn in ways that suited their preferences within the virtual world. Working within a virtual community helped staff to learn outside formal training and extended their knowledge, skills and understanding. The flexibility of arrangements for learning and developing skills in the virtual space suits the participants' needs.

Staff who take part in the virtual world learn about how to share ideas, how to involve others in developing knowledge and how to create a knowledge sharing culture within the organisation. Based on sharing ideas and collaborating through discussion, staff learn to value their own expertise and opinions, which in turn, increases motivation and staff satisfaction. Participants became to value the virtual world to support them in skills development, interpersonal skills, different ways to learn and affective factors in building their self-esteem and self-confidence.

Together, staff at all levels have contributed within the virtual world and together share diverse ideas and knowledge. They can dip in and out of the virtual world to see how others think and feel about ideas, develop skills, work on projects and business developments. Utilising the virtual world within the organisation has changed the way teaching and training takes place and everyone has become a teacher in some way, as well as, everyone becoming learners. The focus has been on participating and through this, an online community has formed. A culture has developed that is not about recreating teaching and training that others do to staff, but rather something that everybody does. Through the virtual world, training has evolved where it's no longer restricted to a physical training room.

In measuring impact of the use of virtual worlds, it is important to involve staff and encourage them to own the process of learning and evaluation. SMEs should take note of what works from participant feedback and through reflection, for example, through the 'a day in the life of…' stories (see Tables 7.10 – 7.12).

For practitioners, policy-makers and researchers, the research findings from Study 3 provide important information in the development of education for apprentices and how the use of 3D virtual worlds can be used for a three-way partnership between learning provider, workplace and apprentice. For policy-makers, the knowledge of how online communities of practice develop and encourage informal and formal learning may contribute to understanding diversity in the delivery of education for apprenticeships. Researchers of adult lifelong learning may also find the research of interest. The research study findings are also of use to those who are working with remote learners who would find working in virtual worlds beneficial for their learning.

The next chapter summarises the findings from all three studies to draw the research to a conclusion. I acknowledge that there is considerable scope for discussion and development in the ideas presented in this thesis. The findings in this study could connect with other proposals and research for pedagogy in SMEs. The strength in this study is in how it intersects informal learning with communities of practice and the ability to nurture a growth mindset for professional development in organisations and carry out self-reflection and self-discovery activities for identity formation.

# Chapter 8: Conclusion

This penultimate chapter to the thesis synthesises the research and discusses its contribution to knowledge with regards to the impact of informal learning in SMEs, as well as, its implications. It will tie together the various issues raised in the study chapters, whilst reflecting on the introductory thesis statements. It provides answers to the research questions and identifies the theoretical and policy implications of the study with respect to the overall study area. The limitations of the study are highlighted. The following final chapter provides direction and areas for future research.

## *8.1 Review of the Study*

The title of this thesis is: "Using Virtual Reality to Enhance Informal Learning in Small and Medium Enterprises". The goal was to uncover the effects that powerful virtual reality and 3D technology is having on the way people engage in informal learning in the work place. More specifically, the focus was on how virtual worlds build identity, motivation and professional development and develop informal learning in Communities of Practice. The aim was to explore whether virtual worlds could allow SMEs to work in ways they cannot in real life and if they could be a useful analogue and/ or substitution of the real world.

The project was an exploratory study into the experiences of virtual worlds for training in SMEs and how virtual worlds can be used to transfer knowledge and create learning experiences. A review of the literature on a variety of learning – collaborative, work-based, social and informal, identified ways that virtual worlds could be used to support informal learning in the work place with the development of communities of practice.

A pilot study and three case studies were carried out over the three years of study. Three SMEs involved in the study were from different industries:

- Langdel, a manufacturing and retail organisation
- Samedel, a logistics company

- Qiadel, a pharma company

Second Life, the virtual 3D world was used across all the studies. A qualitative and quantitative analysis of employees' and apprentices' experiences of using virtual reality through Second Life® was completed to explore how virtual worlds allow SMEs to work in ways they cannot in real life; how they can support professional development and build communities of practice.

The study sought to answer three questions:

**Research Question 1:** *How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world?*

**Research Question 2:** *To what extent do virtual worlds develop identity, motivation and professional development?*

**Research Question 3:** *In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning?*

## *8.2 Development of the Conceptual Framework*

The VINE conceptual framework (see Figure. 1.2) was created in order to structure the literature review findings and subsequent data collection and analysis. It contained a helicopter view of the study, identifying the key concepts that together formed the key elements for researching the use of virtual reality by non-educationalists for informal learning in the workplace. Informal learning is the overarching element together with the following concepts: communities of practice, professional development, identity and an analogue for the real world.

This thesis has produced substantial empirical data about how people are using virtual worlds to coalesce, learn and develop skills, providing evidence of communities of practice. It has examined the use of virtual worlds for collaboration and learning. As a result of the research, the VINE was further

expanded upon with the addition of an outer circle which incorporated how working in Second Life ® developed and strengthened practice, engagement, adaptability and participants' use of the virtual world for support. Wenger (2008) defines belonging to a community of practice as a process of learning, engagement and contribution to the community and how participants cultivate their practice. The framework attempts to bring together the various aspects of activity in the virtual world and provides focus for the study's findings and the different aspects that relate to informal learning and the experience of the participants using the virtual world in work-based learning. The studies showed how participants felt a confidence through their avatar both when anonymous and later when the participants became to know each other, which was greater than during the pilot study in the classroom training. This also linked with an increase in engagement, the more time that participants spent in the virtual world. Engagement between participants spread beyond the boundaries of work tasks to social engagement because of the collaborative nature of working in the virtual world. This helped improve their practice. The ability to repeatedly practice skills in the virtual world was a collective influence on activity taking place within the virtual communities. Managers reported that failure by the apprentices in the virtual world was desirable because it meant issues could be resolved virtually before they occurred in real life. Apprentices reported that they did not feel afraid to fail in the virtual world, unlike in the real world. It helped that they were able to repeatedly practice processes under the guidance of an expert to lead them to success. Even when there was a known working solution to something, adaptability was evident amongst the participants as they often tried out other strategies, looking for a better solution. These characteristics were exhibited by participants in the study who reported that having a safe environment where they felt supported and knew it was okay to try things out and fail, helped them learn. Staff reported that in the real world they are often afraid to fail, but in the virtual world when they failed, it led to real satisfaction when they overcame the problem they'd first encountered and they could draw on support when needed. When people are challenged but don't quite succeed, it is actually extremely motivating.

It is relatively easy for people to start using the virtual world. Users were teleported by the trainer into the destination and from that point on whenever users logged into Second Life® they were already in that destination. The bar is constantly raising as staff and apprentices work in the virtual world learning new skills. The SMEs did not need to invest much resource to get started. Second Life® was free to download. It is low-risk and high reward, which helps get people interested and continue to keep them interested.

Accounting for and using intrinsic motivations is important. Doing satisfying work and being successful is an intrinsic reward. Social connections provide intrinsic rewards. Belonging to something, participating in something bigger than ourselves, and making a contribution helps satisfy our cravings for meaning, another intrinsic reward. McGonigal (2011) also says similar when she talks about motivation that comes from inside. This is one of the reasons why Second Life® attracts such a varied and large user base with over 900,000 active users every month (Altberg, 2015). McGonigal (2011) claims hard work makes us happy, even some of the routine tasks are beneficial at times when we just need to disengage our mind. However, harder work, especially success at it, releases complex neurochemicals in the brain which affect our brain's arousal and reward systems.

> "We only ever play [games] because we want to. Games don't fuel our appetite for extrinsic reward… Instead, games enrich us with intrinsic rewards. They actively engage us in satisfying work that we have the chance to be successful at… And if we play…long enough, with a big enough network of players, we feel a part of something bigger than ourselves…"
>
> ***McGonigal, (2011, pp.50-51)***

The study also showed how teams large and small, sometimes just a pair of people, fixed and ad-hoc, can self-organize around challenging goals. Teams provide opportunities to share knowledge, both tacit and factual, demonstrating each of Wenger's (2008) key characteristics for a community of practice: joint enterprise, mutual engagement and shared repertoire are accomplished via

various methods like doing things together for mutual engagement, sharing stories and experiences and mutual accountability for joint enterprise. The study saw characteristics of a community of practice being exhibited by the teams in the SMEs. They have a culture and this developed around role playing and working in the virtual world and having fun. The communities of practice became more and more cohesive and better at what it did over time. The participants exhibited key characteristics of communities of practice through mutual engagement, joint enterprise and shared repertoire.

Lave and Wenger (1991) used the historical notion of apprenticeship to illustrate the process of becoming a full participant in a community of practice and learning through participation in a social group. The theoretical cases for communities of practice are founded on the understanding of identify and practice.

> "Things have to be done, relationships worked out, processes invented, situations interpreted, artefacts produced, conflicts resolved"
>
> ***(Wenger, 2008, p.49)***

Practice is intricately related with identity. Community members need to connect with each other and 'thus acknowledge each other as participants" (Wenger, 2008, p.149) such that a community is founded on identities being negotiated. The findings of this study were consistent with Wenger's theory that learning takes place through participation in situated social practices where 'Learning is the engine of practice, and practice the history of that learning' (Wenger, 2008, p.96). The findings of this thesis study are also consistent with learning presented by Farris (2006), Gray (2003) and Sfard (1998). Gray (2003) successfully used Wenger's 2001 framework (Wenger, 2001) to create an online community for a geographically spread and segregated workforce to support, communicate and share knowledge with each other. It helped new staff orientate the working culture and become embedded in the community of practice, working with colleagues to learn new skills and participating in informal learning.

> "The purpose of this study was to understand to what extent participants' experiences in an online environment constituted a community of practice. The study also sought to understand the nature of the informal learning that occurred, motivations for participation, and the role played by the moderator in the community."
>
> ***(Gray, 2003 p21)***

The virtual world acted as an enabler to learning, allowing people to work on training and resources over time and also becoming more confident in working in the virtual world itself. The virtual world enabled individuals to participate from any location.

It is however, noted by others that an online community cannot be termed a community of practice. Hung and Chen (2002) used Brown and Duguid's (2002) framework for learning to decide whether an internet community exhibited the characteristics of a true community. According to Hung and Chen's use of Brown and Duguid's framework, learning should be:

> "demand-driven through contextualized engagement of tasks and problems; a social act through dialog and the distribution of cognition and expertise and an identity formation through knowing how or through gaining experiences relevant to the community's practices; it includes knowing about the knowledge required for a practice"
>
> ***(Hung and Chen, 2002 p24)***

They described internet-based communities as quasi-communities, suggesting that "participants are primarily involved in discourse about knowledge rather than learning to be" (Hung and Chen, 2002, p.26).

This thesis study identified informal learning opportunities that occurred during activity in the virtual world .

The theoretical cases for communities of practice, identity and professional development therefore need to be revisited in light of developments in virtual reality in order to further understanding the dynamics of 3D communities and how they can be made more sustainable for learning in SMEs and with apprentices.

## *8.3 Empirical Findings*

The main empirical findings are chapter specific and were summarized within the respective empirical chapters: pilot study, study 1, study 2 and study 3. This section will synthesize the empirical findings to answer the study's three research questions.

This research started by exploring the features of virtual worlds that employees see as positive and negative to inform the methodology for the main study. It also evaluated the effects of current face-to-face training without any connection to technology so that a comparison could be made within training virtual worlds. The pilot study with 22 participants looked at the effect of working in the virtual world to provide customer service training. It found that the 3D technology was welcomed by those who were not confident in work processes, as it allowed them the opportunity to practice in a safe environment, mirror the actions of experts and gain confidence. However, the technology was seen as unnecessary by those who were already experienced as they already had the knowledge and found it longer to learn the same things, but they did recognise the benefit for learners and for teaching others.

The pilot sought insights into how 3D technology could support the development of informal learning in the workplace and provide the right kind of engagement between apprentice, SME and learning provider which would be embedded into everyday work. If the government's policy is to place the responsibility of training onto the employer, then the right kind of intervention is required. The use of virtual worlds in the workplace provided a sustained and genuinely productive and supportive dialogue between all three parties forming a

partnership between employers, apprentices and employees, and learning providers.

Working in virtual worlds allowed employers to play a real part in improving the skills of apprentices on a large scale with collaboration between the SMEs and learning providers.

The pilot study revealed that managers were concerned about apprentices' competencies in areas such as customer awareness, communication, attitudes, confidence, aptitudes and self-management. The use of virtual worlds bridges the gaps between education and industry and extended far beyond the requirements of the apprenticeship training.

In the right context, the pilot study showed that 3D technology could support learning in the workplace.

The main study consisted of three case studies and built on the findings from the pilot study, revealing how employees and apprentices used 3D technology in their working day and how many created learning opportunities for each other. Data for the main study was collected via questionnaires, focus groups, text chat, story-boards, mini essays and individuals producing a day in the life of scenario, capturing how they used the virtual world throughout their working day.

Most learning is informal, at work, under the guidance of non-educationalists. The use of learning through a laptop has allowed apprentices to work in ways they cannot in real life. There are so many opportunities in the use of virtual worlds via mobile devices, related particularly to a three-way partnership in learning and assessment between apprentices and employees, employers and learning providers: co-ordination of off- and on-the-job learning; real-time oversight for employers of their employees' progress; use of virtual events at work to enrich learning, demonstrations of processes and development of learning communities. Its use is endless and hugely enriching by allowing learning to be much more opportunistic.

The use of virtual reality enabled apprentices and staff to learn in any location and at any time. The training activities were developed to include examples drawn from everyday work activities so that it reflected real life. Second Life ® was used as a way for apprentices to develop and practice skills. By taking on a role in a fictional situation, it's a useful way to provide an experience to learners and develop a more tacit understanding of course content and work based processes to improve assessment, feedback and feed-forward.

Entering the virtual world, learners can adopt a role to practice their skills via role-play activities, before transferring their skills to real life, prior to being assessed. Anonymity enables learners to build their confidence, make numerous attempts, develop and practise skills, take risks, fail and communicate more than they may in a real-life situation. There's no fear of asking a stupid question or saying the wrong thing, instead students can grow and develop in a safe environment. Virtual worlds have limitless possibilities in education.

Wider and more whole scale use of digitally enabled learning is needed; one that balances ambitious top-down vision with a collaborative bottom up responsibility for innovation. Increasingly, learning happens outside organisations and inside the workplace, staff are forced to 'power down'. Now technology can be portrayed as socially transformative; technology 'is us' (Rettie 2005). The first generation of technology enhanced learning was Web 1.0, the web (and the educator) as broadcaster, and students were readers and recipients; the second generation must be Web 2.0, everyone writers and readers. Knowledge is now created locally, partially, contingently, for-me, for-now.

**1.** ***How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world?***

**a. Learning through practising:** It was recognised by many participants in the study that virtual reality enhances their ability to learn for the job and serves as a huge confidence builder by being able to repeatedly practise procedures in a non-threatening, safe environment. Participants reported that they became totally engrossed within the virtual world, where there weren't the distractions of the workplace. Staff reported that they looked forward to returning to the

virtual world to see the virtual sea and beach, which provided a calming retreat from the busy hub of the workplace. Nevertheless, it could not replicate all the physical and environmental issues that are encountered in real life work, for example, using the touch screens on hand held terminals (equipment in the workplace) and physical environmental issues experienced in their work, such as building access and weather conditions.

**b. Learning by imitating best practice:** Work in the virtual world with the courier company focused on providing practical customer experience and developing vital assets such as accuracy, repeatedly practicing processes, confidence building, communications skills and resilience. The majority of participants highlighted the ability to watch and listen to a more experienced member of staff and be able to imitate them in a safe, virtual environment disguised in an avatar resulted in being able to perform at a quicker pace in their job role, but they still did not enjoy the system glitches experienced in Second Life and often found the movement of avatars to be frustrating.

**c. Learning through conversation:** Many of the sampled participants reported that working in the virtual environment encouraged more discussion and feedback through the use of avatars. Interestingly, these discussions often arose around the weaknesses in using the system, for example, missing elements in the virtual world triggered more knowledgeable staff to recognise this which sparked stories for others to learn from. Participants did miss visible communication cues that are not presented in virtual reality.

***2. To what extent do virtual worlds develop identity, motivation and professional development?***

**a. Learning through roleplay:** There was evidence of participants under the presence of the avatar, had the confidence to be who they wanted to be in the virtual world, use shared language and were motivated to replicate this in the real world. In both the virtual world and the real world, this process developed over time.

**b. Learning through reflection:** Regular reviews after role playing allowed all participants to come together and review both their own and their colleagues' performance for professional development. This was a catalyst to innovation and creativity as participants could see performance gaps that were holding back progress. This process helped participants develop their identity and motivated individuals to improve and think about their work in entirely new ways. Participants reported that this process was much more beneficial than the 360-degree reviews because feedback was visible to all participants but under the facade of an avatar, making it more palatable. Participants said they were motivated by the strong incentive to address performance gaps in order to avoid losing face in second life. The key point reported was the opportunity to reflect in a non-threatening and fun environment in the disguise of avatars. Participants reported they still needed to be able to communicate outside of the virtual world.

**c. Learning through collaboration:** The use of Second Life® combined communication and collaborative working with a sense of presence and collective participation which provided opportunities for developing authentic learning environments through meaningful interaction. Participants naturally coalesced into working in small and large groups to discuss problems and made use of presentation tools.

***3. How do virtual worlds build communities of practice to transfer knowledge management and develop informal learning?***

**a. Learning through coaching and mentoring:** Employees developed their skills, values, beliefs and attitudes under the guidance of more experienced and knowledgeable, like-minded peers and mentors working in the virtual world. Staff reported that they still found having a real-life mentor in the workplace as useful but didn't feel the need for as frequent interaction face-to-face. A three-way partnership developed between the SMEs, Employer and Apprentices where virtual reality was used to monitor progress of apprentices, view the apprentices demonstrating work processes and provide coaching and mentoring. As well as, informing the subject matter of training and work to be carried out in the virtual world, close relationships that developed between SMEs, Employer and

Apprentice enabled experts to be introduced through masterclasses, workshops and mentoring sessions.

**b. Learning through informal, social interaction:** The building of a community of practice developed through the feeling of presence and meaningful interactions in a learning environment. Learning occurred through regular participation that was social in nature and knowledge was socially constructed. Participants enjoyed the use of avatars and escaping to another environment outside of work. Staff could freely interact and use the world as they wished, which reduced barriers in time and space but they still liked the opportunity for real life interaction too.

**c. Sharing common interests and goals:** Through focused activity, participants in the virtual world developed a unique knowledge base that was both general in nature and specific to specialisms. Participants said that a community feeling developed from having shared goals and experiences and participating together in the virtual world to achieve objectives, problem solve and create resources in a safe and supportive environment. Staff and apprentices were set challenges and problems to solve which further bolstered their skills set.

## *8.4 Limitations of the Study*

As well as strengths, all research has its limitations. There is considerable scope for further development in the findings of this thesis.

Through a series of case studies, the research has offered an evaluative perspective in the use of virtual reality in SMEs and on an important development in vocational education policy, that is that the government would like employers to be educating young people in the workplace with the support of learning providers. As a direct consequence of this methodology, the study encountered a number of limitations, which need to be considered:

1) There were few case studies (one pilot study and three main studies). Although many more SMEs were approached to allow me access to their workplace, most requests had to be declined because of unrealistic

requests to build specific work environments and simulations in Second Life's ® virtual world, which would have been too costly.

2) The case studies were limiting, because build costs within the virtual world were not funded, however, this does indicate how much can be achieved without spending any funds and using the existing virtual worlds how they are, because of the findings shown in this study. The use of virtual reality has far more potential with and without funds being spent. Some of the findings from the research participants on the limits within the virtual world, could be addressed and overcome if funds were spent, such as, incorporating more environmental factors that the courier drivers encountered, for example, uneven surfaces, pets and access issues.

3) This thesis was time bound and restricted by the number of participants taking part. 116 participants took part in the research using Second Life ® for a total of 40 hours. Although assessors from learning providers accessed the virtual world, they were not part of the formal data capture. The research is distinctive in using virtual worlds for a three-way partnership between educators, employers and apprentices and goes some way to reducing the limiting effect of the size of the research study. The approach was successful in exploring the social and informal context of learning and communities of practice, as well as, accessing three stakeholders together that has not been previously studied in the use of virtual worlds.

4) The ethnic or cultural background of participants was not requested of the participants, as part of the questionnaire data and may impose limitations on the scope of the overall findings. The knowledge from this research study is generalisable for work based learning for apprentices, however, extrapolating the findings are difficult in a small-scale study due its limited scope and the limitations of how the technology was used. The literature in this subject, is also relatively immature. The particular sample and methods also add to the questionability.

## *8.5 Conclusion*

The research described in this thesis demonstrates some of the impact virtual reality in SMEs can have on informal learning by looking at its use between Employees in SMEs, Staff and Apprentices and learning providers. This group worked in virtual worlds to blur the boundaries between virtual spaces and the physical workplace, where the virtual world was often a useful analogue and in some cases a better substitution than the real world.

The research has extended understanding of how virtual worlds can allow SMEs to work in ways they cannot in real life; build identity, motivation and professional development and has contributed to literature on informal learning by providing evidence of how collaborative informal learning practices are supported and built through communities of practice. It has also provided a substantial body of empirical data on virtual worlds which will act as a resource for researchers interested in developing the use of virtual reality for work-based learning and training of apprentices.

The next chapter that follows, completes the thesis and provides direction and areas for future research.

## Chapter 9: Implications

This chapter discusses the research and its contribution to knowledge about the impact of virtual worlds in SMEs, as well as, its implications for its use for work-based learning with apprentices and employees and learning for Further and Vocational Education providers. Findings from this thesis study can be extended into a wider context and attract sponsorship from industry for subsequent research. It discusses implications and learning methods within virtual worlds and concludes by making a number of practical suggestions of how to build on from this study.

The main implications of the research are its messages about how virtual worlds can be a useful analogue for the real world, supporting professional development, communities of practice and the development of identity. It forms a key part of the solution for employers to embrace the concept of T-shaped learning (see Figure 1.3) to develop enterprising, work-ready individuals who meet the needs of employers. The skills and attributes encapsulated in the two cross-cutting skills sets are highly critical for employers. Staff development has to include opportunities to adopt practices that embody T-shaped learning. The T-shaped employee is an individual who is developing skills for the future and is equipped with a broader range of personal, professional and technical expertise. With relatively little disruption or upheaval to existing systems within SMEs, virtual worlds can be used to support learning in the workplace. Virtual worlds can realistically be incorporated into busy work environments to support, engage and improve working practice and the development of skills.

SMEs are always looking for new ways to develop and improve their employees and working in virtual worlds is an exciting prospect as it allows employees to experience learning within an environment where everyone is involved. We experience life in three-dimensions. We move, we see, we hear, we learn in three dimensions. Blending of the virtual world with the real world has the potential to be revolutionary. It allows situations to be visualised and brought to life. We should not be confined to the virtual or just the digital. Mixing digital content into real life work-based scenarios enhances reality. Within the virtual world, employees are able to immerse themselves into a scene and collaborate

with others regardless of distance. Employees using virtual worlds in the work place can visualise scenarios, practice work processes and share ideas. The use of the virtual world makes work more relevant because it is contextualised. SMEs do not have time to make errors, so the virtual world allows staff to fail, in order to succeed in the real world. Figure 9.2 below summarises the studies' findings in how virtual reality was used in SMEs and are discussed in more detail below:


***Figure 9.1: How virtual reality is used within the SMEs taking part in this study.***

The study revealed a number of learning approaches being used within the virtual worlds, which employers can successfully encourage and support for lifelong learning. Here are some of the key learning methods that emerged from the study:

- Learning by imitating best practice – Apprentices and other staff members learned from employees who were experts in procedures by listening, watching and imitating their actions. In the virtual world staff were able to watch demonstrations of processes, for example, the Samedel demonstrated the customer doorstep experience and then staff were able try out the process for themselves. Staff are able to repeatedly copy actions until they are confident.

- Learning through reflection – The virtual world provides a place for staff to escape the business of the office. The setting of seeing a beach and the sea or a room without real-life distractions helped staff to think things through, which helped them learn by having a space to do this that conveniently fitted in to their daily routine.

- Learning through role play – The adoption of avatars and working in a virtual environment helped staff to feel comfortable with role play in comparison to carrying out role play in a classroom face-to-face environment. Through role play, staff were able to test out scenarios, practise processes, learn through trial and error and experiment with different styles and approaches.

- Learning through coaching and mentoring - One to one discussion in the virtual world took place to enhance an individual staff member's knowledge, skills and work performance. This activity in the virtual world helped individuals to develop personal attributes. Staff were able to build their confidence, develop their communication skills and learn how to interact with customers and colleagues. One-to-one interaction in the virtual world helped apprentices and staff to develop the right attitudes, knowledge and skills in the workplace. Regular meetings developed in the

virtual world where individuals could meet, reflect, collaborate, provide guidance and direction, share experiences, and discuss issues.

- Learning through practising – The virtual world enabled staff to practise processes and become confident in routine work procedures. Repetition and learning through trial and error were evident throughout the study. Staff were able to pick out parts of the process they struggled with and repeatedly practise these.

- Learning through conversation and feedback – Through the virtual world, staff found it easier to provide and accept feedback, under the guise of avatars. They were also willing to teach and help others because barriers were removed by all being represented through an avatar. The virtual world took the embarrassment away. Conversations helped staff understand and improve on their work practice.

Coaching was a key thread that emerged from the study. Coaching was important for the apprentices to be encouraged, receive feedback, practice skills and work on weaknesses. The virtual world provides a social learning process whereby more skilled employees in the learning community could help apprentices and other lesser skilled staff to find their way, through discussion, practicing processes and being observed in the virtual world.

The environment provided a distraction-free place to learn where staff could improve in a safe environment and visualise how to do thing. There wasn't the distractions of a face-to-face environment and processes for both learning skills and work ethics both emerged through the tutelage of more experienced staff.

Much learning that takes place in SMEs is informal, rather than formal. Formal training has a role to play, but on-the-fly learning is taking place all the time in the workplace. The use of virtual reality enables spontaneous and unplanned learning to take place during impromptu conversation, coaching, reflection, observing, repeated practice, imitation etc. Vygotsky (1978) said that we learn from others who are more knowledgeable and skilled and trying out things.

Communities of practice developed within the virtual world allowing participants to share time and knowledge and learn from each other. Learning within the community involved practising alongside others. The apprentices and staff learned from others who were further along in their job role and career and learned alongside others. Participating in the virtual world allowed staff to think through situations and practice routines they may have not previously encountered. Working in the virtual world enabled participants to open up their mind and be curious, collaborate, reflect, practice resourcefulness and become more resilient in their work by having time to practice processes.

Working in the virtual world facilitated the process of learning from and with others. Collaborative learning became natural as people interacted. Participants helped workers learn, demonstrated work to others, suggested responses to problems, explained how to do something, provided information, gave and received feedback and worked with others collaboratively. Many activities took place in the virtual world which aided learning from and with others. These included:

- Fostering a culture where it is safe to make mistakes. Participants felt the virtual world was open and they had the freedom to try things out and practice without fear of embarrassment.

- Team meetings were held which raised issues and generated ideas. Solutions emerged within the virtual world.

- Using the virtual world to pose issues and share ideas. This occurred more because of the ease in which to do so and also because the virtual world was considered to be a safety net, where there wasn't fear of reprisal for not knowing.

- Employees used the virtual world to socialise and this fostered and strengthened working relations and collaborative team working. Participants learned much more through having a place they could go to at breaks to chat and meet staff members from other locations without leaving their desk.

- Encouraging the development of Communities of Practice to explore specific issues or address particular projects.

This study has inverted traditional classroom training in the workplace into immersive informal learning, where a three-way partnership took place between staff, apprentices, the employer and educational providers. Informal learning took place within the virtual world through social interaction and conversation; roleplay; storytelling; problem-solving; simulations and imitating best practice. Apprentices learn by being mentored by more experienced staff and their peers, by collaborating and through reflection. Staff have the freedom to learn through failing, which ultimately leads to success, by practicing in safety, as many times as they need until proficient and confident. Within the virtual world, participants make use of fictional situations in roleplay, which are evaluated by both their peers and mentors.

The use of virtual reality extended the existing theory of communities of practice and workplace learning by enabling participants to model and build their own learning experiences through contextualised activities. Sharing stories, experiences and encounters within the community enabled apprentices to apply their learning to real-world situations, developing and applying their knowledge and skills in work-based context. This personalisation to suit the individual was motivating and meaningful. Working through various realistic scenarios and hearing other people share their experiences and stories enabled everyone to build up a catalogue of experiences, they could refer to when required for dealing with customers, managing meetings, building skills and knowledge. Immersive learning has resulted in participants working together to solve, re-work, support, develop and work through case-based scenarios to achieve a desired result.

The completion of this thesis is timely. Over the four years since the study began, virtual reality has continued to grow in use and development and its use is an exciting area of research for further and vocation education providers. The technology has more potential to break new ground in apprenticeships and work-based learning than virtual reality.

A key benefit is that students/apprentices can step into scenes and see lifelike characters. There are significant developments taking place in virtual reality which firmly places the use of virtual worlds as a key development for work-based learning and vocation education. Virtual reality headsets are enabling three-dimensional worlds to be used even more effectively in teaching and learning with a greater feeling of immersion, making users feel truly present. Mark Zuckerberg, the chief executive of Facebook predicts that virtual reality will go far beyond gaming. In March 2014, Facebook acquired the company, Oculous VR. Oculous VR builds virtual reality technology, like the Oculus Rift headset. Wearing a VR headset, you enter a completely immersive computer-generated environment, like a game or a movie scene or a place far away. The incredible thing about the technology is that you feel like you're actually present in another place with other people. People who try it say it's different from anything they've ever experienced in their lives. Oculus's mission is to enable you to experience the impossible. Their technology opens up the possibility of completely new kinds of experiences" (Zuckerberg, 2014).

The Oculus Rift headset is leading the way with immersible video, audio and touch experiences. In his statement Zuckerberg said "Imagine…studying in a classroom of students and teachers all over the world or consulting with a doctor face-to-face – just by putting on goggles in your home" (Zuckerberg, 2014). "This is really a new communication platform. By feeling truly present, you can share unbounded spaces and experiences with the people in your life. Imagine sharing not just moments with your friends online, but entire experiences and adventures" (Zuckerberg, 2014).

A commercial version of the headset has been available since 2016. To achieve the goals that Zuckerberg outlines, Oculus Rift needs developers to create those "unbounded spaces and experiences", with Linden Lab the creators of Second Life, having more experience than most in the area. Linden Lab have built a new world called "Sansar" for the Oculus Rift, which launched in early 2017. Their plan is to make Second Life accessible for anyone who wants to build a virtual reality experience without having to spend a lot of money or need a professional developer. Virtual and augmented reality will be a $150 billion market by 2020

according to Digi-Capital (Digi-Capital, 2015). In a press release about Sansar, Ebbe Altberg, Linden Lab CEO said:

> "Project Sansar will….empower a broad range of people to create with professional quality and reach global audiences….By greatly expanding who can create virtual experiences, Project Sansar will also extend the value of VR to a wide variety of use-cases – from gaming and entertainment to education, architecture, art, community-building, business meetings, healthcare, conferences, training, and more." (Linden Lab, 2015)

The use of virtual worlds will be a game changer in the way students interact and learn within further and vocational education.

From the research summarised in this thesis, those working with apprentices and employees in SMEs may draw information that is helpful in shaping work-based learning, to support informal learning and professional development within Communities of Practice. The discussion within this study of some of the principles that were employed in utilising virtual worlds in SMEs may be helpful in considering how to shape learning provision and how to capture the impact of adult work-based learning, especially with reference to motivation, critical reflection, experiential learning, the social context of learning and Communities of Practice.

The use of virtual reality has the potential to address the government's drive to boost both the quality and quantity of apprenticeships and thus the productivity of the workforce, as outlined in the Queen's Speech (Gov.UK, 2015a). In the speech, it was outlined that businesses would be creating 3 million apprenticeships by 2020. The study provided some insight into how the use of virtual reality can support the relationship between industry and educators, enabling effective collaboration. The findings from this study showed how virtual reality has an important part to play in supporting a three-way partnership between SMEs, Learning Provider and Apprentice.

## *9.1 Recommendations*

The findings of this thesis can usefully inform policy makers real-life experiences of learning in the workplace. There is a lack of clarity about the purposes and meaning of work-based learning and education encompassing adult lifelong learning (Biesta, 2006 and Field, 2002) and this lack of clarity is often reflected in policy. Clarity of purpose and meaning is important if we are to develop more skilled and engaged learning organisations (Eisenberg, 2010 and Senge, 2006). The findings of this research offers policy makers, practitioners and researchers access to important aspects of engaging apprentices and employees in work-based learning. By opening up this topic, the research brings new information to the current discussions about the impact of apprenticeships and work-based learning. Researchers of adult lifelong learning may also find the research of interest. The research study findings are of use to those who are working with remote learners who would find working in virtual worlds beneficial for their learning. The findings of my study suggest the need for policy review which takes fuller account of the use of virtual reality in education and in the workplace, especially for apprentices.

There are so many opportunities in the use of virtual worlds for further and vocational education, related particularly to a three-way partnership in learning:

- Co-ordination of off- and on-the-job learning;
- Real-time oversight for employers of their employees' progress;
- Use of events at work to enrich learning in college via video links,
- Demonstrations of processes which would be costly to repeatedly replicate in a live manufacturing or operational environment introduced into the off-the-job curriculum;
- Interviews with industry leaders
- Development of learning communities

This thesis study is important because business is changing and virtual worlds have the potential to transform work-based learning. UKCES (2014) predict employer-led education and virtual training will be the norm in 2030 and technology will pervade every work environment. The commercial potential of virtual worlds for education, training, and commerce in SMEs is considerable. It is anticipated that this research programme will pave the way for future research in SME training in 3D. This can take two forms. The first would be to extend the research into other sectors within the UK, the second would be to extend the research into a wider European context. It is felt that if this research provides some useful insights into the SME learning environment, it will be considerably easier to attract sponsorship from industry for subsequent research.

Learning policies are increasingly focusing on learning in informal contexts and the relevance of family and community. The way in which learning in informal settings impacts on the formal and potentially brings social benefits, has been the focus of government interest (HM Treasury, 2015). I am in favour of a move away from the old narrow focus on formal learning in a formal context in lifelong learning policy. Instead a broader debate and revaluation of informal learning will more accurately reflect today's society. If Britain is going to rise to these formidable challenges then it needs fundamental reform of further and higher education (Bailey et al, 2015, Kelly, 2015) and it needs a shift in cultural expectations and perceptions of work based learning.

To generate achievable policy strategies and development targets with regards to work-based learning and informal learning at work, there is a need for more case studies at SME level using apprentices and other employees working in virtual reality to allow further assessment of learning opportunities. Exploring the following as future research strategies can facilitate the attainment of this goal:

- The role of communities of practices in being a learner in a social virtual world, taking into the account the three-way relationship between Employer, Apprentice and SME.

- Further investigation into addressing the bridge between those who are pro virtual worlds and those who are anti virtual reality.

- Identifying personal aspects of employees and apprentices that benefit from working within virtual worlds.

More broadly, I suggest that there needs to be a determined effort to put work-based learning at the heart of SMEs and recognise the importance of informal learning using virtual worlds as a means to support continuous professional development. As part of this, a wider debate is needed, about utilising technology for communities of practice and to encourage lifelong learning. This could be done through the creation of more national and international fora to facilitate learning from other countries and accelerate new thinking about how to use virtual reality in the workplace. It is also important to co-develop guidance for employers, colleges, training providers, apprentices and employees on the learning methods which are most suited in virtual reality. In this way, we can support the development of staff and apprentices for the 21st Century.

# Appendices

## *Appendix A: A map to the literature review*

The following provides a map to the literature review explaining the topic areas being discussed and my rationale for their choice. I've organised the topics into clusters and mapped these against the research questions.

| **Research Question 1:**<br>How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world? | |
|---|---|
| **Topic Area** | **Rationale** |
| **Online Learning and Distance Education** | Interest in online learning is increasing as a means of meeting the needs of disparate people, where institutional-based learning presents difficulties (Farrell, 1999). Much can be learned from the higher education sector, where online learning has been used for a longer period of time and experienced much growth and success. This is an indication that there is significant potential for the use of virtual reality in the workplace and advantageous for those who are unable to attend classroom training (Bates, 2000), such as, apprentices. |
| **Work-Based Learning** | The UK government's drive to recruit 3 million apprentices by 2020 (Gov.UK, 2015a) takes education into a modern work setting, where employers lead on shaping the way their workforce learns and develops skills. UK demand for higher level skills will increase in coming years driven by business expansion and the problem of an ageing workforce (Harrison, 2012). If the UK is to meet these needs, then fundamental reform of the way people learn within the workplace, is needed. This study focuses on work-based learning within SMEs. |
| **Collaborative Learning** | Studies in collaborative learning show how learners are empowered through group work by engaging socially and psychologically in a learning community (Dillenbourg, 1999; Gokhale, 1995). There is also research focused on how best to support collaborative learning (Hiltz, 1998) and computer |

| | |
|---|---|
| | supported collaborative learning (CSCL) (McConnell 2002) to develop a deep approach to learning (Boud 1988) which shifts power relations from institutional control to the learner. It will be useful to extend on the literature which focuses on formal learning, to consider how virtual reality might be used to support informal learning in SMEs. |
| **Informal and Social Learning** | There is a growing divide in education between people's use of social networking at home and how this could bridge the gap between informal learning outside of institutions and the use of technology within a work setting (Rettie, 2005; Sharples et al, 2009). Informal learning has been well documented since the 1970s (Livingston, 1999) but there's little research on whether and how the growth of virtual reality has impacted the way and where informal learning takes place. There could be an opportunity for SMEs to respond by utilising the use of virtual reality to support informal learning in the workplace, creating opportunities that were not previously possible and changing current training practices. |

| **Research Question 2:**<br>To what extent do virtual worlds develop identity, motivation and professional development? | |
|---|---|
| **Topic Area** | **Rationale** |
| **Lifelong Learning** | Particular issues and perspectives on lifelong learning will be critically analysed and these will be related to the research study. The meanings of and arguments for, lifelong learning will be critically examined that have been promoted by policy makers in the local and international context over a number of years. In policy terms, the study considers how lifelong learning as a strategy to enhance economic productivity and competitiveness in SMEs can be supported through the use of virtual worlds to develop identity, motivation and professional development of staff. |
| **Heutagogy** | This study aims to extend understanding of the ways that virtual reality might be used to enhance the empowerment of staff to informally learn at work under the guidance of non-educationalists. Learners are responsible for identifying and meeting their (and their fellow peers') learning needs. The learners themselves are a key learning resource in their knowledge building. A self-determined learner in a cooperative learning environment will naturally choose a 'deep' approach to learning. The study examines how virtual worlds are used to develop identity, motivation and professional development. |
| **Identity** | Wenger (2008) investigated the impact of identity and showed how practice and identity are closely linked, which impacts on the experience participants feel in mediated environments. The literature shows how people feel about |

| | |
|---|---|
| | how their identity affects their ability to learn and learning can impact subsequent changes in a person's identity. The research study focuses on how identities are negotiated and developed. It considers how individuals begin to make sense of their identity and make adjustments, as a result of their experiences within virtual reality. |
| **Affective Activities** | Arguably the most important aspect of work are affective activities to bring about learning in the workplace. Affective relates to staff being motivated and willing to develop professionally because they identify with the organisation and its goals. If staff are affective, it is commonly associated with largely positive outcomes for the organisation (greater effort, higher performance, lower absenteeism). In order to understand more about the development of identity, motivation and professional development, the importance of affective activities is considered. The research investigates affective issues and their impact on using virtual reality for informal learning. |

| **Research Question 3:**<br>In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning? | |
|---|---|
| **Topic Area** | **Rationale** |
| **Communities of Practice** | This study aims to understand how the use of virtual reality can be used to support communities of practice amongst apprentices and employees in SMEs who, without the security of a single or permanent institutional 'home', often lack the opportunity to interact with colleagues or benefit from the kind of ongoing support and informal development enjoyed by students being educated at an institutional campus. In particular, the project is investigating the role that virtual worlds play, or could play, in informing professional practice of, and facilitating continuing professional development for, apprentices and other members of staff in SMEs. |

## *Appendix B: Invitation letter to SMEs*


Dear Sir / Madam,

I am a student at The University of Glasgow carrying out a small-scale research project which is to contribute towards gaining a doctorate degree in education. I am researching the use of computer generated, three-dimensional virtual worlds as a mechanism to enhance informal learning in small and medium enterprises

I am writing to ask if you would like employees from your organisation to take part in using the virtual world in a context to suit your work place, for example, informal learning, training, virtual meetings. The technology is free to use.

If you'd like to take part in the research, please could you distribute the information and consent forms on my behalf. The staff members can be chosen at random by yourself.

I will provide all the letters and information with stamped addressed envelopes for their return; but ask if you could write on the names and addresses on the envelope and post. All postage will be pre-provided. I have enclosed a copy of my enhanced CRB clearance. I ask you to complete the contact names and addresses to prevent myself having access to confidential contact information; which is not relevant to the research study. I have provided copies of all the information sheets, consent forms and a copy of the questionnaire that will be used for your reference.

Participants in the research will be asked to complete a short questionnaire and take part in a focus group to share their experiences of working in the virtual world.

**Purpose:**

This small-scale research study will investigate the topic of informal learning in the work place using a virtual world, to seek some provisional answers to the following three questions:

**Research Question 1:** *How might virtual worlds allow SMEs to work in ways they cannot in real life and are they a useful analogue and/or substitution of the real world?*

**Research Question 2:** *To what extent do virtual worlds develop identity, motivation and professional development?*

**Research Question 3:** *In what ways can virtual worlds be used to build communities of practice to transfer knowledge management and develop informal learning?*

**Confidentiality:**

The responses will be kept completely confidential. Findings will not be linked to individuals or to individual organisations. They will be reported in aggregate form only.

The research has been reviewed by and received ethics clearance from the team running my course at The University of Glasgow. Should you have any concerns or comments I'm available by phone and email and my contact details are at the end of this letter.

**Next Steps:**

If you have any questions, or require clarification on any items, do not hesitate to contact me. If you are happy to be involved, then please send me a quick email or give me a call and I will then discuss with you further how you might make use of the virtual world in the workplace. I will give you a telephone call in a few days' time to check if it is okay to proceed.

Thank you very much for your help.

Kind Regards
Katharine Jewitt

Email: k.jewitt.1@research.gla.ac.uk

If you have any concerns regarding the conduct of the research project you can also contact the convener of the College of Social Sciences Research Committee, Dr Valentia Bold at *valentia.bold@glasgow.ac.uk*

## *Appendix C: Copy of Information Sheet and Consent Form*

University of Glasgow | College of Social Sciences

# Plain Language Statement

**1. Study title and Researcher Details**

The role of 3D technologies in the development of virtual learning and training in SMEs.

You can contact the Researcher at any time:

Katharine Jewitt

Email: k.jewitt.1@research.gla.ac.uk

**2. Invitation paragraph**

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Thank you for reading this.

**3. What is the purpose of the study?**

The research explores the strategies employees adopt for learning and contributes to current debates about lifelong learning. The aim of the research is to investigate the use of virtual worlds to support training and learning in the workplace.

The research uses Second Life which is a multi-user three-dimensional virtual world that was started by the US firm Linden Lab in 2003 and accessed through the internet. You will design an avatar and carry out work training and work activity using your 'second life' avatar online.

You will be asked questions about working in the virtual world. You'll be asked questions like "Have you faced any difficulties in working in the virtual world?" and "what are the advantages of learning in this format?".

**4. Why have I been chosen?**

I am asking if you would be involved because your use of 3D learning can help us in making learning and training better and you might find it interesting to have the opportunity to share your thoughts and experiences.

**5. Do I have to take part?**

You do not have to be in the study. If you do not want to be involved, please return the consent form. And remember, if you decide to be in the study but later you change your mind, then you can advise us of this at any time.

**6. What will happen to me if I take part?**

If you decide to take part in this study you will be asked to complete a series of short questionnaires that will be sent to you to complete, following a series of training sessions that will take place using 3D technology.

**7. Will my taking part in this study be kept confidential?**

The things you say and any information I write about you will not have your name with it, so no one will know they are your answers or the things that you did. Only the researcher will access the information. Nobody else will see the answers you give.

**8. What will happen to the results of the research study?**

The data collected will be used anonymously in written reports, presentations and published papers relating to the study.

**9. Who has reviewed the study?**

The study has been reviewed by the Management Team at your organisation and by the Researcher and her Supervisor at the University of Glasgow.

**10. Contact for Further Information**

If you have any concerns regarding the conduct of the research project you can also contact the convener of the College of Social Sciences Research Committee, Dr Valentia Bold at *valentia.bold@glasgow.ac.uk*

**Sample of Consent Form:**

I am willing to take part in this research, and by signing below I give my permission for the data collected to be used anonymously in any written reports, presentations and published papers relating to this study.

**IF YOU WANT TO BE IN THE STUDY, SIGN AND PRINT YOUR NAME ON THE LINE BELOW:**

Your name,
printed: _____

Your
signature: _____

Date: _____

**Please return your signed form using the stamped addressed envelope provided.**

**Please keep the information sheet for future reference.**

## *Appendix D: Ethics Letter of Approval*

University of Glasgow
College of Social Sciences

**College Research Ethics**

**Request for Amendments - Reviewer Feedback**

**Ethics Committee for Non-Clinical Research Involving Human Subjects**

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**Application Details**

Staff Research Ethics Application ☐ Postgraduate Student Research Ethics Application ☒

Application Number: CSS20120156

Applicant's Name: Katharine Jewitt

Project Title: Using virtual reality to enhance informal learning in small and medium enterprises

Original Date of Application Approval: 20/04/2012

Date of Amendments Approved: 10/08/2016

Outcome: Amendments Approved

---

**Reviewer Comments**

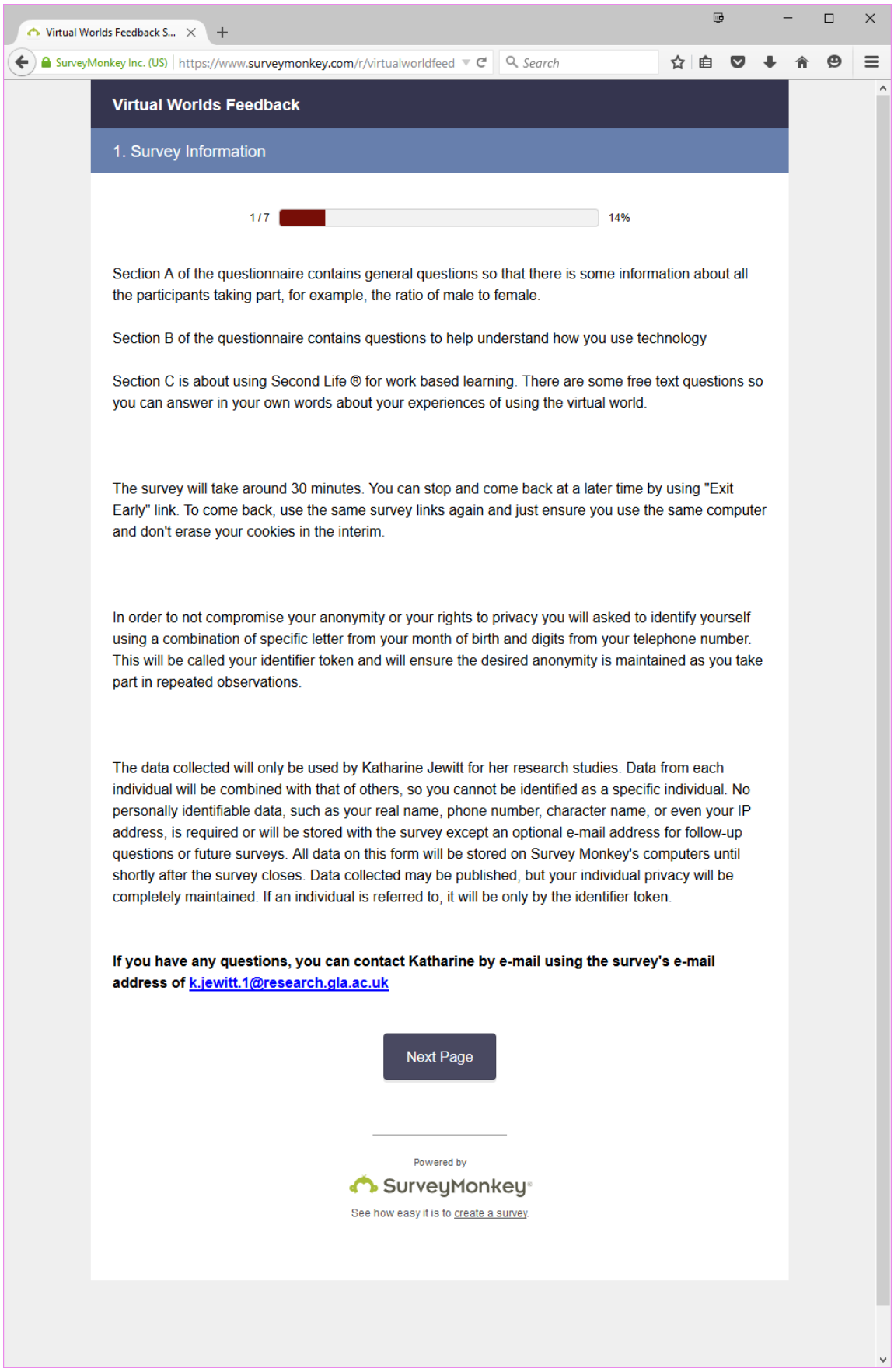
Amendments approved by supervisor, now lodged in ethics file and confirmed.

Please retain this notification for future reference. If you have any enquiries, please email socsci-ethics@glasgow.ac.uk.

University of Glasgow
College of Social Sciences
Florentine House, 53 Hillhead Street. Glasgow G12 8QF
The University of Glasgow, charity number SC004401

E-mail: socsci-ethics@glasgow.ac.uk

## *Appendix E: Questionnaire completed by all research participants taking part in Second Life®*



Virtual Worlds Feedback S...

SurveyMonkey Inc. (US) https://www.surveymonkey.com/r/virtualworldfeed

Search

**Virtual Worlds Feedback**

1. Survey Information

1 / 7 14%

Section A of the questionnaire contains general questions so that there is some information about all the participants taking part, for example, the ratio of male to female.

Section B of the questionnaire contains questions to help understand how you use technology

Section C is about using Second Life ® for work based learning. There are some free text questions so you can answer in your own words about your experiences of using the virtual world.

The survey will take around 30 minutes. You can stop and come back at a later time by using "Exit Early" link. To come back, use the same survey links again and just ensure you use the same computer and don't erase your cookies in the interim.

In order to not compromise your anonymity or your rights to privacy you will asked to identify yourself using a combination of specific letter from your month of birth and digits from your telephone number. This will be called your identifier token and will ensure the desired anonymity is maintained as you take part in repeated observations.

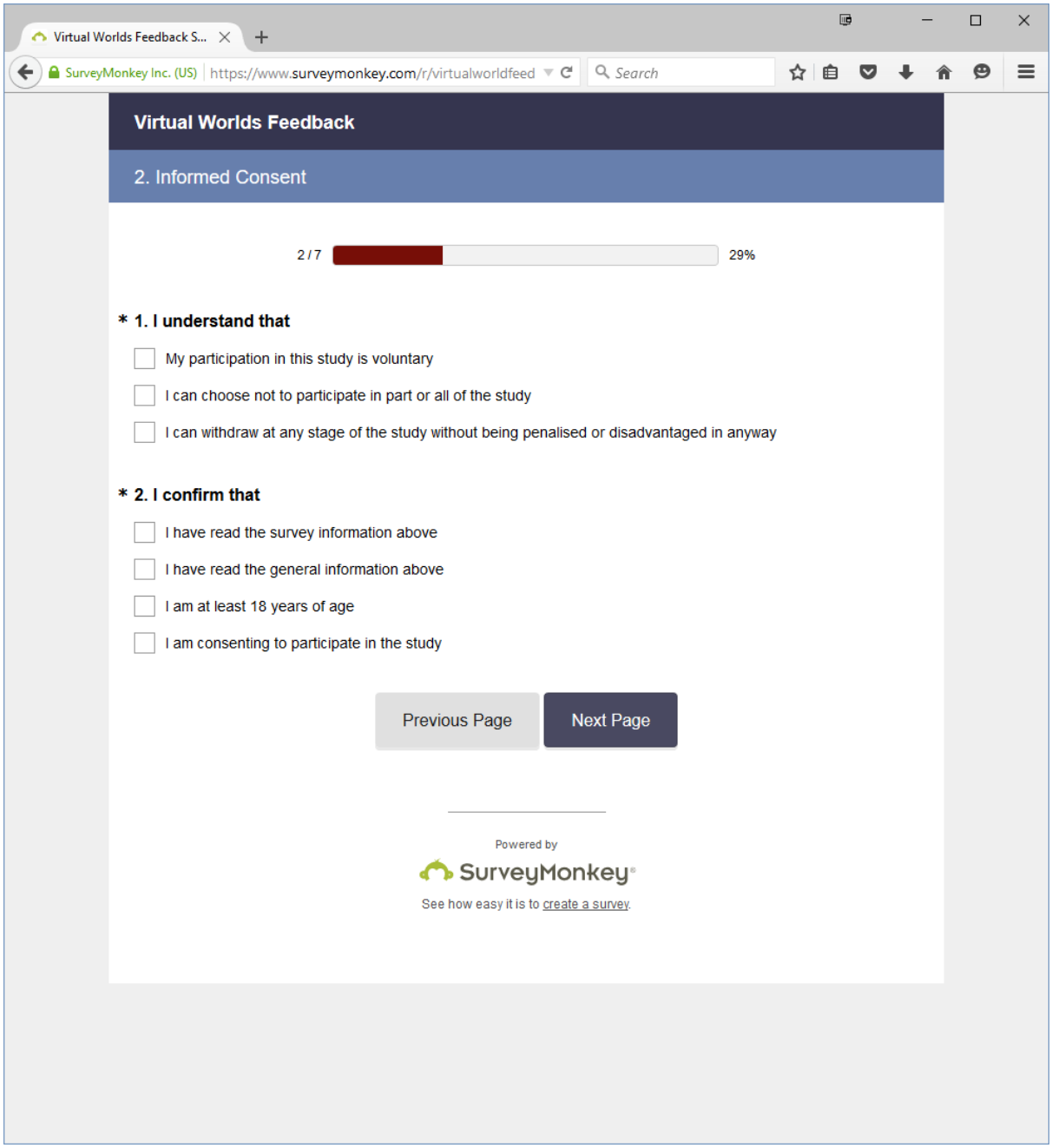
The data collected will only be used by Katharine Jewitt for her research studies. Data from each individual will be combined with that of others, so you cannot be identified as a specific individual. No personally identifiable data, such as your real name, phone number, character name, or even your IP address, is required or will be stored with the survey except an optional e-mail address for follow-up questions or future surveys. All data on this form will be stored on Survey Monkey's computers until shortly after the survey closes. Data collected may be published, but your individual privacy will be completely maintained. If an individual is referred to, it will be only by the identifier token.

**If you have any questions, you can contact Katharine by e-mail using the survey's e-mail address of k.jewitt.1@research.gla.ac.uk**

Next Page

Powered by SurveyMonkey

See how easy it is to create a survey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Virtual Worlds Feedback
2. Informed Consent
2 / 7
29%
* 1. I understand that
My participation in this study is voluntary
I can choose not to participate in part or all of the study
I can withdraw at any stage of the study without being penalised or disadvantaged in anyway
* 2. I confirm that
I have read the survey information above
I have read the general information above
I am at least 18 years of age
I am consenting to participate in the study
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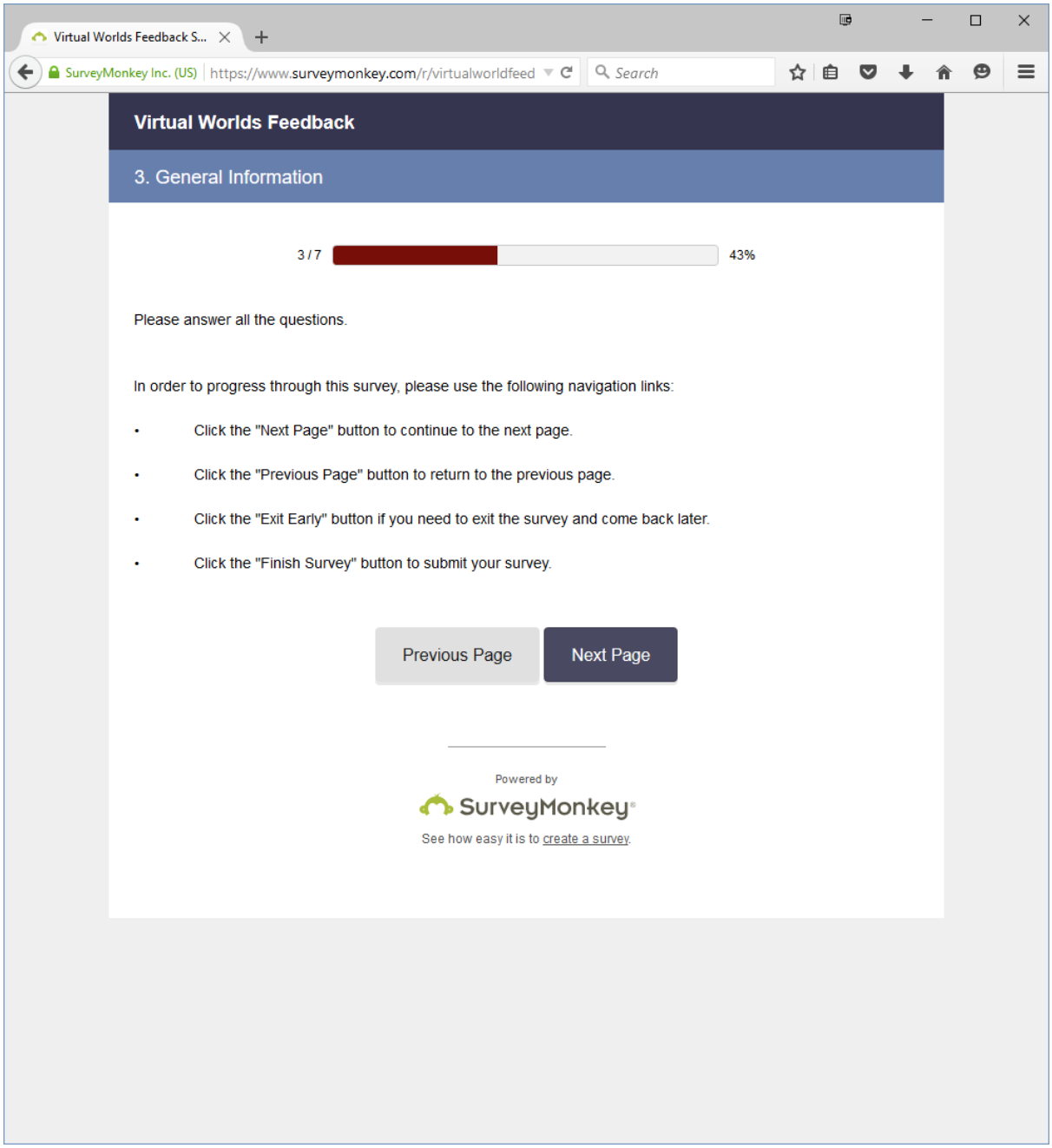
SurveyMonkey
See how easy it is to create a survey.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https://www.surveymonkey.com/r/virtualworldfeed
Search
Virtual Worlds Feedback
3. General Information
3 / 7
43%
Please answer all the questions.
In order to progress through this survey, please use the following navigation links:
Click the "Next Page" button to continue to the next page.
Click the "Previous Page" button to return to the previous page.
Click the "Exit Early" button if you need to exit the survey and come back later.
Click the "Finish Survey" button to submit your survey.
Previous Page
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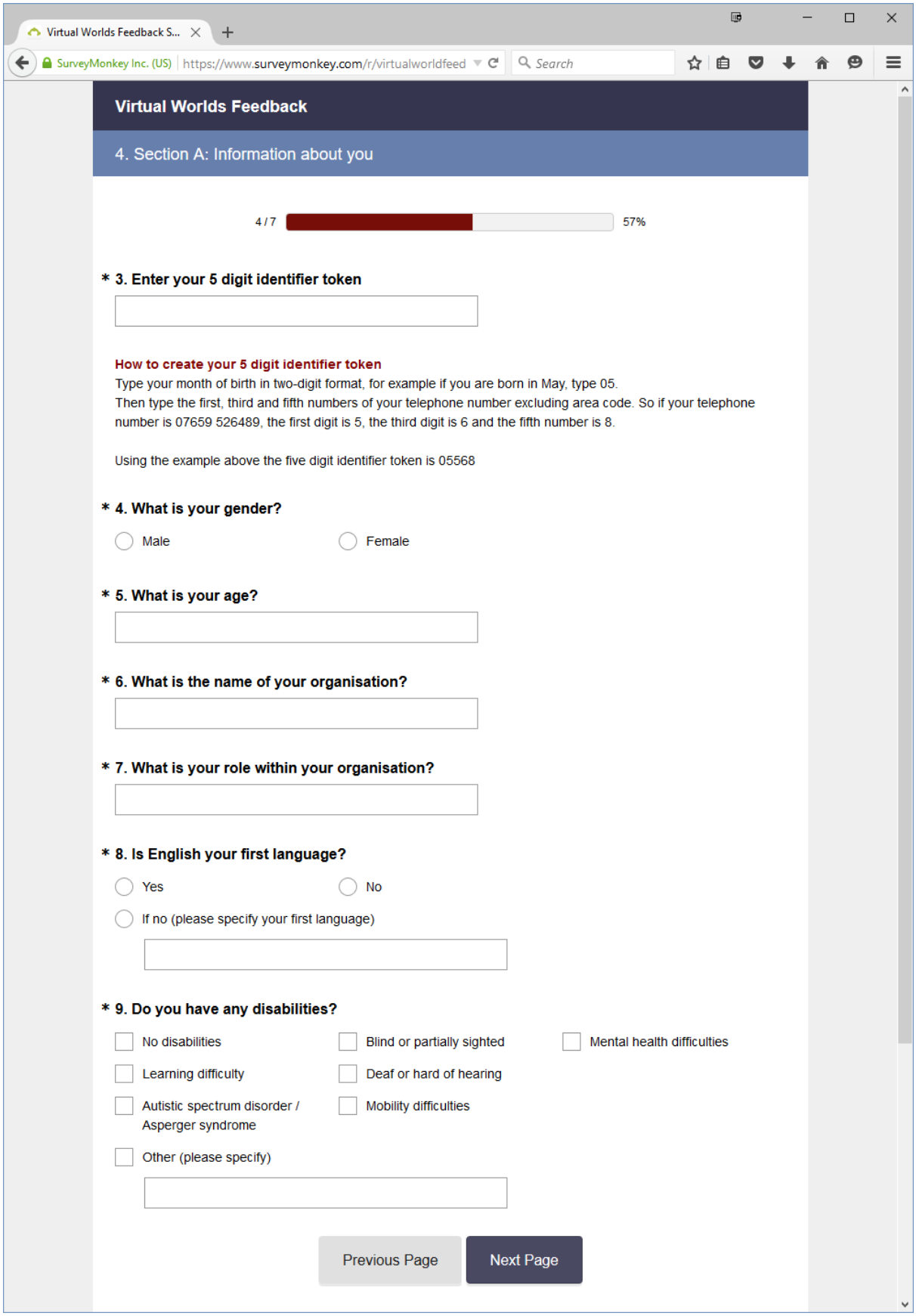
Powered by
SurveyMonkey
See how easy it is to create a survey.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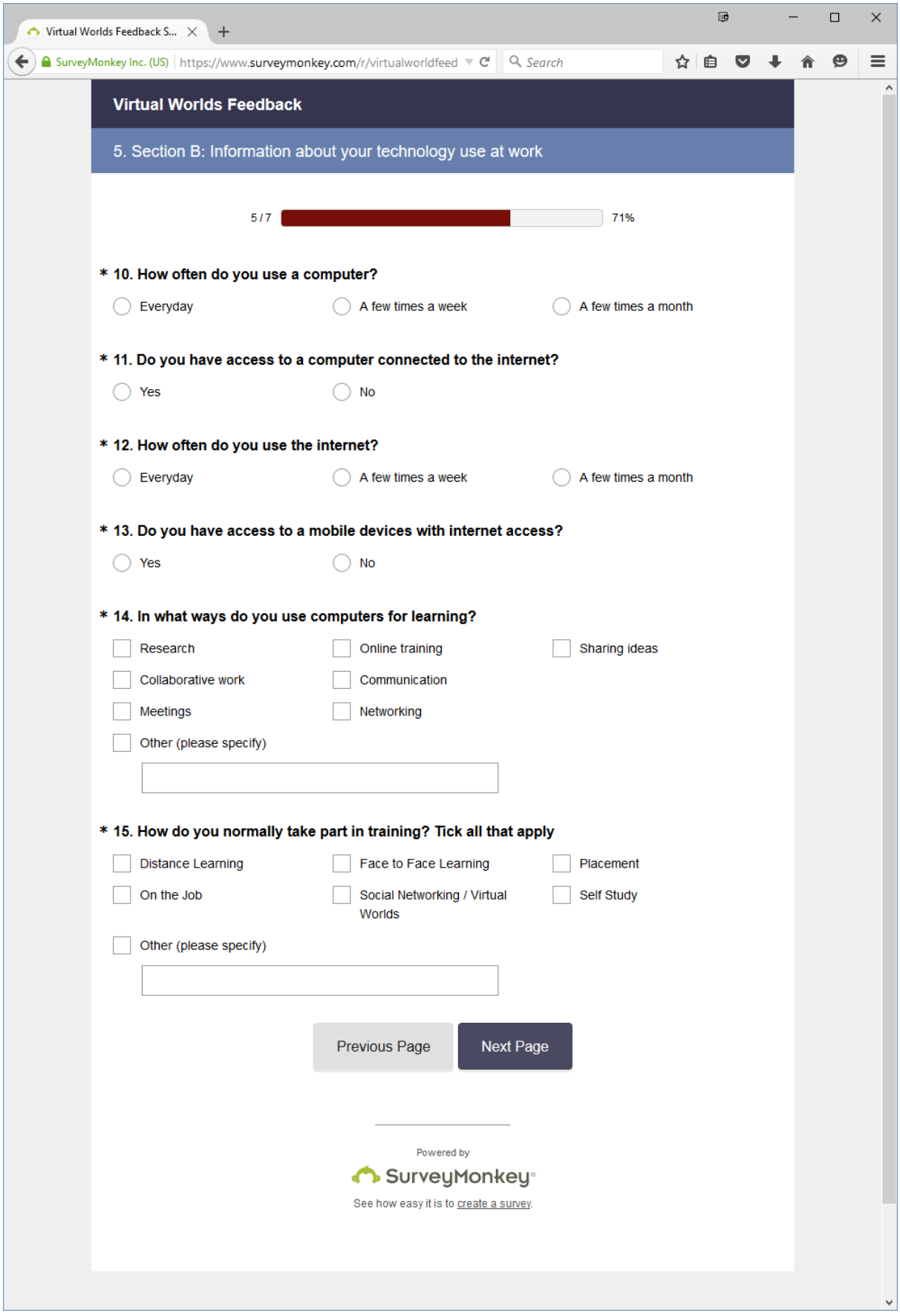
https://www.surveymonkey.com/r/virtualworldfeed
Search
Virtual Worlds Feedback
4. Section A: Information about you
4 / 7
57%
* 3. Enter your 5 digit identifier token
How to create your 5 digit identifier token
Type your month of birth in two-digit format, for example if you are born in May, type 05.
Then type the first, third and fifth numbers of your telephone number excluding area code. So if your telephone number is 07659 526489, the first digit is 5, the third digit is 6 and the fifth number is 8.
Using the example above the five digit identifier token is 05568
* 4. What is your gender?
Male
Female
* 5. What is your age?
* 6. What is the name of your organisation?
* 7. What is your role within your organisation?
* 8. Is English your first language?
Yes
No
If no (please specify your first language)
* 9. Do you have any disabilities?
No disabilities
Blind or partially sighted
Mental health difficulties
Learning difficulty
Deaf or hard of hearing
Autistic spectrum disorder / Asperger syndrome
Mobility difficulties
Other (please specify)
Previous Page
Next Page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SurveyMonkey Inc. (US)
https://www.surveymonkey.com/r/virtualworldfeed
Search
Virtual Worlds Feedback
5. Section B: Information about your technology use at work
5 / 7
71%
* 10. How often do you use a computer?
Everyday
A few times a week
A few times a month
* 11. Do you have access to a computer connected to the internet?
Yes
No
* 12. How often do you use the internet?
Everyday
A few times a week
A few times a month
* 13. Do you have access to a mobile devices with internet access?
Yes
No
* 14. In what ways do you use computers for learning?
Research
Online training
Sharing ideas
Collaborative work
Communication
Meetings
Networking
Other (please specify)
* 15. How do you normally take part in training? Tick all that apply
Distance Learning
Face to Face Learning
Placement
On the Job
Social Networking / Virtual Worlds
Self Study
Other (please specify)
Previous Page
Next Page
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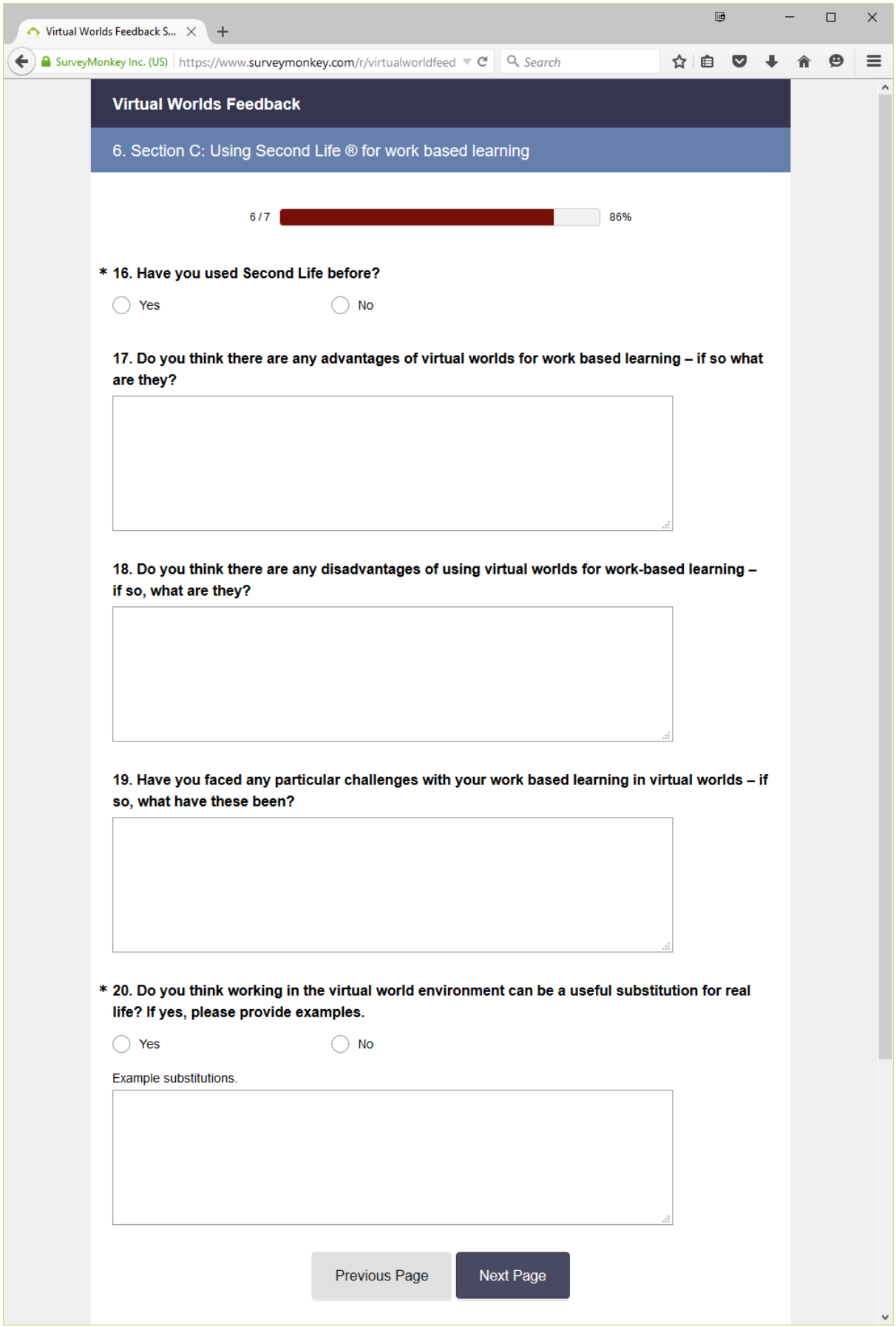
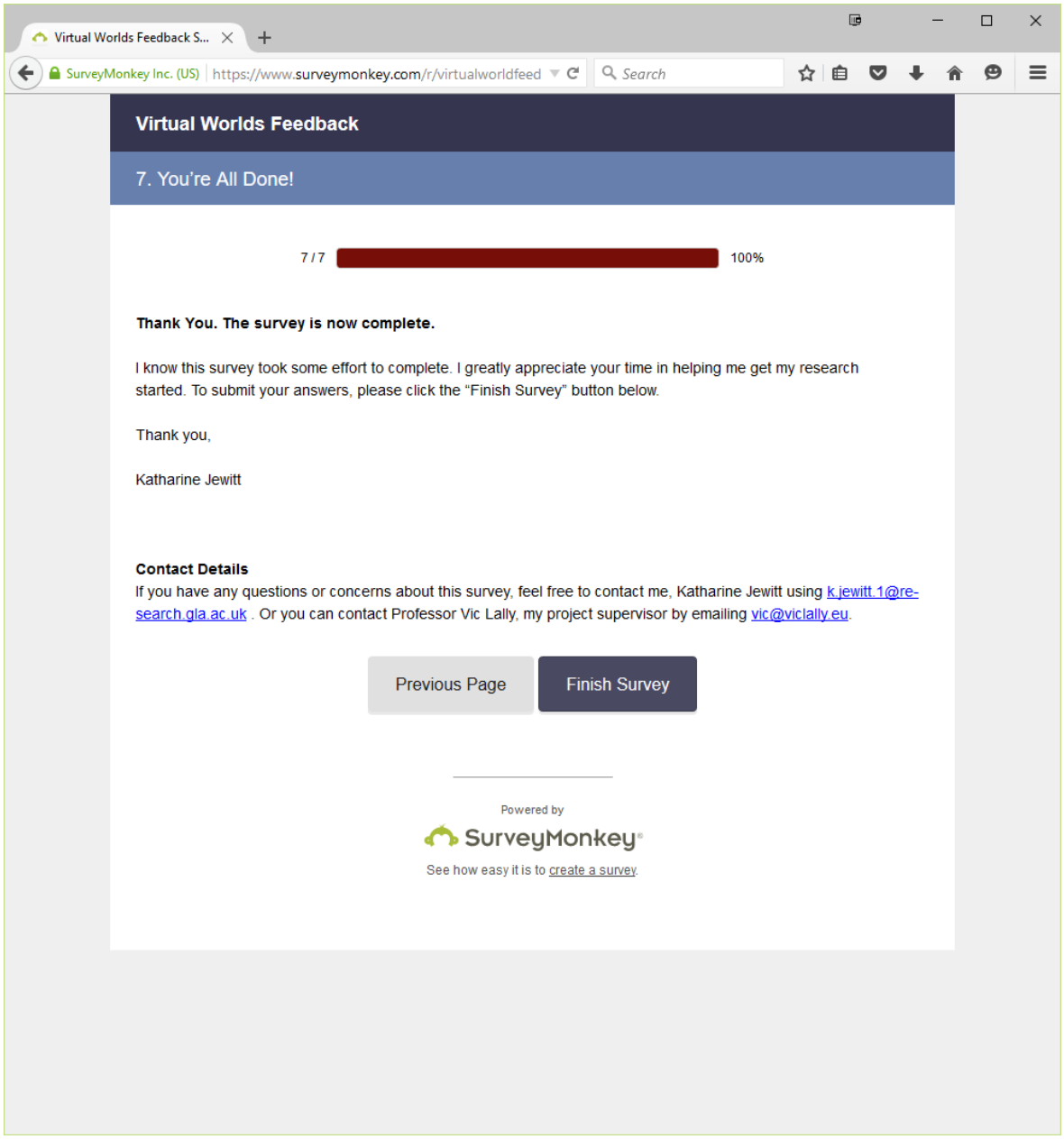
SurveyMonkey
See how easy it is to create a survey.


Virtual Worlds Feedback S...
SurveyMonkey Inc. (US)
https://www.surveymonkey.com/r/virtualworldfeed
Search
Virtual Worlds Feedback
6. Section C: Using Second Life ® for work based learning
6 / 7
86%
* 16. Have you used Second Life before?
Yes
No
17. Do you think there are any advantages of virtual worlds for work based learning – if so what are they?
18. Do you think there are any disadvantages of using virtual worlds for work-based learning – if so, what are they?
19. Have you faced any particular challenges with your work based learning in virtual worlds – if so, what have these been?
* 20. Do you think working in the virtual world environment can be a useful substitution for real life? If yes, please provide examples.
Yes
No
Example substitutions.
Previous Page
Next Page


Virtual Worlds Feedback S...
SurveyMonkey Inc. (US)
https://www.surveymonkey.com/r/virtualworldfeed
Search
Virtual Worlds Feedback
7. You're All Done!
7 / 7
100%
Thank You. The survey is now complete.
I know this survey took some effort to complete. I greatly appreciate your time in helping me get my research started. To submit your answers, please click the "Finish Survey" button below.
Thank you,
Katharine Jewitt
Contact Details
If you have any questions or concerns about this survey, feel free to contact me, Katharine Jewitt using k.jewitt.1@research.gla.ac.uk . Or you can contact Professor Vic Lally, my project supervisor by emailing vic@viclally.eu.
Previous Page
Finish Survey
Powered by
SurveyMonkey
See how easy it is to create a survey.

## *Appendix F: Second Life® Quick Start Guide*

SECOND LIFE

# Quickstart Guide

Welcome to your Second Life! This guide will help you get started fast, by explaining how to complete some of the most common tasks you'll need to get the most out of your new Second Life. It might be helpful to print this guide for reference as you explore the World.

### Mouse

You'll use a mouse to click buttons, make selections, and interact with the Second Life Viewer interface.

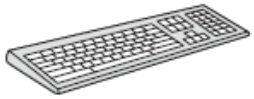
**Symbols used in this guide**

Right-click
or Ctrl+click (On a Mac)

Left-click

### Keyboard

You'll use a keyboard to participate in text chats, IMs, for searching, and more. Lots of common tasks are easier once you learn keyboard shortcuts.



**Symbols used in this guide**

Keyboard key

### Mic/Headset

If you have a microphone and headphones (or speakers), you can participate in real-time voice conversations with other users.

For help setting up your mic and headset, see Panel 8.

### Viewer Interface

This Quickstart Guide will teach you how to find and use the most important tools in the Second Life Viewer software.

**Symbols used in this guide**

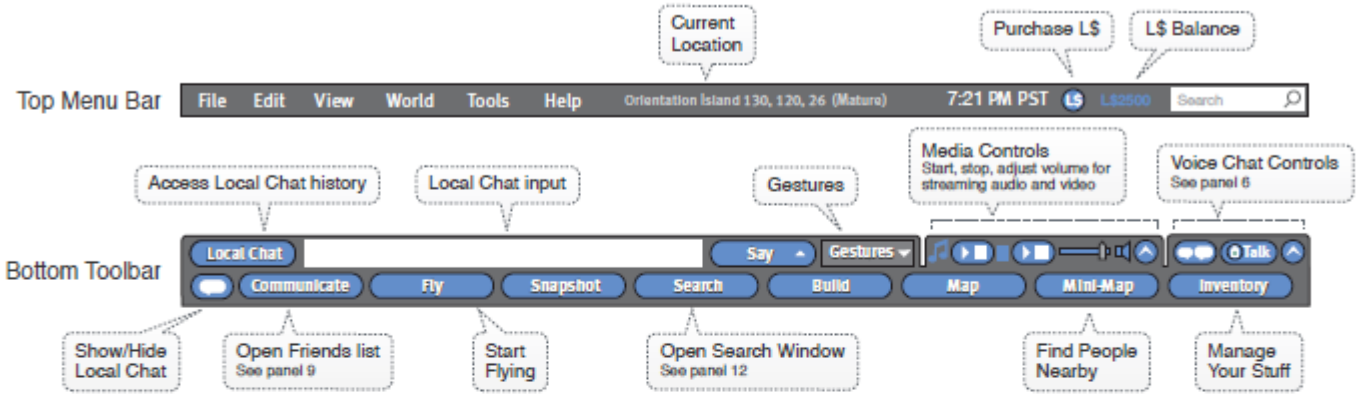

Contextual menus
(sit is selected)


Dropdown menus
(Prefs. is selected)


Interface button

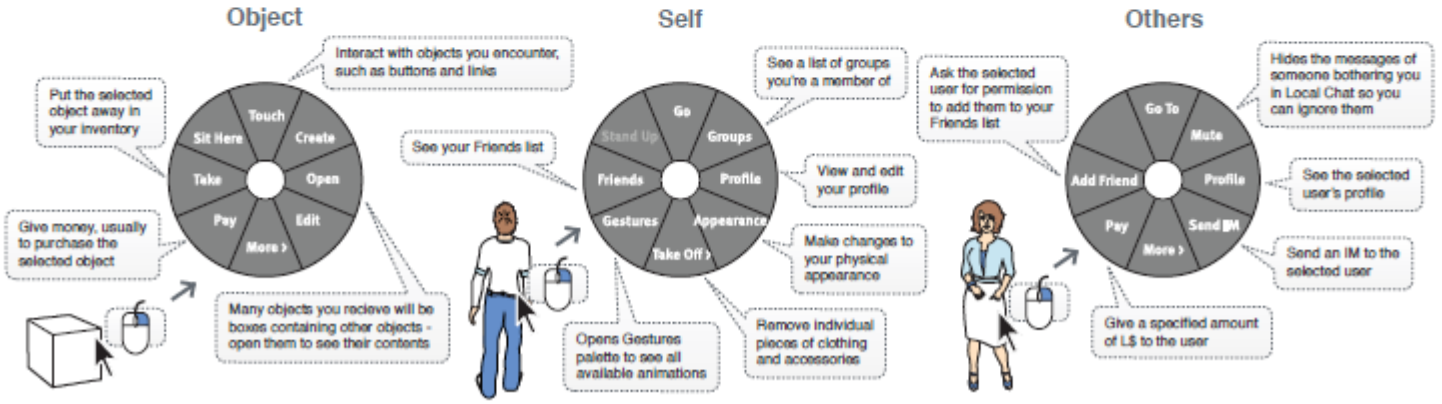
## 1 Viewer interface overview

To access most of the features, tools and options in the Second Life Viewer, you'll want to get comfortable finding your way around both the Top Menu Bar and the Bottom Toolbar.




## 2 Viewer contextual menus

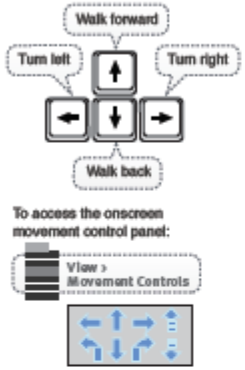
As you explore the world of Second Life, you'll encounter both people and objects to interact with. Many common actions and tools are accessed through contextual menus, which appear when you right-click on objects, yourself, or other users.



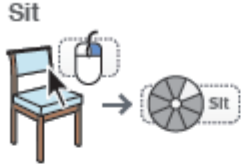
## 3 Moving

In Second Life, your avatar can walk, run, and even fly. If you prefer, you can also use an onscreen control panel to move around.

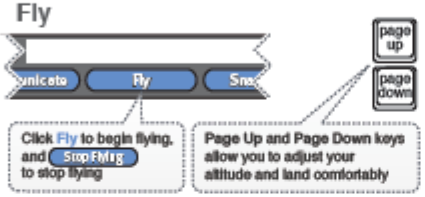
### Walk




### Sit

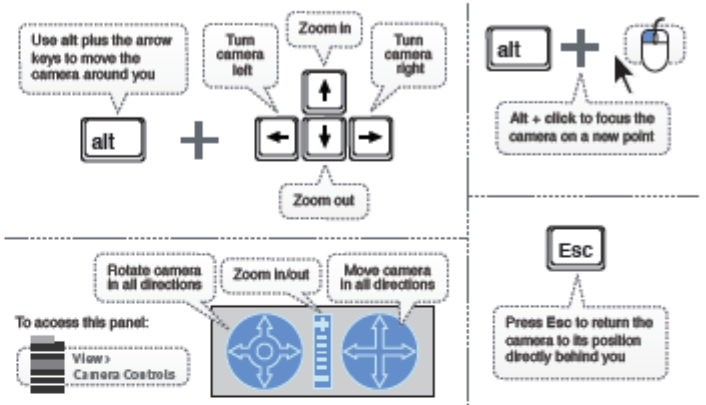



### Fly



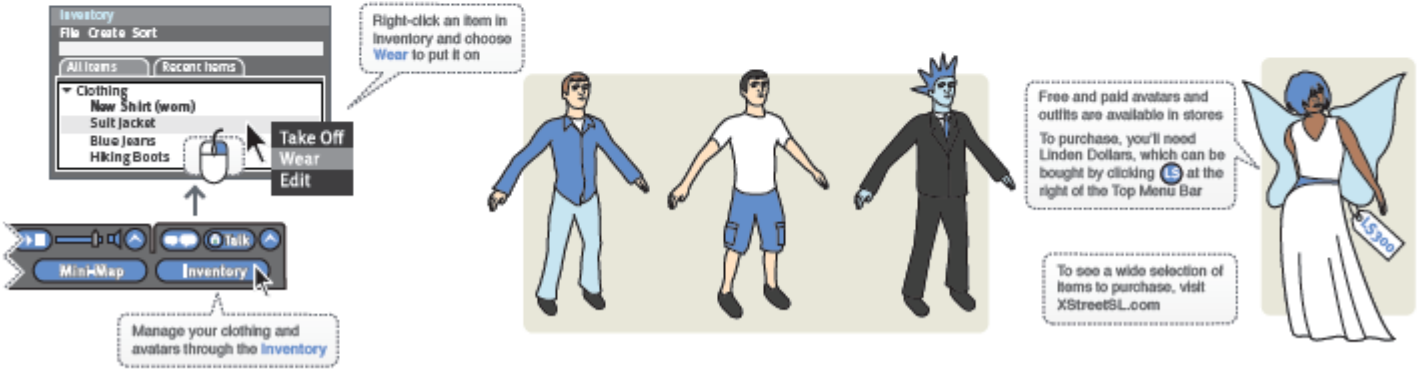

## 4 Seeing

By default, you'll see Second Life from just behind your avatar, but you can move and turn the camera around to look at whatever you like - including yourself.



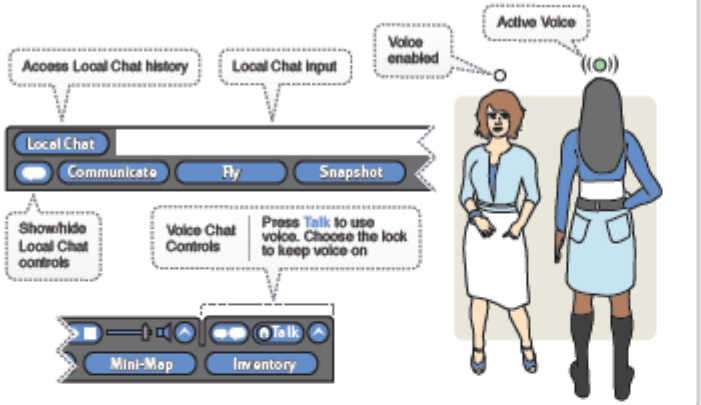

## 5 Appearance

In Second Life, you can look like – and wear – anything you want. Edit your Appearance to adjust your physical features and body, and select clothing, outfits and costumes to wear from your Inventory. You can customize your appearance however you like, or buy pre-designed avatars and outfits that other Residents have made.



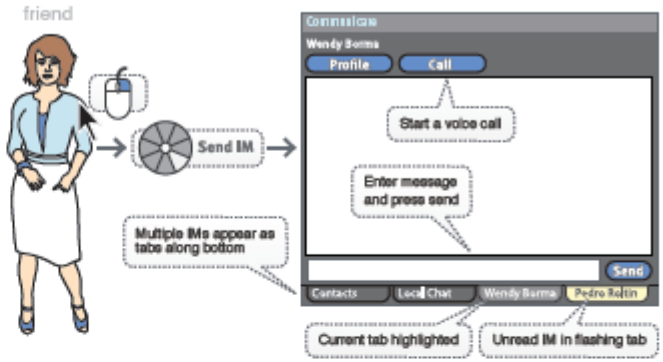
## 6 Local chat & voice

Express yourself! You can talk to the people around you through text-based Local Chat. If you have a microphone, you can also speak out loud using inworld voice.




## 7 IMs & voice calls

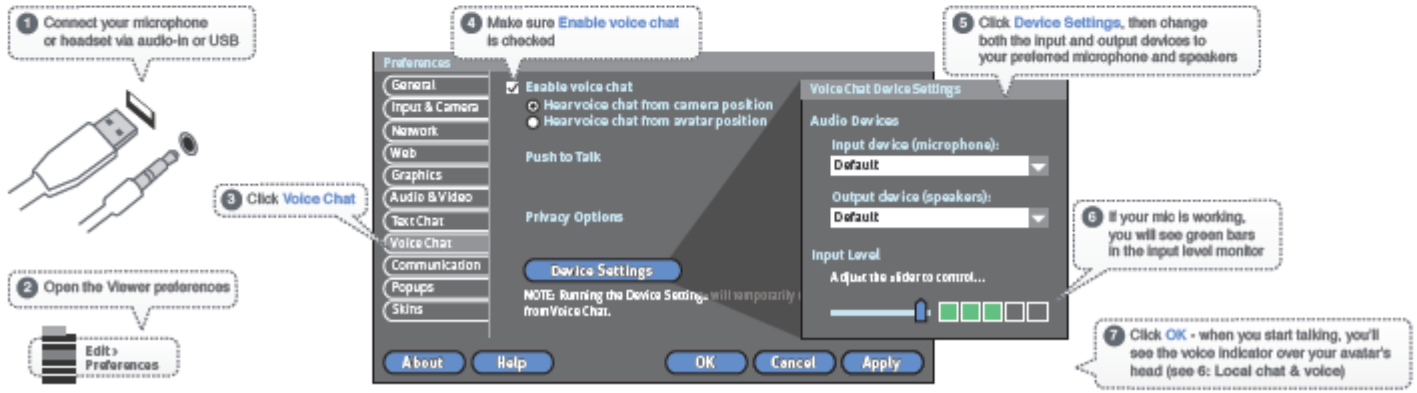
Want to have a private conversation? Use instant messages or voice calls to talk to other users, no matter where they are in Second Life.




You can also IM users who aren't nearby from your Friends list.

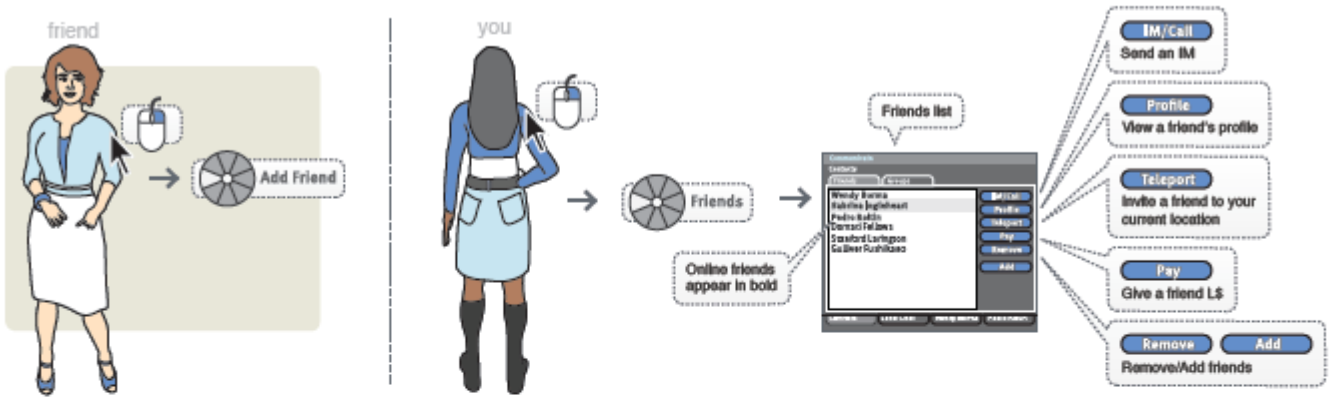
## 8 Set up for voice chat

Tired of typing? To use the Voice features in Second Life, you'll need to set up your microphone and headset. Just follow these simple steps, and you'll be talking in no time.



## 9 Make friends

Second Life is a lot more fun when you have friends to explore it with. When you meet interesting people, you can ask for permission to add them to your Friends list. Then, use the Friends list to see which friends are online, send them messages, view their profiles and more.

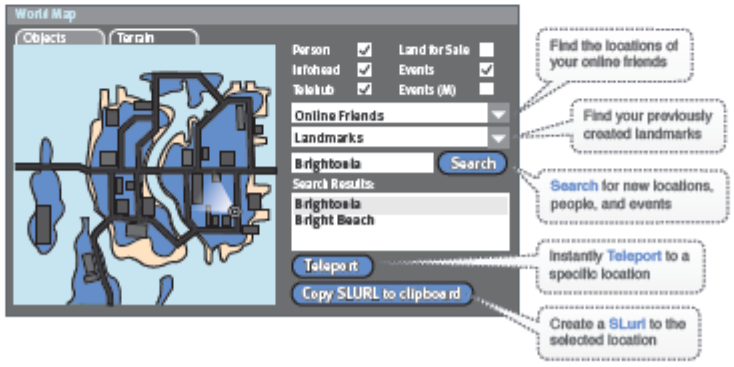



## 10 Location

The world of Second Life is gigantic, and getting bigger every day. If you want to visit a specific location, you can search for it on the Map. You can create and save Landmarks – bookmarks that will bring you back to specific locations. Use Landmarks to save time, and jump straight to your favorite places!


**To create a landmark you can return to later:**


To return to Landmarks you've created, open your Inventory and double-click on any item in the Landmarks folder.




### Teleport

You can Teleport to get from one location to another quickly. To invite a friend to your location, open your Friends list, and click Teleport.

### SLurl

(Second Life URL)

You can use SLurl to teleport to new locations. A SLurl is a web-based link to a location in Second Life. If you click a SLurl with Second Life open on your computer, you can immediately teleport to that location.

## 11 Help

There's a lot to learn in Second Life, but you're never alone. If you have questions, need advice, or don't know what to do, help is always waiting for you. Visit the Support Portal at secondlife.com/support to get help now!


**Support Portal** — At secondlife.com/support, you will have access to the Knowledge Base, tickets, and Billing Support

**Knowledge Base** — Find help videos and information on your avatar, Linden Dollars and more

**Live Chat** — Premium members have access to Live Chat support in Second Life

**Support Tickets** — If you can't find the help you need in the Knowledge Base, you can submit a ticket to the Second Life Support Staff

**Billing Support** — If you have a non-technical issue with your account, you can call the Billing Team toll free 24/7

## 12 What next?

Second Life is packed with interesting things to do, people to meet and places to explore. If you're not sure what do to next, or want to see what's new, you have lots of options.

To find new activities, events and places to explore, visit: secondlife.com/showcase

Talk to other users in Second Life whenever you have questions

Use the Search feature to search all of Second Life


The Showcase tab displays interesting places and things going on in Second Life


Narrow your search results using the tabs at the top of the search window to specifically search for events, places, people and more

# Appendix: Keyboard Shortcuts

## Movement

Guide your avatar's movements in Second Life.

| | |
|---|---|
| Walk forward | W or ↑ |
| Walk backward | S or ↓ |
| Turn left | A or ← |
| Turn right | D or → |
| Run | Double-tap W S or ↑ ↓ |
| Always run | Ctrl/Cmd + R |
| Jump | E (Tap once) |
| Toggle flying | home |
| Fly up | Hold E or hold page up |
| Fly down | Hold C or hold page down |

## View

Control your camera view and perspective in Second Life.

| | |
|---|---|
| Mouselook | M |
| Reset View | Esc |
| Look at | Hold Alt and click mouse to recenter |
| Zoom-in | Ctrl/Cmd + 0 |
| Zoom-default | Ctrl/Cmd + 9 |
| Zoom-out | Ctrl/Cmd + 8 |
| Toggle fullscreen | Alt/Opt + Enter |

## Communicate

Access and participate in text-based Local Chat and Instant Messages with other users.

| | |
|---|---|
| Show chat bar | / (if not displayed) |
| Hide chat bar | Esc (if displayed) |
| Friends | Ctrl/Cmd + Shift + F<br>Toggle between Friends and Groups Tabs with Alt/Opt + ← → |
| Local chat | Ctrl/Cmd + H |
| Communicate | Ctrl/Cmd + T |
| Look at last speaker | Ctrl/Cmd + \ |
| Gestures | Ctrl/Cmd + G |

## System

Basic system-wide functions that work in Second Life.

| | |
|---|---|
| Undo | Ctrl/Cmd + Z |
| Redo | Ctrl/Cmd + Y |
| Cut | Ctrl/Cmd + X |
| Copy | Ctrl/Cmd + C |
| Paste | Ctrl/Cmd + V |
| Duplicate | Ctrl/Cmd + D |
| Select all | Ctrl/Cmd + A |
| Deselect | Ctrl/Cmd + E |
| Close window | Ctrl/Cmd + W |
| Close all windows | Ctrl/Cmd + Shift + W |

## General

Quick access to useful Second Life resources, interfaces and tools.

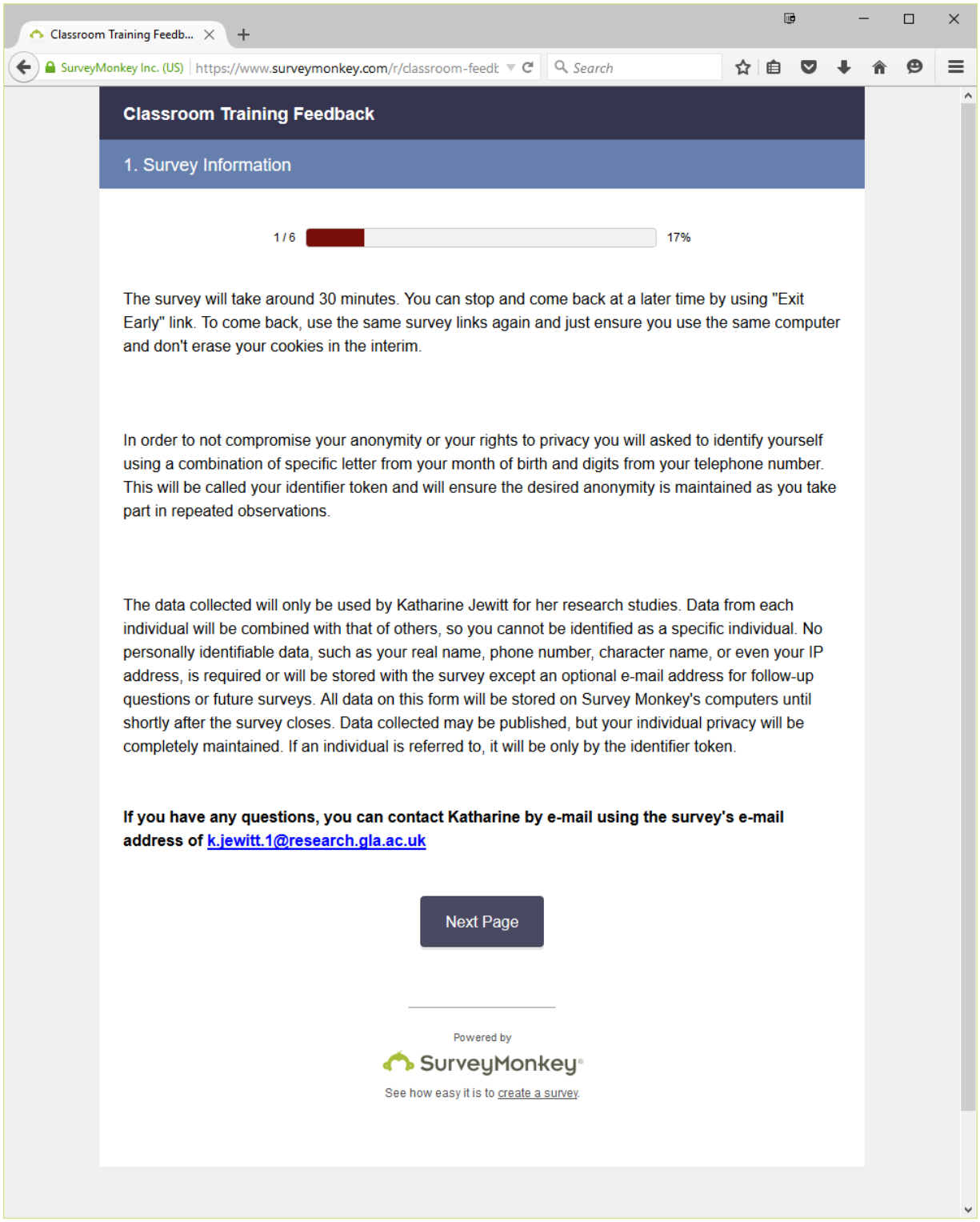
| | |
|---|---|
| Preferences | Ctrl/Cmd + P |
| Help | F1 |
| Search | Ctrl/Cmd + F |
| World map | Ctrl/Cmd + M |
| Mini-map | Ctrl/Cmd + Shift + M |
| Teleport home | Ctrl/Cmd + Shift + H |
| Inventory | Ctrl/Cmd + I |
| Build | B |
| Upload image | Ctrl/Cmd + U |
| Take snapshot | Ctrl/Cmd + Shift + S |
| Snapshot to disk | Ctrl + : |
| Quit Second Life | Ctrl/Cmd + Q |

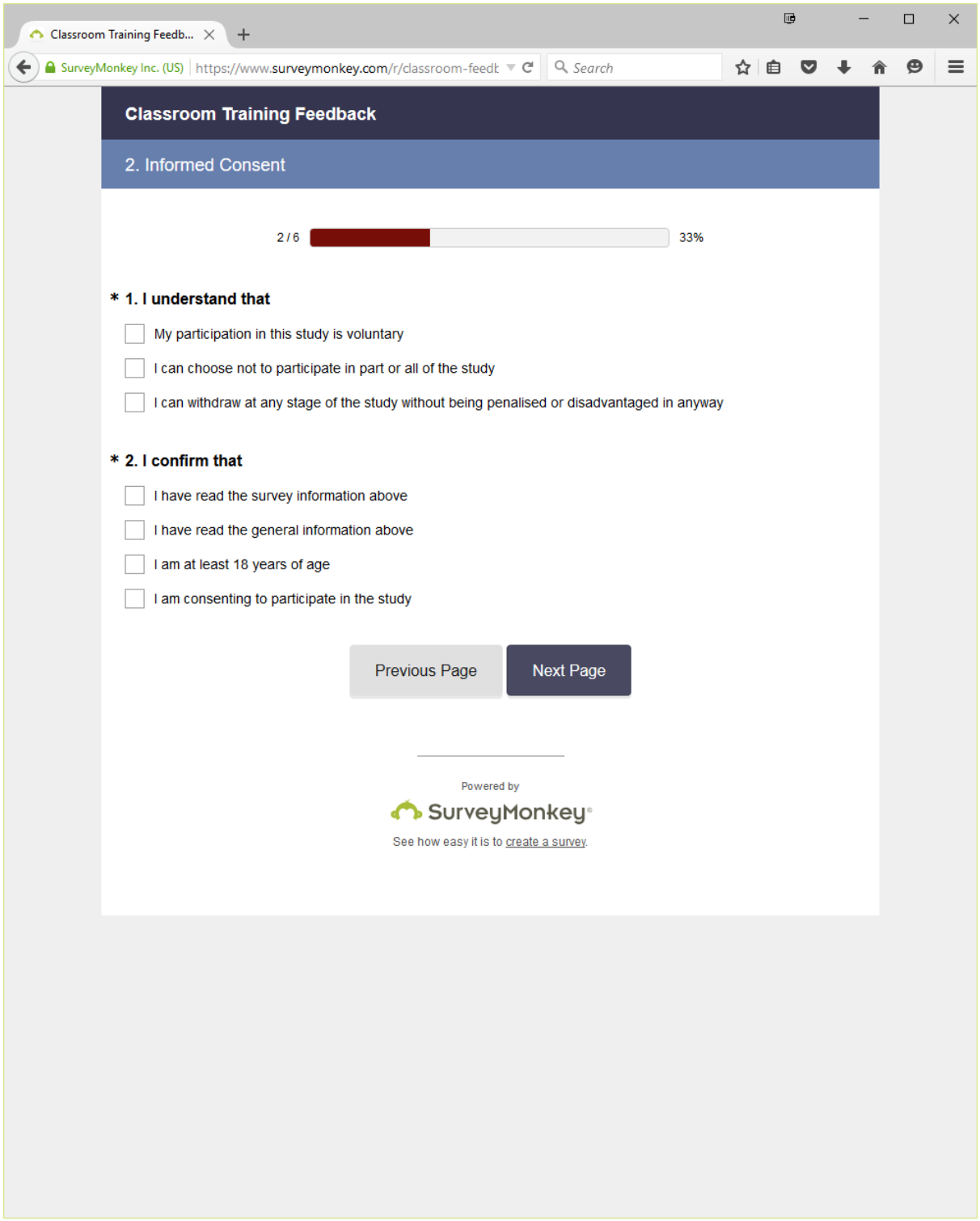
Key:

Ctrl/Cmd = **Ctrl** on a PC; **Command** on a Mac

Alt/Opt = **Alt** on a PC; **Option** on a Mac

## *Appendix G: Questionnaire completed by all research participants taking part in the Pilot Study Classroom Training Prior to Using Second Life®*




Classroom Training Feedb...
SurveyMonkey Inc. (US)
https://www.surveymonkey.com/r/classroom-feedb
Search
Classroom Training Feedback
2. Informed Consent
2 / 6
33%
* 1. I understand that
My participation in this study is voluntary
I can choose not to participate in part or all of the study
I can withdraw at any stage of the study without being penalised or disadvantaged in anyway
* 2. I confirm that
I have read the survey information above
I have read the general information above
I am at least 18 years of age
I am consenting to participate in the study
Previous Page
Next Page
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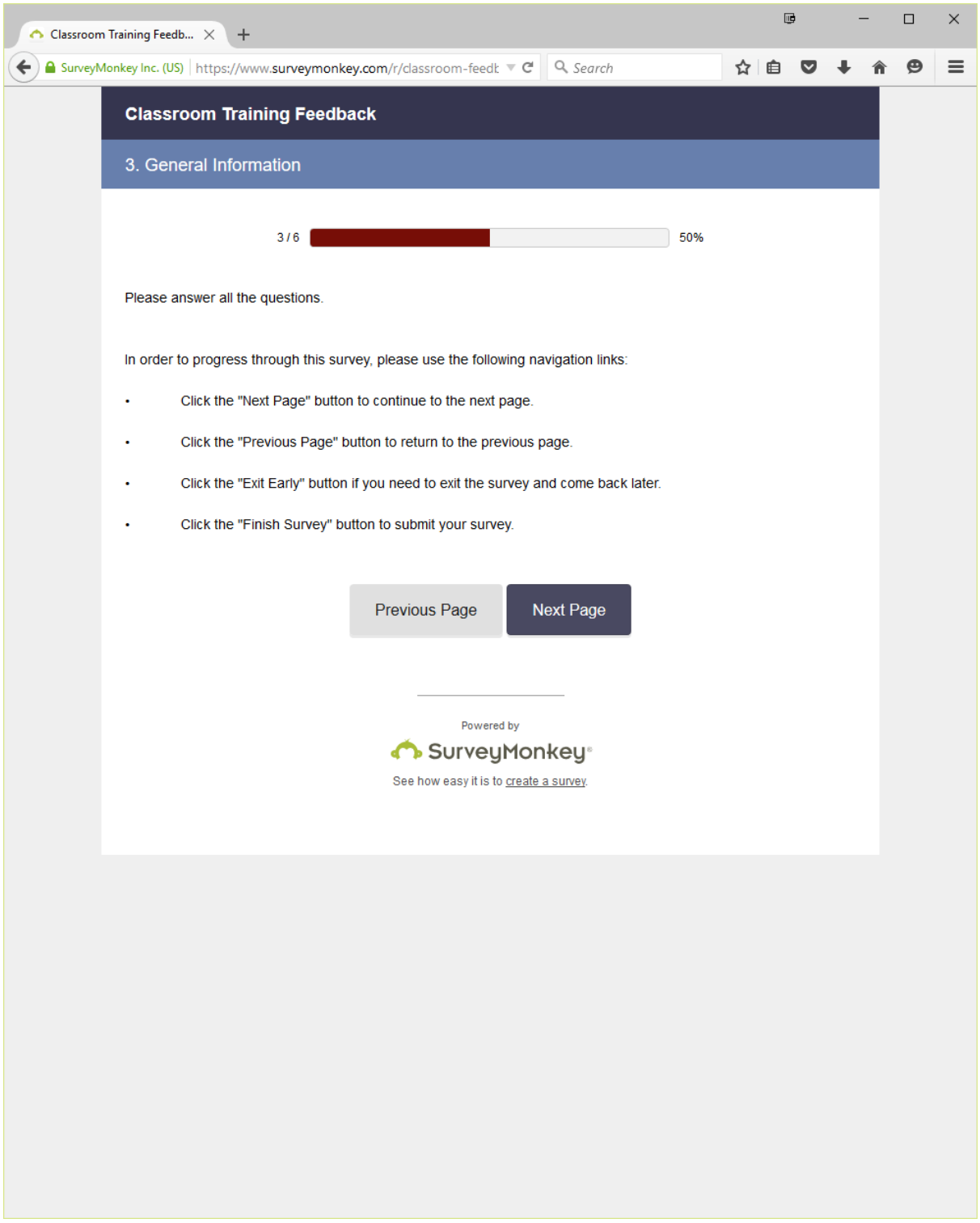
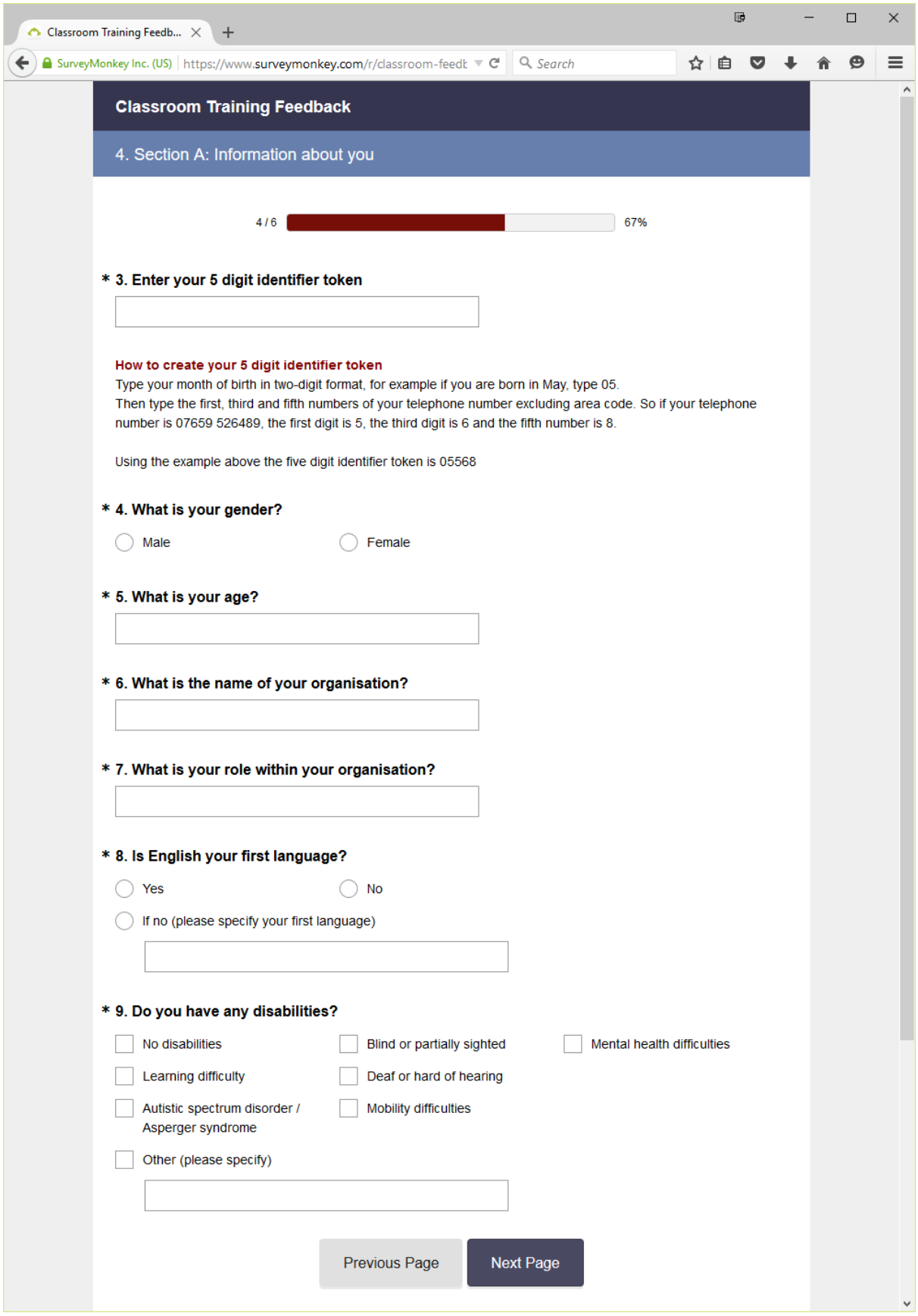
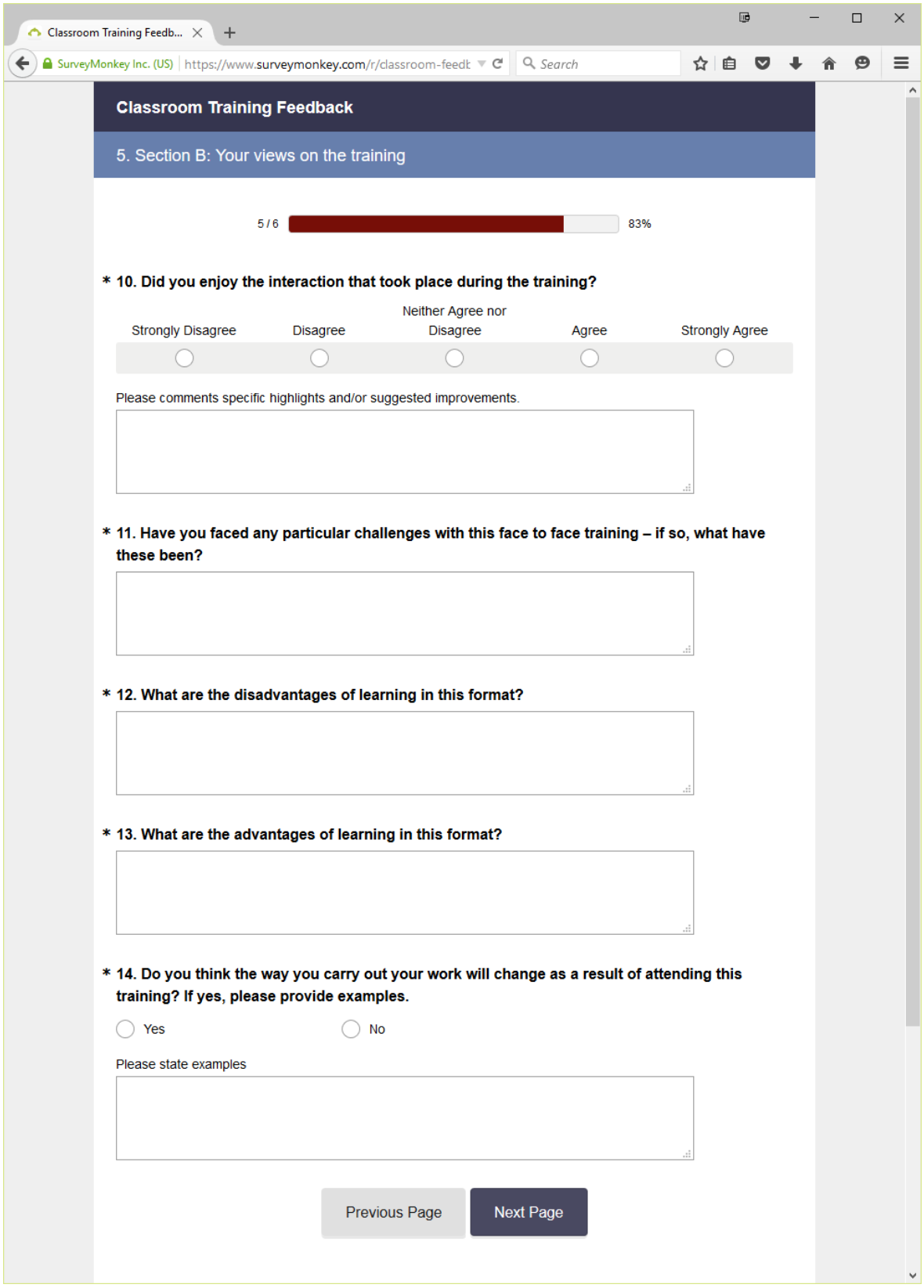
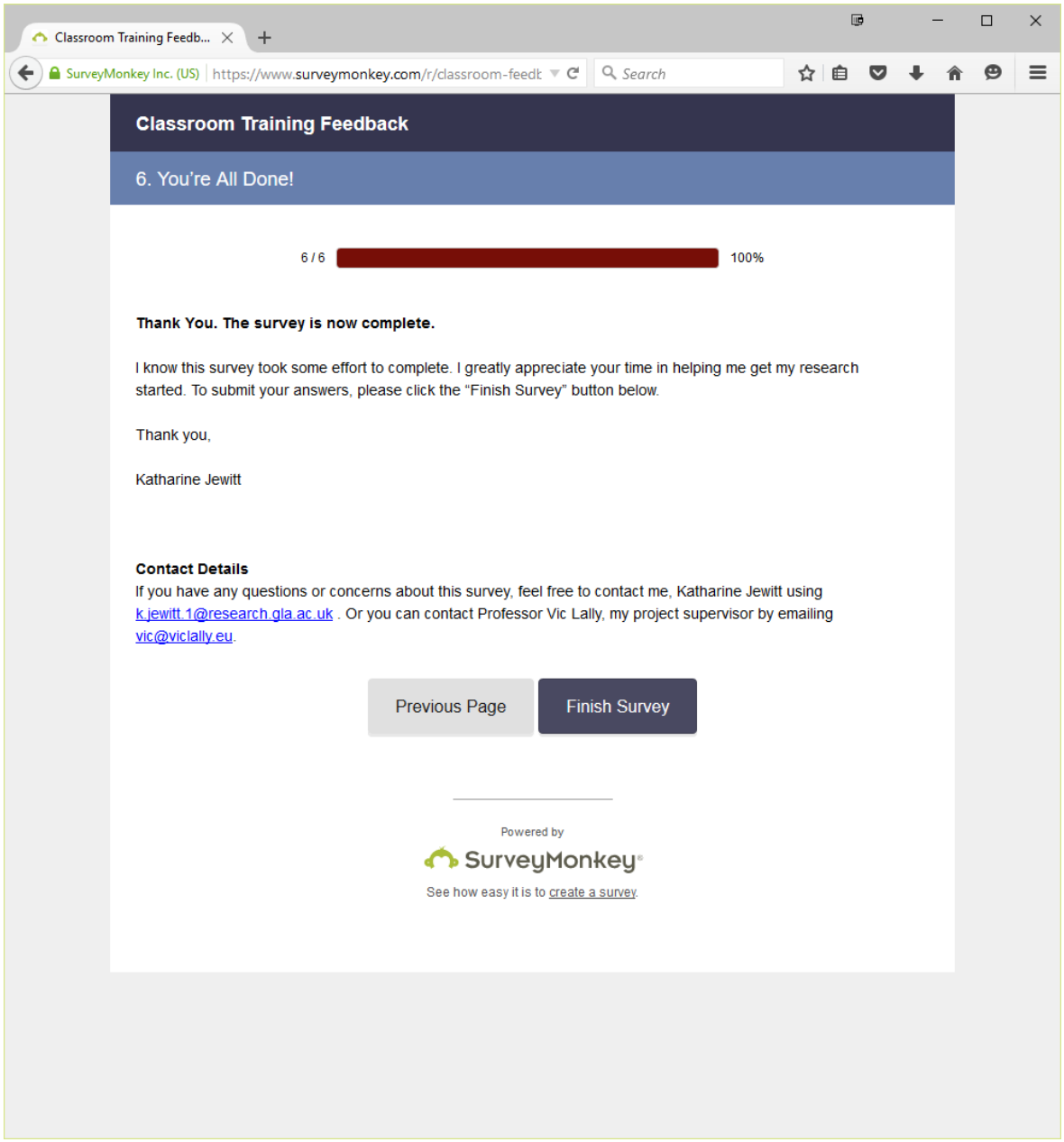
SurveyMonkey
See how easy it is to create a survey.


Classroom Training Feedb...
SurveyMonkey Inc. (US)
https://www.surveymonkey.com/r/classroom-feedb
Search
Classroom Training Feedback
3. General Information
3 / 6
50%
Please answer all the questions.
In order to progress through this survey, please use the following navigation links:
Click the "Next Page" button to continue to the next page.
Click the "Previous Page" button to return to the previous page.
Click the "Exit Early" button if you need to exit the survey and come back later.
Click the "Finish Survey" button to submit your survey.
Previous Page
Next Page
Powered by
SurveyMonkey
See how easy it is to create a survey.


Classroom Training Feedb...
SurveyMonkey Inc. (US)
https://www.surveymonkey.com/r/classroom-feedb
Search
Classroom Training Feedback
4. Section A: Information about you
4 / 6
67%
* 3. Enter your 5 digit identifier token
How to create your 5 digit identifier token
Type your month of birth in two-digit format, for example if you are born in May, type 05.
Then type the first, third and fifth numbers of your telephone number excluding area code. So if your telephone number is 07659 526489, the first digit is 5, the third digit is 6 and the fifth number is 8.
Using the example above the five digit identifier token is 05568
* 4. What is your gender?
Male
Female
* 5. What is your age?
* 6. What is the name of your organisation?
* 7. What is your role within your organisation?
* 8. Is English your first language?
Yes
No
If no (please specify your first language)
* 9. Do you have any disabilities?
No disabilities
Blind or partially sighted
Mental health difficulties
Learning difficulty
Deaf or hard of hearing
Autistic spectrum disorder / Asperger syndrome
Mobility difficulties
Other (please specify)
Previous Page
Next Page


Classroom Training Feedb...
SurveyMonkey Inc. (US)
https://www.surveymonkey.com/r/classroom-feedb
Search
Classroom Training Feedback
5. Section B: Your views on the training
5 / 6
83%
* 10. Did you enjoy the interaction that took place during the training?
Strongly Disagree
Disagree
Neither Agree nor Disagree
Agree
Strongly Agree
Please comments specific highlights and/or suggested improvements.
* 11. Have you faced any particular challenges with this face to face training – if so, what have these been?
* 12. What are the disadvantages of learning in this format?
* 13. What are the advantages of learning in this format?
* 14. Do you think the way you carry out your work will change as a result of attending this training? If yes, please provide examples.
Yes
No
Please state examples
Previous Page
Next Page


Classroom Training Feedb...
SurveyMonkey Inc. (US)
https://www.surveymonkey.com/r/classroom-feedb
Search
Classroom Training Feedback
6. You're All Done!
6 / 6
100%
Thank You. The survey is now complete.
I know this survey took some effort to complete. I greatly appreciate your time in helping me get my research started. To submit your answers, please click the "Finish Survey" button below.
Thank you,
Katharine Jewitt
Contact Details
If you have any questions or concerns about this survey, feel free to contact me, Katharine Jewitt using k.jewitt.1@research.gla.ac.uk . Or you can contact Professor Vic Lally, my project supervisor by emailing vic@viclally.eu.
Previous Page
Finish Survey
Powered by
SurveyMonkey
See how easy it is to create a survey.

# *Appendix H: Quantitative Data collected during the Pilot Study*

## Section A: Information about you

| **What is your age?** | | |
|---|---|---|
| Population | 22 | |
| Minimum | 18 | |
| Maximum | 55 | |
| Range | 37 | |
| Mode(s) | 18, 19 | |
| Mean | 27.4 | |
| Median | 20 | |
| Lower Quartile | 18 | |
| Upper Quartile | 37 | |
| Standard Deviation | 12.1 | |
| **What is your gender?** | | |
| Male | 13 | 59.1% |
| Female | 9 | 40.9% |
| **Total** | **22** | **100%** |
| **Is English your 1st Language** | | |
| Yes | 21 | 95.5% |
| No | 1 | 4.5% |
| **Total** | **22** | **100%** |
| **Do you have any disabilities?** | | |
| No | 21 | 95.5% |
| Yes | 1 | 4.5% |
| **Total** | **22** | **100%** |
| ***Summary of disabilities*** | | |
| Learning difficulty | 1 | 4.5% |
| Autistic Spectrum Disorder / Asperger Syndrome | 0 | 0.0% |
| Blind or partially sighted | 0 | 0.0% |
| Deaf or hard of hearing | 0 | 0.0% |
| Wheelchair user or mobility difficulties | 0 | 0.0% |
| Mental health difficulties | 0 | 0.0% |
| Other | 0 | 0.0% |

## Section B: Information about your technology use at work

| How often do you use a computer? | | |
|---|---|---|
| Everyday | 15 | 68.2% |
| A few times a week | 7 | 31.8% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **22** | **100%** |

| Do you have access to a computer connected to the internet? | | |
|---|---|---|
| Yes | 22 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **22** | **100%** |

| How often do you use the internet? | | |
|---|---|---|
| Everyday | 15 | 68.2% |
| A few times a week | 7 | 31.8% |
| Less than once per week | 0 | 0.0% |
| Less than once per month | 0 | 0.0% |
| **Total** | **22** | **100%** |

| Do you have access to mobile devices with internet access? | | |
|---|---|---|
| Yes | 22 | 100.0% |
| No | 0 | 0.0% |
| **Total** | **22** | **100%** |

| In what ways do you use computers for learning? | | |
|---|---|---|
| Research | 22 | 100.0% |
| Collaborative work | 2 | 9.1% |
| Meetings | 4 | 18.2% |
| Online training | 2 | 9.1% |
| Communication | 22 | 100.0% |
| Networking | 22 | 100.0% |
| Sharing ideas | 4 | 18.2% |
| Other | 0 | 0.0% |

| How do you normally take part in Training? | | |
|---|---|---|
| Distance Learning | 2 | 9.1% |
| Face to Face Training | 22 | 100.0% |
| Placement | 2 | 9.1% |
| Workplace - On the Job | 22 | 100.0% |
| Self Study | 2 | 9.1% |
| Social Networking / Virtual Worlds | 0 | 0.0% |
| Other | 0 | 0.0% |

## Section C: Using Second Life ® for work based learning

| Have you used second life before? | | |
|---|---|---|
| Yes | 1 | 4.5% |
| No | 21 | 95.5% |
| **Total** | **22** | **100%** |

## *Appendix I: Card Story-Board Data Collection for all three studies*

| QA | **PROFESSIONAL DEVELOPMENT**<br>**Which of these personal skills and attributes do you expect to gain from working in the virtual world?** |
|---|---|
| 1 | Team Work |
| 2 | Collaborative Working |
| 3 | Communication Skills |
| 4 | Lifelong Learning |
| 5 | Wider understanding of cross sectors and industry |
| 6 | Confidence and Proficiency |
| 7 | Problem Solving and Critical Thinking |
| 8 | Professional Skills and Development |
| 9 | Leadership Skills |
| 10 | Practical Knowledge |
| 11 | Experience in Subject Specialism |
| 12 | Technical Knowledge |

| QB | **ANALOGUE FOR THE REAL WORLD**<br>**In what ways do you find working in the virtual world is the equivalent of working in the real world or a replacement for the real world?** |
|---|---|
| 1 | Working with people you would not otherwise have been able to do |
| 2 | Less distracting and more effective than the real world |
| 3 | Access to work experiences and projects that you would not otherwise have been involved in. |
| 4 | Develop skills quicker, working in the virtual world eg. because of the ability to repeat and practice tasks |
| 5 | It was easier to learn under the guise of an avatar than in the real world. |
| 6 | Learning through informal, social interaction |

| QC | **IDENTITY AND AGENCY**<br>**Which of these affective factors do you expect to develop whilst working** |
|---|---|
| 1 | Helps me build my self-confidence |
| 2 | Builds my self-esteem |
| 3 | Helps me develop my abilities and achieve in my work |
| 4 | Helps me work with people more effectively |
| 5 | Helps give me direction in my work |
| 6 | Helps me monitor my progress |
| 7 | Helps motivate me in my work |
| 8 | Helps me develop a sense of how I learn best in the workplace |

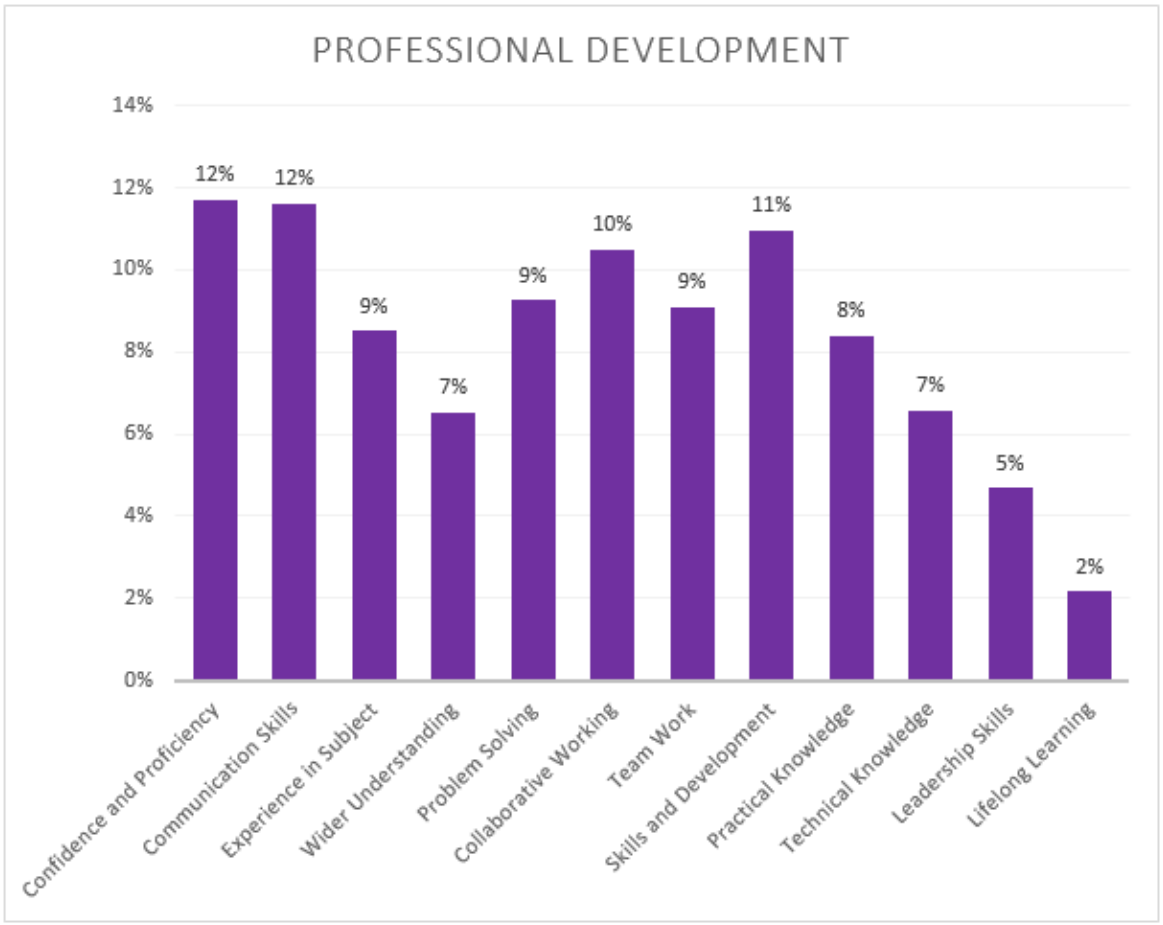
| QD | COMMUNITY OF PRACTICE AND INFORMAL LEARNING<br>In which ways do you learn using Virtual Worlds? |
|---|---|
| 1 | Learning through practising |
| 2 | Learning by imitating best practice |
| 3 | Learning through conversation |
| 4 | Learning through roleplay |
| 5 | Learning through collaboration |
| 6 | Learning through coaching and mentoring |
| 7 | Learning through informal social interaction |

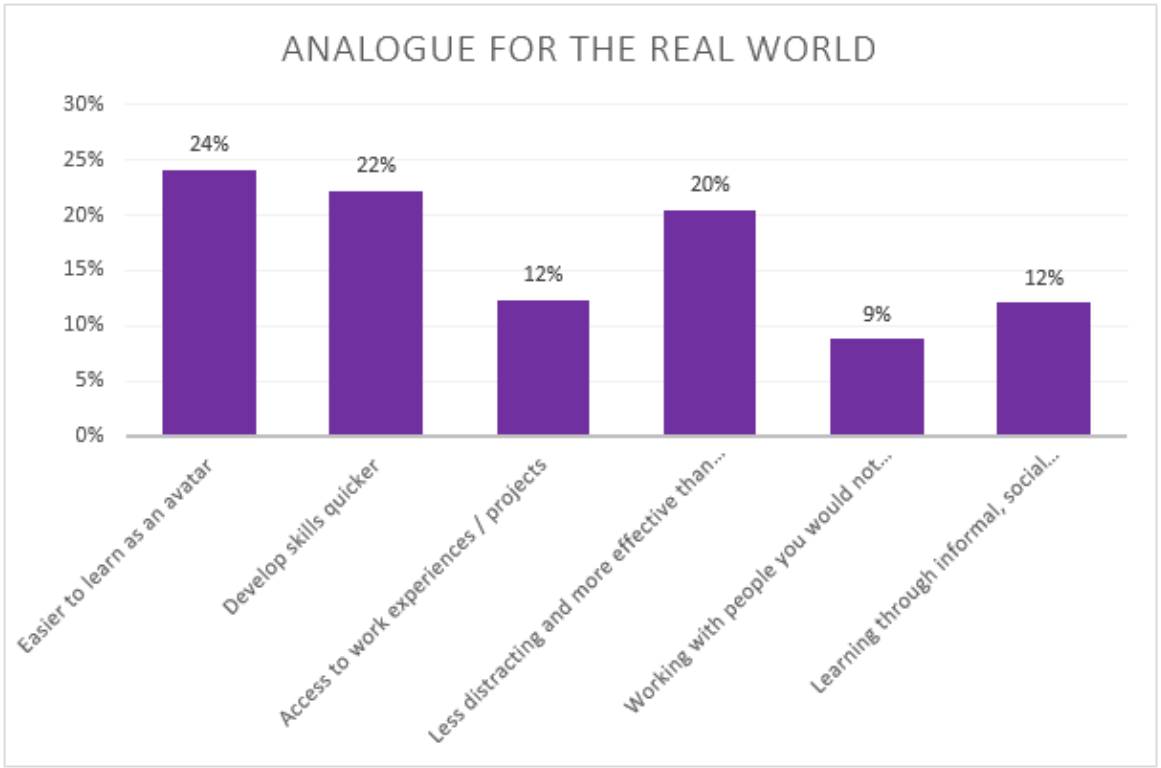
| | QA - PROFESSIONAL DEVELOPMENT | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Communication Skills | Lifelong Learning | Wider understanding of cross sectors and industry | Technical Knowledge | Practical Knowledge | Experience in Subject Specialism | Team Work | Confidence and Proficiency | Professional Skills and Development | Leadership Skills | Collaborative Working | Problem Solving and Critical Thinking |
| ALL | Grand Total | 341 | 86 | 185 | 179 | 225 | 244 | 241 | 372 | 301 | 147 | 290 | 275 |
| | 2886 | 11.6% | 2.2% | 6.5% | 6.6% | 8.4% | 8.5% | 9.1% | 11.7% | 11.0% | 4.7% | 10.5% | 9.3% |

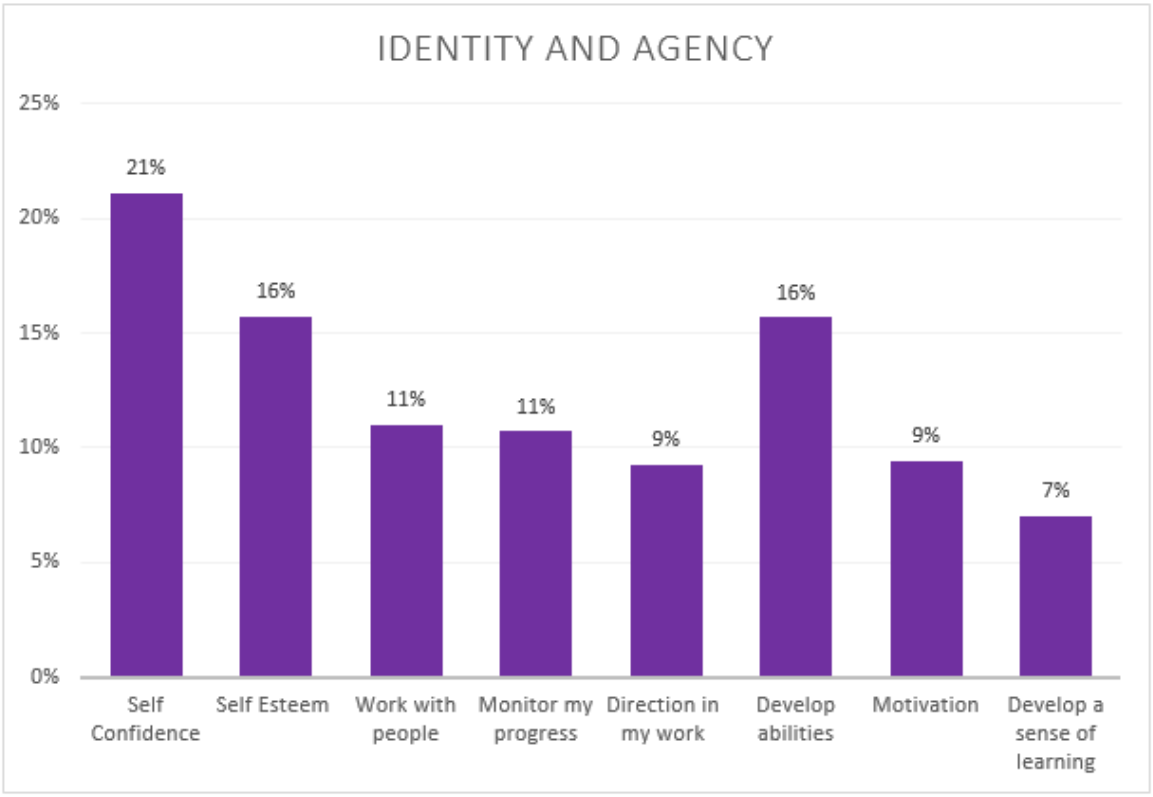
| QB - ANALOGUE FOR THE REAL WORLD | | | | | | |
|---|---|---|---|---|---|---|
| | It was easier to learn under the guise of an avatar than in the real world. | Learning through informal, social interaction | Develop skills quicker, working in the virtual world | Less distracting and more effective than the real world | Working with people you would not otherwise have been able to do | Access to work experiences and projects that you would not otherwise have been involved in |
| Grand Total | 169 | 100 | 179 | 150 | 65 | 114 |
| 777 | 24.1% | 12.0% | 22.2% | 20.5% | 8.8% | 12.4% |

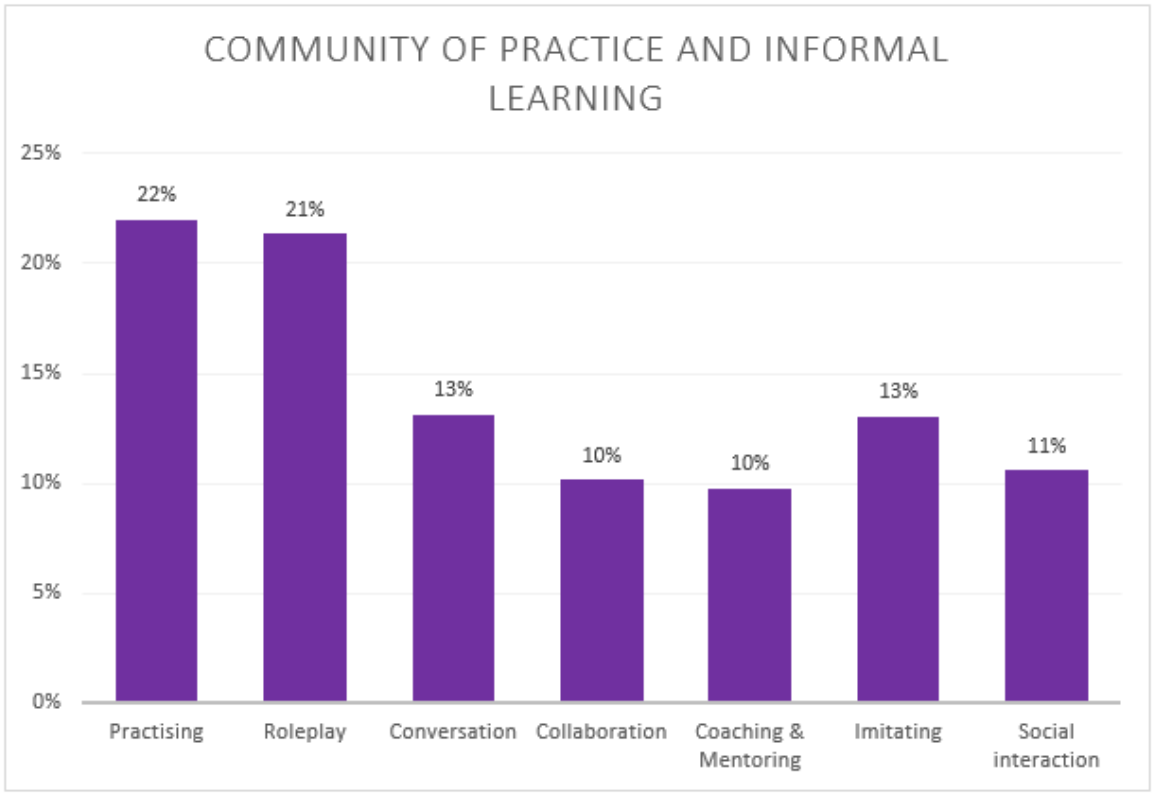
| QC - IDENTITY AND AGENCY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Builds my self-confidence | Develops my abilities and achieve in my work | Builds my self-esteem | Helps motivate me in my work | Helps me work with people more effectively | Helps me monitor my progress | Develops a sense of how I learn best in the workplace | Gives me direction in my work |
| **Grand Total** | **288** | **214** | **221** | **105** | **155** | **111** | **96** | **142** |
| **1332** | 21.1% | 15.7% | 15.7% | 9.4% | 11.0% | 10.7% | 7.0% | 9.3% |

| QD - COMMUNITY OF PRACTICE AND INFORMAL LEARNING | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Learning through roleplay | Learning through collaboration | Learning by imitating best practice | Learning through coaching and mentoring | Learning through social interaction | Learning through conversation | Learning through practising |
| **Grand Total** | **209** | **112** | **139** | **101** | **114** | **134** | **227** |
| **1036** | 21.3% | 10.2% | 13.1% | 9.8% | 10.6% | 13.1% | 22.0% |


PROFESSIONAL DEVELOPMENT
14%
12%
10%
8%
6%
4%
2%
0%
12%
12%
9%
7%
9%
10%
9%
11%
8%
7%
5%
2%
Confidence and Proficiency
Communication Skills
Experience in Subject
Wider Understanding
Problem Solving
Collaborative Working
Team Work
Skills and Development
Practical Knowledge
Technical Knowledge
Leadership Skills
Lifelong Learning


ANALOGUE FOR THE REAL WORLD
30%
25%
20%
15%
10%
5%
0%
24%
22%
12%
20%
9%
12%
Easier to learn as an avatar
Develop skills quicker
Access to work experiences / projects
Less distracting and more effective than...
Working with people you would not...
Learning through informal, social...


IDENTITY AND AGENCY
25%
20%
15%
10%
5%
0%
21%
16%
11%
11%
9%
16%
9%
7%
Self Confidence
Self Esteem
Work with people
Monitor my progress
Direction in my work
Develop abilities
Motivation
Develop a sense of learning


COMMUNITY OF PRACTICE AND INFORMAL LEARNING
25%
20%
15%
10%
5%
0%
22%
21%
13%
10%
10%
13%
11%
Practising
Roleplay
Conversation
Collaboration
Coaching & Mentoring
Imitating
Social interaction

## *Appendix J: Veldhuis-Diermanse Schema for Learning Process Coding (2002)*

| Code | Cognitive learning activities |
|---|---|
| | *Debating* |
| CDPF | • A problem, solution or idea is presented. This contribution is followed by an illustration or argumentation. |
| CDPNF | • A problem, solution or idea is presented. This contribution is *not* followed by an illustration or argumentation. |
| CDAF | • A student does or does not agree with the opinion or idea contributed by another student or author. This viewpoint is followed by a backing, refutation or restriction. |
| CDANF | • A student does or does not agree with the opinion or idea contributed by another student or author. This viewpoint is *not* followed by a backing, refutation or restriction. |
| CDAQ | • Asking a content-directed question |
| | *Using external information and experiences* |
| CCEI | • Contributing new information found in other information sources (mentioned or not) than the discourse |
| CREI | • Referring to information found in other information sources (mentioned or not) than the discourse |
| CSEI | • Summarising or evaluating the information found in other information sources (mentioned or not) than the discourse |
| CREE | • Referring to earlier experiences (scholastic or daily) / Referring to outcomes of running a model |
| | *Linking or repeating internal information* |
| CIL | • Linking facts, ideas or remarks presented in the discourse / Referring explicitly to a contribution in the discourse |
| CIR | • Repeating information without drawing a conclusion or interpreting that information |
| | **Affective learning activities** |
| AM | • General: reacting emotionally to notes of fellow-students, without directly reacting to the content of that note. This can be *positive, negative or neutral* |
| AA | • Asking for (general) feedback, responses or opinions by fellow-students |
| AC | • 'Chatting' or 'Social talks'; contributions that are not relevant to solve the case/task |
| | **Meta-cognitive learning activities** |
| | *Planning* |
| MPA | • Presenting an approach or procedure to carry out the task |
| MAA | • Asking for an approach or procedure to carry out the task |

| | |
|---|---|
| MEA | • Explaining or summarising the approach already adopted |
| | *Keeping clarity* |
| MSD | • Structuring the contributions in the database |
| MAC | • Asking for an explanation, clarification or illustration as a reaction to a certain note |
| MGE | • Explaining unclear information in notes; answering a question asked by another participant |
| | *Monitoring* |
| MKW | • Monitoring the original planning, aim etc. |
| MRP | • Reflecting on one's own actions or on certain contributions to the database |
| | **Rest Activities** |
| RNE | • Units that cannot be decoded by using the categories above |

## *Appendix K: Extracts of Essays from Study 2*

**Essay 1 by Participant 03244**

I couldn't stop giggling when I we first started using the virtual world. It was funny seeing us all as avatars and how people had chosen something completely different to what you thought of them as. The details, the designs, the features, the views are all great and the feeling of being inside a real world that is virtual in proper 3D is impossible for me to describe. At first, I thought it was just for kids. I think people's motivations on why they enjoy working in the virtual world varies but for me it is because of three things, which are all related. 1. I'm a trainer, 2. I'm a community and team builder and 3. I enjoy helping people to be better. I have spent all of my working life, as well as, outside of work when I think about it, bringing people together and helping them organise and form a team and community. That's why I enjoyed working in the virtual world because you can get more out of people because it is a safe environment to work in and practise skills before they try them out in the real world.

Learning is everywhere within the virtual world, which is another reason why I like it. People participate to accomplish something in a different environment in a different way. You develop interpersonal skills and become motivated by working in a special space that is unique to you and those you are working with. I like the way the virtual world is low risk. It's a safe environment to try things out, be someone different to your real life self and see whether things work.

**Essay 2 by Participant 11803**

At first, it was a way to keep in touch with colleagues that drew me to working in the virtual world, as I work from home. To me, the virtual world is all about exploring, trying new things out and discussing with others and sharing ideas. I can't think of any other way that would allow us to work in this way other than through the virtual world, when we're often all over the place and travelling and in different locations on the road.

**Essay 3 by Participant 03688**

I started working in the virtual world for the simple reason that I was intrigued about its possibility in creating an online community and building a knowledge management organisation. One of things that I've noticed is that we are friendly in the online community, people tend to be much more tolerant and willing to explain things and listen more than in the real world I find. Dare I also say that I find it exciting and I know others do too. By exciting I mean like going to the cinema to watch a really good film, you want to see what is going to happen next and you stay until the end of the film. As I use the virtual world more, I find it is a really good way to take a break and de-stress away from the hectic day to day goings on in the office. I can log in and immediately feel better as I find a nice place to sit down. It's a good way to escape for a few minutes and take part in the online community.

**Essay 4 by Participant 09928**

I find it motivating to work in the virtual world because of personal achievement. I am the kind of person that likes to explore options and different ways of approaching things, so being able to do this in the virtual world is extremely rewarding for me. I find it motivating to work something out in the virtual world and then personally achieve it in real life. With access to the virtual world, I get to try challenging things out and draw upon a wide range of people to problem solve. I know there can be a stigma attached with video gamers and this kind of environment to work in, but I see it much more beneficial than for example, some staff who spend all their time on Facebook or Twitter. Given how others spend their time, I think spending time problem solving and socialising with others in the workplace is good thing and improves relationships in the real workplace.

**Essay 5 by Participant 05662**

When working in the virtual world, what people soon get their heads around is that they are interacting with real people. It's no different to the real world, except that we have been provided with a space and a safe opportunity to learn

and try things out. Every avatar you see in the virtual world is a real human working in the organisation with the same feelings and emotions, likes and dislikes. I think using the virtual world has a huge professional development advantage and lifelong learning value for our staff. For all it is a virtual world, it is not a game in any shape or form. It's real, it's just that it uses a three-dimensional platform.

**Essay 6 by Participant 01680**

The virtual world allows relationships to develop amongst all the staff from management to apprentice and to work together to improve knowledge within the organisation and continuously improve. It is more than the sum of its part and is a very powerful platform for a highly effective and learning community to develop. For many, it's now become embedded in the culture to use the virtual world. It's become a way of doing things. When staff need to work something out, it's like putting a different hat on when they enter the virtual world and enter their avatar to find out how best to approach something in the real world.

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