

THE USER EXPERIENCE OF
AN ONLINE PLATFORM
WHEN LEARNING CYTOLOGY.

Ghada Al-najar

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Primary Supervisor: Dr. Ailsa Haxell
Secondary Supervisor: Dr. Fabrice Merien

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~Thank you all~

ATTESTATION OF AUTHORSHIP

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed



Date_30th Oct 2015

ABSTRACT

This research addresses the user experience of an online platform when learning cytology. The study was based in Auckland and the investigation undertaken involved three stages. The first stage was with the student community enrolled in an undergraduate level histology/cytology course of Bachelor of Medical Laboratory Science at Auckland University of Technology. The aim was to explore the students' experiences of the cytology platform www.cytologystuff.com. The second stage was with the cytotechnologist community working at Diagnostic Medlab. The aim was to explore the users' perceived convenience, its values as a learning tool, and their perception of being a peripheral member of a virtual community of practice that might also be advantageous to students. The last stage was a self-reflection that explores the researcher's personal experience. The aim was to explore the use of the online platform, providing a reflective account of the researchers' experience and barriers encountered. The study involved undertaking a qualitative and quantitative piece of research.

Mixed methods approach, taken included an open-end and closed-end questionnaire to provide the data. The student survey cohort was collected online through www.surveymonkey.com. The cytotechnologist survey was paper based, as this was identified as being more appropriate by the staff manager. Participants' responses were then transferred to www.surveymonkey.com, to assist in the data analysis process; the research methods, survey questionnaire and data finding are in chapter four.

Actor-Network Theory provides a framework to analyse user experience of an online platform for learning cytology, with accounts of what students, cytotechnologist staff and researchers experience when making use of the online platform www.cytologystuff.com.

What this site might provide an opportunity for students to be involved in an online community of practice was investigated. However, the data analysed using the study simple statistical analysis methods showed mixed results. The analysis informed by Actor-Network Theory provides sensibilities brought forward particular limitations in making use of the site. The students' experience of the site was overwhelmingly positive as a learning tool, but it was perceived as too simplistic for the cytotechnologists for practical applications.

TABLE OF CONTENTS

| | |
|---|-------------|
| ACKNOWLEDGEMENTS..... | II |
| ATTESTATION OF AUTHORSHIP | III |
| ABSTRACT | IV |
| TABLE OF CONTENTS..... | V |
| LIST OF TABLES | VII |
| LIST OF FIGURES | VIII |
| 1 CHAPTER ONE: INTRODUCTION | 1 |
| 1.1 INTRODUCTION:..... | 1 |
| 1.2 INTRODUCTION TO CYTOLOGY: | 2 |
| 1.3 FOUNDATION OF CLINICAL CYTOLOGY: | 2 |
| 1.4 THE 20TH CENTURY: | 3 |
| 1.5 CERVICAL SCREENING IN NEW ZEALAND:..... | 4 |
| 1.6 PROFESSOR GREEN AT THE NATIONAL WOMEN’S HOSPITAL: | 4 |
| 2 CHAPTER TWO: LITERATURE REVIEW | 6 |
| 3 CHAPTER THREE: RESEARCH STUDY | 15 |
| 3.1 AIMS AND STUDY OBJECTIVES: | 15 |
| 3.2 RESEARCH FRAMEWORK: | 15 |
| 3.3 RESEARCH PARADIGMS: | 16 |
| 3.4 RESEARCH APPROACHES: | 17 |
| 3.5 RESEARCH STRATEGIES:..... | 19 |
| 3.6 RESEARCH METHODS AND SAMPLING CHOICES: | 20 |
| 3.7 TIME HORIZON: | 21 |
| 4 CHAPTER FOUR: RESEARCH FINDINGS..... | 22 |
| 4.1 ETHICAL CONSIDERATIONS: | 22 |
| 4.2 SURVEY METHODS: | 23 |
| 4.3 DATA COLLECTION AND ANALYSIS TECHNIQUES:..... | 23 |

| | | |
|----------|---|-----------|
| 4.4 | DATA ANALYSIS:..... | 24 |
| 4.5 | RESEARCH FINDINGS: | 25 |
| 4.6 | STUDENT COMMUNITY SURVEY: | 25 |
| 4.7 | CYTOTECHNOLOGISTS' COMMUNITY SURVEY:..... | 36 |
| 4.8 | THEMES:..... | 50 |
| 5 | CHAPTER FIVE: SELF-REFLECTION; THE RESEARCHER'S PERSONAL EXPERIENCE..... | 51 |
| 5.1 | INTRODUCTION:..... | 51 |
| 5.2 | THE PROJECT:..... | 52 |
| 5.4 | REFLECTING ON MY EXPERIENCE IN USING WWW.CYTOLOGYSTUFF.COM | 58 |
| 5.5 | PLATFORM WWW.CYTOLOGYSTUFF.COM: | 59 |
| 5.6 | THE 3D CELL EXPERIENCE: | 75 |
| 6 | CHAPTER SIX: DISCUSSIONS | 78 |
| 6.1 | INTRODUCTION:..... | 78 |
| 6.2 | THE STUDENT COMMUNITY: | 78 |
| | FIGURE 6.2:1 | 80 |
| 6.3 | THE CYTOTECHNOLOGIST COMMUNITY: | 83 |
| 6.4 | FINDINGS:..... | 89 |
| 6.5 | IMPLICATIONS: | 91 |
| 6.6 | REFLECTION: | 91 |
| 7 | REFERENCES: | 93 |
| 8 | APPENDIX..... | 99 |
| 8.1 | APPENDIX-A: ETHICS APPLICATION: 15/24 | 99 |
| 8.2 | APPENDIX-B: PARTICIPANT INFORMATION SHEET..... | 101 |
| 8.3 | APPENDIX-C: CYTOTECHNOLOGISTS SURVEY QUESTIONNAIRE | 103 |
| 8.4 | APPENDIX-A: REMINDER:..... | 108 |

LIST OF TABLES

| | |
|---|----|
| Table 4.6-1 Auckland University of Technology student survey question- 1..... | 28 |
| Table 4.6-2 Auckland University of Technology student survey question- 2..... | 29 |
| Table 4.6-3 Auckland University of Technology student survey question- 3..... | 30 |
| Table 4.6-4 Auckland University of Technology student survey question- 4..... | 31 |
| Table 4.6-5 Auckland University of Technology student survey question- 5..... | 32 |
| Table 4.6-6 Auckland University of Technology student survey question- 6..... | 33 |
| Table 4.6-7 Auckland University of Technology student survey question- 7..... | 34 |
| Table 4.6-8 Auckland University of Technology student survey question- 8..... | 35 |
| Table 4.7-1 Auckland Cytotechnologists' community survey question- 4..... | 39 |
| Table 4.7-2 Auckland Cytotechnologists' community survey question- 5..... | 40 |
| Table 4.7-3 Auckland Cytotechnologists' community survey question- 6..... | 41 |
| Table 4.7-4 Auckland Cytotechnologists' community survey question- 7..... | 43 |
| Table 4.7-5 Auckland Cytotechnologists' community survey question- 8..... | 44 |
| Table 4.7-6 Auckland Cytotechnologists' community survey question- 9..... | 45 |
| Table 4.7-7 Auckland Cytotechnologists' community survey question-10..... | 47 |
| Table 4.7-8 Auckland Cytotechnologists' community survey question-11..... | 48 |
| Table 4.7-9 Auckland Cytotechnologists' community survey question-12..... | 49 |
| Table 4.7-10 Auckland Cytotechnologists' community survey question- 13..... | 50 |
| Table 6.2-1 Students Reflection of knowing Theme..... | 82 |
| Table 6.2-2 Knowing with A new Eye Theme..... | 83 |

LIST OF FIGURES

| | |
|--|----|
| Figure 3.2:1 Research Onion (adapted from Saunders, Saunders et al. 2011)..... | 16 |
| Figure 4.6:1 Auckland University of Technology student survey question- 1. | 28 |
| Figure 4.6:2 Auckland University of Technology student survey question- 2. | 29 |
| Figure 4.6:3 Auckland University of Technology student survey question- 3. | 30 |
| Figure 4.6:4 Auckland University of Technology student survey question- 4. | 31 |
| Figure 4.6:5 Auckland University of Technology student survey question- 5. | 32 |
| Figure 4.6:6 Auckland University of Technology student survey question- 6. | 33 |
| Figure 4.6:7 Auckland University of Technology student survey question- 7. | 34 |
| Figure 4.6:8 Auckland University of Technology student survey question- 8. | 35 |
| Figure 4.7:1 Auckland Cytotechnologists' community survey question- 1..... | 36 |
| Figure 4.7:2 Auckland Cytotechnologists' community survey question- 2..... | 37 |
| Figure 4.7:3 Auckland Cytotechnologists' community survey question- 3..... | 37 |
| Figure 4.7:4 Auckland Cytotechnologists' community survey question- 4..... | 39 |
| Figure 4.7:5 Auckland Cytotechnologists' community survey question- 5..... | 40 |
| Figure 4.7:6 Auckland Cytotechnologists' community survey question- 6..... | 41 |
| Figure 4.7:7 Auckland Cytotechnologists' community survey question- 7..... | 43 |
| Figure 4.7:8 Auckland Cytotechnologists' community survey question- 8..... | 44 |
| Figure 4.7:9 Auckland Cytotechnologists' community survey question- 9..... | 45 |
| Figure 4.7:10 Auckland Cytotechnologists' community survey question- 47 | |
| Figure 4.7:11 Auckland Cytotechnologists' community survey question-11 48 | |
| Figure 4.7:12 Auckland Cytotechnologists' community survey question-12 49 | |
| Figure 4.7:13 Auckland Cytotechnologists' community survey question- 13 50 | |
| Figure 5.2:1 Image capture of creative commons window | 57 |
| Figure 5.2:2 Tigirs Euphrates Image capture of wikipedia..... | 57 |
| Figure 5.5:1 Adapted image is a screen capture, top part window of www.cytologystuff.com..... | 62 |
| Figure 5.5:2 Adapted image is a screen capture of the lower part of the window of www.cytologystuff.com..... | 63 |
| Figure 5.5:3 Adapted image is; | 63 |
| Figure 5.5:4 Adapted image is a screen capture, window of "CE stuff" of www.cytologystuff.com..... | 65 |
| Figure 5.5:5 Adapted image is a screen capture, window of" Other Peoples' Stuff" . | 65 |
| Figure 5.5:6 Adapted image is a screen capture, window of select "Interact". www.cytologystuff.com..... | 66 |
| Figure 5.5:7 Adapted image is a screen capture of select study cases of www.cytologystuff.com..... | 67 |
| Figure 5.5:8 Adapted image is a screen capture window of gynaecology Atlas..... | 68 |
| Figure 5.5:9 Adapted image is a screen capture "Gynaecology Non-Atlas Table of Contents" from www.cytologystuff.com. | 68 |

| | |
|--|----|
| Figure 5.5:10 Adapted image is a screen capture; “Molecular Stuff” from http://www.cytologystuff.com/ www.cytologystuff.com..... | 70 |
| Figure 5.5:11 Adapted image is a screen capture of “Cell Biology” from www.cytologystuff.com..... | 70 |
| Figure 5.5:12 Adapted image is a screen capture of “Molecular Biology” from www.cytologystuff.com..... | 71 |
| Figure 5.5:13 Adapted image is a screen capture window from “Molecular Stuff” from the readable Online platform www.cytologystuff.com. | 71 |
| Figure 5.5:14 Adapted image is a screen capture of” Window Instrumentation” from www.cytologystuff.com..... | 73 |
| Figure 5.5:15 Adapted image is a screen capture window of Instrumentation: “Fluorescence In Situ Hybridization” from www.cytologystuff.com. | 73 |
| Figure 5.5:16 Adapted image is a screen capture window of instrumentations: “Electrophoresis” from www.cytologystuff.com..... | 74 |
| Figure 5.5:17 Adapted image is a screen capture window of Instrumentations: “Target Amplification Equipment” from www.cytologystuff.com. | 74 |
| Figure 5.6:1 http://vcell.ndsu.nodak.edu/animations/flythrough/movie-flash.htm | 76 |
| Figure 6.2:1 Experiential Learning Theory model adapted from (Kolb & Lewis, 1986). | 80 |
| Figure 6.3:1 knowing With a New Eye Theme | 89 |

1 CHAPTER ONE: INTRODUCTION

1.1 Introduction:

The information revolution due to the massive content available on the World Wide Web (WWW) since the late 20th century has had immense impacts on education and indeed all fields of life (Lee & Tsai, 2010)

Shaping a learning network, whether it is scientific or for any other domain, involves asking questions such as what particular knowledge or strategies might be useful and how to view learning from different perspectives (Willingham, 2008). For many years the basic rule or mode of delivery of cytology courses was traditional face-to-face class teaching based on textbook materials and microscopic study of slides using laboratory stream. However, the technology of cytology testing and handling of specimens has advanced since this science was first taught. First-year students enrolled in the Bachelor of Medical Laboratory Science programme, who undertake the undergraduate-level histology/cytology course at Auckland University of Technology (AUT), are expected to learn the basic introduction to cytology. Light microscopy and hand specimens are the primary teaching methods for first-year undergraduate instruction in histology/cytology in AUT. Two slide preparations, conventional smear and liquid-based cytology slides are used for the non-gynaecological cytology course. A survey study in Europe, found that graduate entry was favoured when engaging in various methods of basic education and cytology training, particularly with respect to non-gynaecological cytology (Anic & Eide, 2014). Prerequisite prior knowledge is required, such as what a network is, how to make use of an online network platform, and whether the online platform can offer the user an interactive approach. This study focuses on user experience of an online platform for learning cytology in terms of four dimensions: awareness, cost, complexity and perceived values. In this educational context, multiple things or objects extrinsic to the immediate study context play a part, including human and non-human factors within networks.

The Actor-Network Theory (ANT) used in this study is like creating a source of light by building a chandelier. Chandeliers are often used as decorative focal points for rooms, but they often do not illuminate as they ought to, and the chandelier itself consumes one's attention rather than the illuminated scene.

The lead author in the field, Bruno Latour (Lander, 2000) who explicitly writes that one cannot use ANT as if it were one monolithic entity. On every occurrence it is different because different actors are involved and every network studied is different. Latour talks of any study as throwing light on some areas, which has the simultaneous effect of casting other areas into shadow. How might thinking about a learning network help with the learning of cytology? Does the network face resistance to change? How does learning cytology relate to new practices? This study addresses these questions by focusing on the user experience of an online platform when learning cytology.

1.2 Introduction to Cytology:

The roots of cytology are to be found in a dramatic event in September 1665, when the Royal Society published *Micrographia* by Robert Hooke, the English polymath and natural philosopher. Hooke had been asked by his colleagues to share his “microscopic observations”, with the result that the scientific community became aware of a new realm of the very small, never seen before. Jervis (2014) described this publication as the first scientific best-seller and Knellwolf (2001) emphasised how new phrases entered the language as a result, such as “being looked upon with a microscope”.

The book *Micrographia* is described by Edwards (2014) as having inspired wide public interest in the new science of microscopy. The teaching of cytology adopted Hooke’s method of drawing images of what was seen under the microscope, to preserve the experience in the observer’s memory. The drawings captured what had been learned, in lectures and from books, and also became a major tool of communication. Robert Hooke has since been referred to as the father of the study of cells and of (Morgan, 1992).

1.3 Foundation of Clinical Cytology:

The first documented account of clinical cytology was recorded in the early part of the 19th century as a tool for preliminary diagnosis (Naylor, 2011), at this stage, cytology was restricted in practice to the use of exfoliated cells. In 1854, Professor Lionel Beale published the seminal volume *The Microscope and its Application to Clinical Medicine*. His illustrated text included drawings of unstained cancer cells and his research focus was on the best technique to preserve the cells for microscopic examination, showing changes produced by the disease (Beale, 1854). This was the foundation of understanding the process of the disease at a cellular level, specifically looking at the harm done to the cells by the disease. Noteworthy is that changes are introduced by the

preservation technique. Cytopathology (from Greek *pathos*, “fate, harm”) was then developed as a branch of pathology, studying and diagnosing diseases at the cellular level (Naylor, 2000). The discipline was first named by Rudolf Virchow in 1858 ; Virchow and Chance (1860) drew together the two techniques of examining exfoliated cells and of preserving them for future study and teaching (Azar, 1997).

The knowledge gained from microscopic examination could thus be communicated to new researchers in a growing international discipline. For example, a Swiss diagnostic cytopathology, Lebert, published an atlas in 1861 that included illustrations of cells exfoliated from cancer of the cervix (Pixel, Reich, Winter & Young, 2009) was defined, shaped and taught through the 19th century, but the focus was on cell changes due to disease rather than on any changes on a cellular level caused by conventional techniques. Spriggs and Boddington (1989), noted that there was a burgeoning tension between cell biology, cytology and the means by which cells were obtained even in those times. However, cell biology was only slowly accepted as part of cytopathology or clinical cytology, partly because of resistance arising from a confusion between cell biology and cytology, and uncertainty as to whether the cells being examined were exfoliated or not (Spriggs & Boddington, 1989).

1.4 The 20th Century:

In the previous sections the researcher charted the development of cytological evaluation, by which exfoliated cells need to be obtained for examination. This made it possible for a pathologist to use a microscope to examine the individual cells in a sample. Obtaining cells for examination, ideally with minimal invasiveness for patients, such as using biopsy by needle puncture or aspiration, was first proposed in Memorial Hospital for Cancer and Allied Diseases in New York in 1926 (Martin & Ellis, 1930). Further changes occurred in the way cells are obtained and also fixed. Georgios Nikolaou Papanicolaou, the Greek pioneer of cytopathology for early cancer detection and the inventor of chromatic stain and “Pap smear” (PS), first reported that uterine cancer could be diagnosed by means of exfoliated cells from a vaginal smear in 1928 (Papanicolaou, 1942). Papanicolaou staining is a wet fixative technique used to differentiate cells that is reliable, cost effective, and easy to use, and the specimens can be gynaecological or non-gynaecological smears (Roemen, zur Hausen & Speel, 2015). As such, it is used worldwide for cervical cancer screening;—With the publication of a paper titled *Diagnostic Value of Vaginal Smears in Carcinoma of the Uterus* (Papanicolaou & Traut, 1943), the importance of screening was quickly grasped by

gynaecologists, and mass cervical screening commenced in the US, driven by scientific acceptance of the new techniques for diagnosing cervical cancer.

1.5 Cervical Screening in New Zealand:

The first New Zealand pathologist who looked into the possibilities of gynaecological cytology was Dr Lindsay Brown in 1947 at Cornwall Hospital, later named the National Women's Hospital (Green, 1978). The first cervical cytology screening laboratory was established at the National Women's Hospital in 1954 and was restricted to women over 30 years of age being examined for gynaecological reasons. However, women were not offered smears until 1962, and it took 15 years to introduce the cervical screening program as a diagnostic tool; even then, some resistance continued (Jones & Fitzgerald, 2004).

In 1948, cervical cancer data collection was first established in New Zealand as a part of the National Cancer Registry (NCR). Annual reports on the medical statistics of National Cancer Registry in New Zealand were provided by the public health statistician. Further study was undertaken at the National Women's Hospital, with some data provided by Professor Green, which formed the beginning of his study of 503 cases of cervical carcinoma in situ from 1950 to 1965 (Green, 1966).

The event was described in a Metro magazine article as "An Unfortunate Experiment" Bunkle and Coney (1987), and this article was identified as having led to a Ministerial Enquiry, written up as the Cartwright Inquiry (Cartwright, 1988). The details of this debacle are explained in the following section.

1.6 Professor Green at the National Women's Hospital:

At national or even international conferences and gatherings involving topics related to cancer screening, the unfortunate experiment at the National Women's Hospital has provided an impetus to learn from history (Bunkle, 2015). Professor Green's aim was to prove that cervical carcinoma in situ was not a pre-malignant disease (Green, 1964). He used his authority to insist that all women aged fewer than 35, with positive smears of cervical carcinoma in situ, and no clinical or colposcopy evidence of invasive cancer, be referred to him for medical follow-up. Punch biopsy specimens would be taken, and if at any stage he was concerned or if he feared for the safety of a patient, a cone biopsy would be performed. He was aiming to resolve the contemporaneous controversy about whether to continue the biological model of screening for cervical cancer (Green, 1981). Green did not share with his patients the fact that he was conducting a study, or give them alternative

options, representing a gross breach of scientific and medical ethics, which is why the study was so controversial. From 1957 to 1965, Green followed up 50 pregnant young women diagnosed with cancer *in situ*. His aim was to demonstrate that young patients diagnosed with cancer *in situ* who were treated by his conservative model might have normal pregnancies, and show no significantly increased risk of progressing from cancer *in situ* to invasive cancer.

The Green episode provided an object lesson in resisting change that caused demonstrable harm to a community (Chang, 1990). Green himself undertook his exhaustive efforts in the belief he was preserving women's fertility, but his legacy is anathema to the scientific community. As Shakespeare said of Julius Caesar in the eponymous play: "The Evil That Men Do Lives After Them, The Good Is Oft Interred With Their Bones". Any good work undertaken by Green has long been subsumed within the negativity associated with this particular "unfortunate experiment" and the changes then made to New Zealand healthcare provision subsequent to the Cartwright report.

Following on from the Cartwright Report, procedures mandating informed consent and ethical approval for research include formal ethical approval for research involving people, whether individually or as cultural groups, and indeed for any research that might involve harm. In addition, the Office of the Health and Disability Commissioner was established according to the recommendations of the Report by the Health and Disability Commissioner Act (1994). This office established the Code of Rights of health care clients, and the obligations and duties of health care providers in New Zealand.

However, despite its ethical problems, Green's research provided a starting point for the vigorous development of cytological research in New Zealand, and highlighted the importance of teaching in order to keep up to date with good practice in relevant scientific communities. In this regard, this study seeks to enhance the process of developing new processes of cytology training in an ethical way, with full integrity for researchers, professionals and participants.

To this end, the Health and Disability Commissioner's functions are to ensure that research such as this one obtains ethical approval for the collection of responses from students and technologists, and to be sure that participation in research projects is voluntary, fully informed (regarding the study itself and participants' legal and statutory rights), consensual, and mitigated for any potential harm. How new processes are learned and integrated into practice are not just lessons then in curiosity, but contribute to the development of safe and respectful practice also.

2 CHAPTER TWO: LITERATURE REVIEW

This chapter focuses on education, science and the influence of technology on clinical practice and learning cytology. Explored in this chapter is the pedagogical intent with online learning. Particular literatures drawn upon include learning for a new era, communities of practice and experiential learning. This is used as a platform to then consider online teaching of microscopy and cytology.

There are different schools of thought that explain the pedagogy of education as an art, a science, or both. Some define pedagogy as the art of teaching education methods see for example Cobern et al. (2014). Such writers emphasise the highly personal and subjective aspects, the interplay between individuals and communities. Others define the words as the science of education and instruction (see for example Yong, 2014). Taking the science of teaching, there is emphasis on the tools that have been developed to plan, organise, direct and monitor (Yong, 2014). The user experience of an online platform when learning cytology may be described as a systematised body of knowledge, based on proper findings and exact principles, and capable of verification. However, user involvement can be both an art and science.

This is an important consideration because there are times in teaching and learning practices where both an arts understanding and a scientific basis can inform evaluative judgements to be made.

Learning to make decisions is dependent on prior knowledge as well as on skills that develop in association with one's peers. This fits well with the constructionist approach, as explained in the following chapters. The new developments in the cytology field are not made in isolation, but develop within a community of practice, where new knowledge grows from past knowledge.

Constructionist educational theory is one form of pedagogy, informed by beliefs of andragogy, as in adult education, that has been applied to teaching and learning theory for the digital age (Siemens, 2014). The new level of potential and development of the digital age does not have its own trajectory for development, but needs mature guidance, or community collaboration of more capable peers (Moate & Sullivan, 2015). On an individual level, a constructionist approach is premised on the knowledge journey starting from what is known, taking the learner to what is not, and providing a space for

further self-development. Scardamalia and Bereiter (2015) expanded the journey of learning and education in an open informational world, wherein knowledge development can be based on individuals' active participation in problem solving and critical thinking (Choi, Lindquist, & Song, 2014).

This opens discussion for how teachers can provide successive levels of guidance and support students in bridging further learning opportunities (Xin et al., 2015). When teachers use a variety of instructional techniques for scaffolding learning, they extend students in learning enabling the student to become competent and confident with their new knowledge and learning progress (Posel, McGee, & Fleiszer, 2014). An example of this can be seen in the work of Bender et al. (2000) who describe a process of scaffolding developed to facilitate and engage students' interest creating a structure, or schema to enhance the learning process, enabling students to synthesise facts and link them with their process mechanism to reach a defensible diagnosis, whereby students' progress when help is no longer needed.

The challenges associated with practice development, which is changing quickly in the current cytology field, requires a shift in learning strategies and learning styles whereby diagnostic reasoning is emphasised. Lave and Wenger (1999) identified that there is a valid role for students as legitimate peripheral participants inside of a community of practice. This is supported by the findings of Avent, Patterson, Lu, and Small (2009), who identified value in having students learning what a professional community means by placing them alongside online communities of practice. There are mixed views, however, in terms of whether an online platform might enhance or detract from learning.

Aflexible learning approach by Bigum and Rowan (2004) using computers and technologies communication as a model in teacher and education revealed that the relationship between technologies and flexibility is not a simple one.

This raises the question of whether such delivery might be useful in introducing introductory cytology students to an online platform for learning and teaching, and if so, how this might best be achieved. As explained in Chapter One, the pioneering of microscopy and the biological term 'cell' was illustrated by two-dimensional drawings to demonstrate the meaning of the exfoliated cell as a small room. The teaching of

cytology adopted Hooke's method of drawing images of what was seen using the microscope (Edwards, 2014). Traditionally, learning and teaching of cytology has involved samples on glass slides and conventional light microscopy. When represented within illustrations, these flattened images are not truly representative of three-dimensional cells inside living tissues. Restricting the teaching tools of cytology to traditional methods, risks isolating new learners from current advances material of cytology and the ongoing professional development within online resources. The online platforms technologies can provide learning with the latest knowledge and practices within international cytology communities. This suggests there would be value in positioning students alongside an online community of practitioners.

However in making any change, there is need to both learn and unlearn. As stated by Antisthenes (d. 371 BC): "The most useful piece of learning for the uses of life is to unlearn what is untrue" (Shaw, 2006). Staying attached to (or *learning*) outdated practices could be a hindrance to being able to adapt in a changing health professional context. This concept can be illustrated by the Actor Network Theory, an inside way of looking at things or practices, whereby repeating outmoded methods can be considered as repeated dramatic performances, as stated by John Law,

There are at least two ways in which performances don't exist in the abstract.

First, they always take place in a context of other performances. This means that the success of any performance is uncertain and that anomalous performances tend to fail because they find that they cannot easily recruit the right actors. Thus new performances interact with enactments of older performances--to mimic and reaffirm them, or perhaps to interfere with them and suggest alternatives.

Second, performances don't exist in the abstract because, to state the obvious, they need to be enacted. Performances are material processes, practices, which take place day by day and minute by minute. Since performances are specific, this also leads to multiplicity, so that what appears to be one thing (an "object," "working," "knowledge") may be understood as a set of related performances. More strongly, it suggests that abstraction (including abstract knowledge) is a performance, something enacted in specific a location that has to be re-enacted in other locations in further performances if it is to carry. This has all sorts of implications. One is that things don't come to rest in a single form once agreement, or what is called "closure," is achieved. They rumble on and on, as it were, noisy and noisome (Law & Singleton, 2000, p. 275).

Rumblings on similarly plague education. Daniel Pink describes a new way of thinking as essential for the new era (Pink, 2010). Growing support of a new way of thinking and learning highlights the changing and moving of technology from an agricultural age, through to an industrial age, then to a knowledge age, and then information age (Pink, 2005). In each age different skills have been valued and different ways of working as well as learning have been needed, with different fundamental abilities being absolute essentials for professional success and personal fulfilment (Pink, 2006). He argues that any educational project should be functionally and emotionally engaging, and explains that any finding of the design or learning is not the end product, but the essence of persuasions and the narrative story behind the learning (Pink, 2007). His argument is in favour of cognitive skills and empathy; this involves an emotional aspect of learning, and being able to accept that there is a need to change. Developing such skills requires focus on active learning that allows for being able to adapt new scenarios.

The writing of Shor and Freire (1987) had argued for a focus shift toward *how* students learn rather than *what* students might learn, yet this shift has yet to be negotiated within educational practices where what needs to be learned remains prominent. In a similar vein to Pink, Ironside (2004) argues students must not so much learn *what* to think but *how* to think. In more recent writings of Schlegel et al. (2015), there is an attempt to address the three aspects of what is taught, how it is taught and how learning is assessed through engaging the student with learning that is worthwhile. Taking a student-centred approach, Lea, Stephenson, and Troy (2003) involved students with both researchers and practitioners based on the premise that if the current education climate and technology is changing, then the institutions of education should change their approaches of teaching to cope with such changes.

This has provided a platform for internet-based education, arguing that such learning can occur at any time, in any community or place (Battersby & Verdi, 2015). Furthermore, with connectivity made possible with internet-based learning (Dee et al., 2011), practitioners outside the academic environment can continue their education, keeping up with developments in the field. There is then added value, for learning in a networked world for facilitating lifelong learning which is also safe and convenient, and which provides an avenue for continuing education in many parts of the world where traditional formats are difficult, such as my own nation, Iraq. As discussed in the previous chapter, sharing knowledge of current practice standards as they occur

internationally is important in preventing backwaters of unquestioned or out of date practice

What is being learned as well as how, is combines education, work and personal development (Kolb, 2014). Learning as described by Kolb is “*the key process whereby knowledge is created through the transformation of experience*” (Kolb, 1984, p.38). Kolb’s experiential learning model offers an appreciation for how reflecting on experiences or practices enable knowledge acquisition, and what might need to be amenable to change when newer practices are needed. While there is value in a theory that situates learning as a cycle of experiencing, reflecting, thinking and applying what has been learned, practice may well be messier than this implies. As stated earlier, older practices sometimes rumble on and this occurs alongside a raft of other practices. The unidirectional path described by Kolb does not have sufficient explanatory power, and does not account for how knowledge held may nonetheless be restricted or difficult to apply.

The use of online learning platforms has been introduced into undergraduate programs in the teaching and learning of microscopy, pathology and cytology. Virtual microscopy is being used as a revolutionary method of teaching microscopic pathology, and is being used for continuing educational and self-assessment quality programs for several pathology organisations (Dee et al., 2011).

The University of North Carolina introduced a unique cytopathology unit for second-year medical school students (Maygarden & Novotny, 1998). Data from this pathology course suggested that teaching students about the role of cytology in modern medical practice can help to bridge the gap between the basic science of pathology and clinical medicine. The University of Iowa Carver College of Medicine implemented and evaluated the use of virtual microscopy in the general and systemic pathology course for medical students, bioscience graduate students, cytology education, a comparative pathology research resources course and histopathology for veterinary medicine (Dee & Meyerholz, 2007).

They concluded that the use of virtual learning environments resulted in improved student learning. The University of Queensland implemented a new virtual microscopy programme for its first-year veterinary histology course and assessed the student’s perceptions of the new technology (Mills, Bradley, Woodall, & Wildermoth, 2007). The results showed that students preferred virtual microscopy for learning histology, understanding and clearly visualising structures, and identified advantages in students

using time effectively within the online environment, which allowed for anywhere-anytime flexibility with learning. The University of Tennessee College of Veterinary Medicine has been using both virtual microscopy and light microscopy within their veterinary curriculum since 2007 (Sims, Mendis-Handagama, & Moore, 2007). Their experience was of virtual microscopy images that were easy to use, improved student performance in microanatomy, and improved student understanding of how to systematically view microscopic sections.

In each of these four universities, students were exposed to a blending of old and new teaching methods, giving them the freedom to choose between learning methods, both during the course and for ongoing learning. Giving consideration to lifelong learning where technology is always changing, there is a need to consider how a community of professionals might support both current student learning needs as well as ongoing learning needs. The ongoing learning and development of cytology, as discussed in the previous chapter, encompassed historical dynamics, and brings forward considerations not only for time but also for place.

The rapid improvement and proliferation of technology in general, including within molecular cytology, is described as revolutionizing tools for diagnosis (Gundersen et al., 1988). The preceding chapter discussed how exfoliated cells under the microscope opened the door for diagnostic tools. Current developments surpass where the microscope can take us. New smear taking techniques are less damaging to the cells under study and new imaging technologies no longer require a cell to be so damaged when being studied. The impact of technological changes shows that when one door is closing, another is opening wider, and new beginnings bring more changes and challenges (Field et al., 2012).

The high sensitivity of the new cytology assays provide better results, however clinically the test sensitivity can increase the detection of abnormalities in routine cytology, which can improve economic performance as well as patient diagnosis, treatment and management (Barr Fritcher, Kipp, Halling, & Clayton, 2014). The test reduces the cost of physician visits and cytology screening, however it increases referrals for colposcopy examination (Verhoef et al., 2014). The rapid on-site evaluation of fine needle aspiration cytology collections significantly reduced inadequate reports of thyroid fine needle aspiration and enabled highly accurate specimen adequacy assay by rapid on-site evaluation of different body specimens (Shield, Cosier, Ellerby, Gartrell, & Papadimos,

2014). Consequently, molecular tests for positive, high-risk human papillomavirus is taking over from the conventional screening of Pap smear or even the relatively recent method of liquid based cytology (Dijkstra et al., 2014).

There are costs associated with updating equipment that are not solely economic, but also social. There is a need to maintain practitioners' experience in-line with current standards within their field. There is a need for a means of facilitating ongoing professional development, increasing the quality of teaching cytotechnologists to maintain currency with technological advances (Farahani & Pantanowitz, 2015). A cytotechnologist working in England shared his personal views and professional journey in his book *Extending the Boundaries of Cytology* (Shambayati, 2014) and asked a very simple and heavy question: "Are cytologists becoming the pathology field dinosaurs?" His conclusion was that cytotechnologists can prevent the risk of extinction by gaining new skills (Shambayati, 2014). Supporting Shambayati's perspective, Schmitt argued that in the 21st century, traditional cytology practices will not aid in the teaching or practice of cytology, so if such changes are not made the profession risks being left behind in a changed world, and the authors suggest this may represent crossing the Rubicon to a point of no return for cytology (Schmitt, 2011)¹

A survey of training and education of cytotechnologists in 15 European countries revealed that all technology improvement in cytology is changing and education and training programmes need to adapt to these changes (Anic & Eide, 2014). Web-based learning systems implementing the use of virtual microscopy for maintaining professional competence in skills have been demonstrated as effective in teaching and learning decision making (Pouliakis, Archondakis, Karakitsou, & Karakitsos, 2014). Web-based systems have also been demonstrated as effective for professional distance education of cytotechnologists for maintaining professional competence in light of developing technology. In addition, contrasting traditional training methods involving light microscopy with virtual microscopy cytology has been shown to be effective for training cytotechnologists (Khalbuss, Cuda, & Cucoranu, 2013). Teaching and learning involving

¹ The Rubicon; was a river in North-eastern Italy that marked the ancient boundary between Italy and Cisalpine Gaul. Julius Caesar led his army across it into Italy in 49 bc, breaking the law forbidding a general to lead an army out of his province, and so committing himself to war against the Senate and Pompey. The ensuing civil war resulted in victory for Caesar after three years. This relates to difficulty of making a change from which there is no return and points to a need for thoughtful practitioners.

virtual microscopy has also been shown to improve outcome performance for the cytotechnologist trainees using online study (Khalbuss, 2014).

And as demonstrated by Khalbuss (2012) communication speed between the screeners, quality assurance and educational tools of the traditional technology, also improved using virtual cytology with new approaches involving whole slide imaging in cytopathology education

In the USA, a website linked to cytology professional competencies was launched in March, 2014 by the Cytology Education Learning Laboratory (www.cytologyedlab.org), with 22 new entry-level competencies added to the cytotechnologist student curriculum (Means, Pantanowitz, & Sheldon, 2014). The new website provided virtual cell images, enabled by the most recent emerging technology. This webpages were designed to allow users to download these entry-level competency-related resources from the Cytology Education Learning Laboratory database, including PDF documents, images (jpeg), PowerPoint presentations, audio teaching files (MP3, MP4) and videos, as well as external web links, and also allowed for contributors to easily upload various files (articles, images, videos, etc.). This provided an opportunity for user-generated content that roused worldwide interest, not only among cytotechnologists, but also among other by health professionals such as pathologists. The Euro cytology web-based training system project was supported by the Leonardo da Vinci programme with the aim of increasing access to training in clinical cytology and harmonising training in this important specialty of pathology throughout Europe. The purpose was to provide an image bank of carefully selected images together with supporting text and references to provide a unified platform of training and professional education for cytotechnologists engaged in all aspects of clinical cytology screening and diagnosis (Zeppa et al., 2011).

Similar developments have occurred globally. Japan also developed a web-based tool for learning development, clinical teaching and clinical case-study education, providing web-based, clinically challenging evaluation tasks for medical students (Stergiou et al., 2009). The sequential questions and answers helped undergraduate medical students because of the integration of multi-language-capable sequential questions and answers assessment and teaching instrument. This study added a different level of interacting with the clinical aspects of cytopathology, such as data organisation and problem solving, attracting worldwide interest in the ongoing education needs of cytologists in the context of changing technology.

Obviously no one knows how clinical cytology testing will be viewed in the future nor can we precisely predict students' experience in the field of education beyond 2020 (Lyons, Hannon, & Macken, 2014). However, as identified by Stoler (2000), there is an ongoing need for future-focused changes to the current technology that impacts on cytology testing and learning. In summary, the history of the last century teaches us that cytology has evolved through advances in technology and teaching methods to prepare scientists and technologists to respond to these changes. What these web-based initiatives hold in common is a need for access to current technology developments and knowledge of how these may impact on cytology learning and practices. At the same time, what we might accept as a given is that further change will come. The rise and rise of machines (where increasingly computers are delegated tasks that once were the domain of humans) gives rise to further consideration for not only how, but what is taught.

So far there are insufficient studies relating to the effects of combining free web-based learning with traditional methods for introductory cytology science students. This raises questions of whether such delivery might be used successfully in introductory cytology using a web-based learning method. The cytology course at AUT is delivered and takes place with the use of microscopes, supplemented by real-case presentations, didactic lectures and audio-visual materials. Given the reviewed literature, there seems to be good reason for making use of online platforms in the education of cytotechnologists. Specifically, these include the ability to view cells in a way that is in keeping with advances in microscopy, as well as by introducing students to international advances in cytology and introducing them to a community of practitioners. Rather than attempting to ask the question of whether this is good or bad, the current research is focused on an exploratory methodology that considers the users' experience in making use of such platforms.

This research therefore investigates the users' experience of an online platform in a segment of the free web-based resource for learning cytology (www.cytologystuff.com), to potentially inform curriculum development.

3.1 Aims and Study Objectives:

The overall aim of this research to add to the current literature regarding the use of web-based free resources for learning and teaching within an undergraduate course for students enrolled in the undergraduate level histology/cytology course at AUT. This project explores the user's experience of an online platform when learning cytology. In exploring the user's experience, the researcher anticipates investigating the enabling or disabling features of a web-based learning and teaching resource.

3.1.1 The objectives of this study are:

- Explore students' experiences of the platform.
- Explore cytotechnologists' experiences of the platform.
- Self-reflect (the researcher's personal experience of making use of the platform)

3.1.2 The potential or anticipated benefits of this study are that:

- Users can develop confidence, proficiency and skills for their future professional practice.
- Improved user engagement with online communities of practice and be involved in collaborative processes as part of their ongoing learning.
- Users of the online platform may contribute to a community of practice involving students as peripheral members of a community of practice.

The results of this study will be used to inform curriculum design within the AUT Bachelor of Medical Laboratory Science undergraduate degree, relating to the learning and teaching of cytology content.

3.1.3 Objectives of this study on a personal level for the researcher:

The author of this report aims is to develop and advance research skills complementary to her role at AUT and to extend her own knowledge in regard to the learning of cytology practice.

3.2 Research Framework:

The term 'epistemology' was introduced by Ferrier (1856) to describe the paradigm or philosophy that is concerned with the nature and scope of knowledge. This study investigates how knowledge develops using constructivist epistemology philosophy.

Constructivism argues that knowledge is independent of human minds, but occurs as an active process of human social construction.

3.2.1 Research Onion

In this chapter, the researcher examines the different layers of this research and their inter-relationships. The research adopts the metaphor of the ‘Research Onion’ proposed by Saunders, Lewis and Thornhill as the framework for the study in order to look at how knowledge is produced, what knowledge is valued, and how knowledge is learned when adapting different methods or changes. The starting point of this chapter illustrates the core of the research extending to multiple external layers this is depicted in the following image.

See below Figure 3.2:1 Research Onion (adapted from Saunders, Saunders et al. 2011)

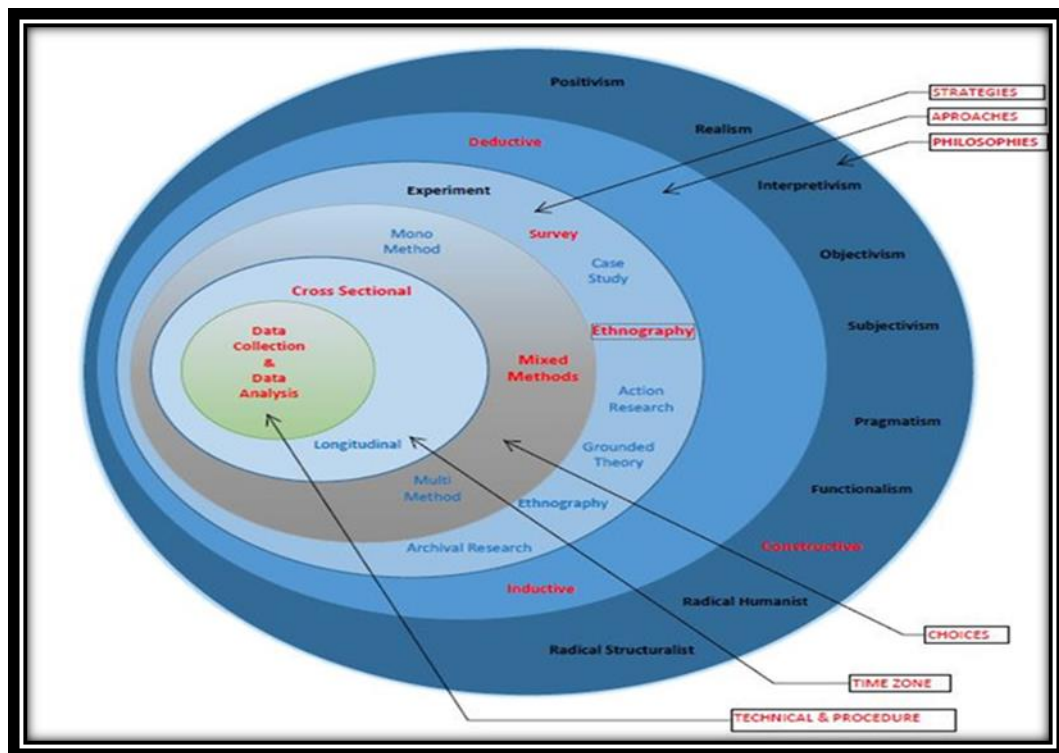


Figure 3.2:1 Research Onion (adapted from Saunders, Saunders et al. 2011)

3.3 Research Paradigms:

The metaphor of the “research onion” proposed by Saunders, Lewis and Thornhill (2007) provides a useful framework for the study as it guides the research from the outer layer of positioning within a particular research philosophy to the inner layer of actual implementation of data collection. The layers of this study need to be in harmony with the research question in terms of exploring the user experience of an online

platform when learning cytology. The researcher has drawn upon constructivism and ANT to avoid essentialist explanations to focus instead on understanding the combinations of interactions. This avoids the binaries involved in saying something is good or bad, true or false, and instead provides opportunities for exploring what occurs and from multiple perspectives including the student experience, the professionals working in the area experiences, and my own experiences making use of the platform.

Quantitative sets of tools are generally associated with positivists, whereas researchers who used qualitative sets of tools in their studies are generally naturalists (Teddle & Tashakkori, 2009). In practical terms, quantitative methods are generally used to verify hypotheses to draw general conclusions, whereas qualitative tools can probe and explore contexts in greater depth such separations however are arbitrary in a world that is messier than such binaries might provide for. A mixed method approach allows for a meeting space between the inductive and deductive approaches. A multi-level perspective might generate better understanding (Somekh & Lewin, 2011).

While mixed methods design may be complementary, certain challenges and tensions can arise when deploying conflicting philosophical or paradigm positions (Greene, 2007). At the same time, research methods, as Law (2004) argues are difficult to contain as being just one thing. They are not easily “black boxed” to use an ANT term for how things fade from consciousness and escape critical discussion.

In considering the methodologies used in the study, the main points are; the research paradigm shapes a research question, data perceived, analysed and the conclusions or implications that are then associated with that study. However, for ANT there is no objective positioning concerning what is viewed.

3.4 Research Approaches:

There are two main approaches identified within the ‘research onion’ framework (Saunders, Lewis and Thornhill, 2012): deductive and inductive. While these align with quantitative and qualitative approaches, in this study it is important to note that a network has no up or down, the large or small foci points are parts of the same network. In this study, learning is not about a body of knowledge transferred from educator to learner; rather, knowledge is distributed across the network and constitutes people’s engagement with it, thus learning occurs depending on the ability of learners to construct and traverse those networks. This aligns with a more connectives approach to learning (see for example Siemens, 2005). People involved in a network are shaping that network, but networks are also shaping the people. Where this occurs within an

internet-based network, the technologies involved are similarly both shaped and shaping. Humans and non-humans are not standalone objects; they are integrated into the network as component actors. In addition, these actors, whether social (the people involved) or technological (the equipment) are also less separated than might be first assumed. Taking a network approach in this research is therefore seen as being useful.

Actor-Network Theory (ANT) was developed by scientists from the work of Michel Callon (1991) and Bruno Latour (1992). The latter, a French philosopher and sociologist, was especially renowned for his work in the field of science and technology studies (Latour, 1999). ANT treats humans and non-human actors as part of a network (Latour, 2012). Informed by ANT, a focus on the interactions between participants and technologies in this study, is intended to bring forward both social factors such as cytotechnologists' beliefs, practices and perspectives can have impacts that are instrumental in the future of cytology future as well as the impact of the technologies through which their work is taught and learned.

The density and scientific cooperation properties of the network are determined by how actors' connections make the whole greater than the sum of its own parts. Having explained the network as an actor network, involving things both social and technological, the next step is to explain the dynamic interactions between actors.

A seminal ANT study entitled *Domestication of the Scallops and the Fishermen of St Brjeuc Bay* by Callon (1986), described the processes involved as a sociology of translation. Callon's study outlined the stages involved in the regulation between human and non-human actors, where change is presented as a series of translations involving four assumptions: *problématisation*, *l'interressement*; *inscription (enrolment)*; and *mobilisation*.

In relating this to the current study, problematisation shows that with new technologies, such as the possibility of three-dimensional images for learning and teaching cytology, practitioners, academicians and students must catch up, but so too must the technology. An ANT analysis focusses on how such changes are deeply constitutive for both human and nonhuman actors involved. Technology rather than being perceived as additive to the learning and teaching experience, is considered constitutive (Waltz, 2004).

ANT explains how the steps of translation may eventually result in mobilisation where an authoritative voice is developed that defines the stabilised network. This study investigates how the steps of translation might be used to explain how an internet-based learning platform is experienced by students of cytology, cytotechnologists and by the

author. It explores how those involved are drawn in and the experiences encountered. Investigated is the potential for forming a stable actor-network that provides for the learning and teaching needed for a professional qualification as a cytotechnologist. In this study evidence of each of the stages of translation will be explored.

3.5 Research Strategies:

The study orientation of the research particularly focuses on learning occurring between education and the workplace, rather than the simple learning act of receiving information. ANT provides a means through which the impact of the material and social can be explored. User experience of online platform when learning cytology could be studied using a practice strategy to gain knowledge, such as surveys and ethnography. However, the timeframe for this study prevented a more ethnographical undertaking involving students or practitioners, but an auto-ethnographical or self-reflection on the researcher's own experience of the platform was undertaken to provide one user's perspective. The survey provided for a time constrained means through which the student and cytologists experiences might be explored. Involving both open and closed questions regarding the use of the online platform allowed for the user's perspectives to be explored.

The seven main research strategies of the research onion outlined by Saunders, Lewis and Thornhill (2012) ultimately aim to engage the best strategies congruent with the philosophy paradigm underpinning a study.

The researcher adopted a survey strategy, whereby semi-structured questionnaires were used. This research method has several advantages, such as ease of use and cost and time effectiveness, however it includes limiting respondents' answers and/or the inability to probe more deeply, compared to in-depth interviews (Nulty, 2008). The survey questionnaire consisted of survey consisted of some open-ended qualitative questions and simple nominal data, with five-point Likert type scale responses related to user experience of the online platform (www.cytologystuff.com). Likert scales are commonly used for measuring attitudes, including student views on various educational experiences (Jamieson, 2004). The five-point scale allowed for a range of feeling responses in relation to specific questions. This allowed for simple descriptive statistics to be used in making comparisons between the two populations groups involved in the research. In addition, the survey provided open-ended questions to garner the participant's experiences of the online learning platform. The responses could then be analysed in terms of themes discussed.

A reflective account on my own use of the site www.cytologystuff.com is also included. The aim was to explore the use of the free online platform and provide the reader with an insider's journey through the online site. Researcher self-reflection, similar to auto-ethnography, involves a qualitative research method that allows the researcher to write with a highly personalised style (Wall, 2008). It is an approach that accommodates subjectivity and emotionality; as such it provides a further perspective on experiences in making use of the online learning platform.

3.6 Research Methods and Sampling Choices:

A key factor in the study methodology is sampling

“Sampling techniques provide a range of methods that enable you to reduce the amount of data you need to collect by considering only data from a subgroup rather than all possible cases or elements... full set of cases from which a sample is taken is called the population” Saunders et al. (2007, p.204).

In first two parts of the study surveys, non-probability sampling was used. As the intention was to explore learners' experience in making use of the site, two groups were selected. The representative sample of the study survey targets two populations. The first involved students undertaking undergraduate course in histology/cytology course as part of their Bachelor of Medical Laboratory Science degree. The other group selected were qualified cytotechnologists, as they also have a learning need in a discipline where practice is changing. As this study explores the user experience, particularly with a focus toward the curriculum development, there is an added benefit of linking the students with a community of practice and maintaining currency with new developments being available from a global perspective, as well as providing a platform through which lifelong learning can be encouraged.

Studying the users' experience of an online platform when learning cytology, and putting students and qualified cytotechnologists together within the same online community was considered to have value in contributing to a potential community of practice. The researcher adopted a survey strategy, whereby semi-structured questionnaires are used as a tool for the mixed methods approach. The research method has several advantages such as ease of use and cost and time effectiveness. The disadvantages, however, include limiting respondent's answers. This research involved the user's experience in regards the learning website www.cytologystuff.com. Data was collected concerning two user groups' experiences: students enrolled in the

undergraduate *Histology and Cytology* course and cytotechnologist staff working at the Diagnostic Medical Lab. The survey questionnaire consisted of both open-ended questions as well as close-ended questions with specific response categories.

Data collection began by initially inviting only students enrolled in the *Histology and Cytology* course to participate in the study on the last day of that course. The aim was to explore the students' user experiences of the online virtual cytology website, www.cytologystuff.com. Secondly, data was gathered by a second invitation to the cytotechnologists who currently worked in the field, regarding their experiences in making use of the www.cytologystuff.com website. The aim was to explore users' perceived convenience, value as a learning tool, and their perception of students being a peripheral member of a virtual community of practice. A reflective account on my own use of the site www.cytologystuff.com is also included. The aim was to explore the use of the free online platform providing the reader an insider perspective in making use of the site to explore both the emotional experience as well as concerns regarding the practicality of the site for learning and teaching.

3.7 Time Horizon:

A cross-sectional research design was used and data was gathered once at the end of the student Histology/Cytology course at AUT. Students' responses to the survey were gathered via www.surveymonkey.com. For the cytotechnologist staff working at Diagnostic Med lab, written responses were gathered before February 2015. Then the data was documented using the same web-platform, www.surveymonkey.com. A reflective account on my own use of the website www.cytologystuff.com was framed as an insider experience on making use of the site for learning and teaching.

4 CHAPTER FOUR: RESEARCH FINDINGS

Light microscopes and hand specimens are the primary teaching methods for the Histology/ Cytology course at AUT. Both conventional smear and liquid based cytology slides are used for the non-gynaecological cytology course. As a teaching assistant for the course, some students asked me which preparation method is more adequate for non-gynaecology specimens. Given the time constraints in the non-gynaecological cytology section of the course, the aim of this project is to explore the user experiences of an online platform, www.cytologystuff.com. To design this project, it is important to address the points of practicality, importance and ethics.

Eventually, the findings of this chapter are discussed in-line with the objectives set forth in the first chapter. The findings bring together the disparate perspectives within the big picture fundamental to the next chapter.

4.1 Ethical Considerations:

Two ethics applications were completed for two surveys. AUT Ethics Committee granted approval for the study on 8 October 2014 for three years, until 8 October 2017 (Reference no. 14/338), and the second ethics application was approved for three years until 10 February 2018 (see Appendix A).

The first survey invited the students enrolled in the undergraduate Histology/Cytology course, the aim being to explore the students' experiences using online platform, www.cytologystuff.com. This part looked into the students' experiences of making the use of technological improvements such as web-based resources. The students were invited to participate in the study on the last day of the course (see Appendix B).

Data collection for the first part of the research started in November 2014 and was completed in January 2015. The second survey invited the cytotechnologists who are currently working in the field to share their experiences of using the www.cytologystuff.com website. This part included perceived convenience, perceived value as a learning tool, how they perceive value for students making use of the site, and their perception of how being a peripheral member of a virtual community of practice might also be advantageous to students. The invitation was sent to the Diagnostic Medlab laboratory only; both the manager and the staff were happy to be involved in the study (see Appendix C).

Data collection for the second part of the research started February 2015 and was completed in March 2015. A reminder to the cytotechnologist community was sent before the last day (see Appendix D).

4.2 Survey Methods:

The two surveys comprised of close-ended, Likert-type questions as well as open-ended questions. For surveying the students enrolled in the Cytology/Histology course at AUT, the online programme www.surveymonkey.com was used. A link was provided through the AUT online platform. Paper invitations were handed out to the students during the last laboratory session of the course, providing the researcher information, the cytology website platform link [to www.cytologystuff.com](http://www.cytologystuff.com), and details on how to participate in the online survey. The AUT online platform also provided the students with easy access to both the cytology website www.cytologystuff.com and the www.surveymonkey.com student questionnaire. The use of the online link to the survey was more convenient for the students; however, paper-based questionnaire surveys were used for the invited cytotechnologist staff at Diagnostic Medlab, and the collected survey data was processed using the online programme www.surveymonkey.com. The advantages of Survey Monkey are:

- Coding and post-coding the data is easy when it is on a spreadsheet.
- Anonymous site that has no links to other media.
- The survey's raw data provides mosaic information that can be processed to produce clearer ideas.
- Free access for short surveys.

The limitations in using Survey Monkey include:

- No 'link' being provided to inform the researcher when the survey questionnaire was completed.
- Transferring data can have errors.
- Cost to update the number of stages and questions.

4.3 Data Collection and Analysis Techniques:

This study explores the user experience of the virtual learning environment www.cytologystuff.com. Primary data were collected through two semi-structured surveys; the first one was conducted by inviting the enrolled students in histology/cytology course at AUT. Participant information sheets were distributed on the last day of the course. The students were invited to visit the website,

www.cytologystuff.com, with a clear indication that participation was completely voluntary and the choice to participate would neither advantage nor disadvantage them in their study progress, and involvement would be anonymous and optional (see Appendix B). The second part of this project included an invitation to the cytology staff at Diagnostic Medlab to participate in a paper-based questionnaire survey and then the data was processed using same online platform www.surveymonkey.com the same clear indication was given that participation was completely voluntary (Appendix C). Both surveys had reminder notices of the invitation issued before the last day of the course for students, and five working days for Diagnostic Medlab cytotechnologists (Appendix B).

4.4 Data Analysis:

The researcher's duty is not simply making information available to the reader, but also to construct the research in a way that shows a harmony of ideas in terms of research design and formation, introduction of the research problem and managing the data information (Saunders, Saunders, Lewis, & Thornhill, 2011). Given limited time for data collection, a survey approach allows for simple statistical analysis, whereby open-ended questions are analysed using thematic analysis, the most common form of investigation in qualitative research (Trochim & Donnelly, 2001). Overarching codes and themes emerging from the data (Attride-Stirling, 2001), allows for integrating and contributing the findings into a more coherent understanding. The useful information can be captured from the collected data, then categorised into various codes and interpreted as themes into more meaningful information (Bryman, 2006). The thematic analysis is not a separate tool (Fereday & Muir-Cochrane, 2008), it is information latent within the data that the researcher extracts by detecting, examining and recording patterns. (Braun & Clarke, 2006) categorised a six-step processes as a framework for thematic analysis:

1. Familiarising with the research data is mainly reading and re-reading the data, highlighting the outcomes and noting down initial points.
2. Generating initial code ideas, starting when the data is examined for the common threads then make use of the found threads for the inductive components of the research (Merriam, 1998).
3. Searching for themes by collating the codes into potential themes and then gathering all data that were relevant to each potential theme.

4. Reviewing themes to check if the themes work in relation to the coded extracts in order to generate the thematic 'map' of the thematic analysis.
5. Defining and naming theme stages to develop appropriate headings for special threads or the unique metaphors used by the research participants (Lander, 2000).
6. Producing the report where the ongoing analysis refines the specifics of each theme, capturing the overall story embedded within the analysis and generating clear definitions and names for each theme.

4.5 Research Findings:

The mixed method of this study produced both quantitative and qualitative information. The main findings of the compiled codes or similar statements of the research were presented, then the data points were analysed. To organise, process and manage the information more efficiently, the researcher simply divided the qualitative information into units, so the qualitative information can be converted into quantitative values. This part of the data analysis was an active process, with the researcher identifying themes in the qualitative data, using the six step processes developed by Braun and Clarke. The first step of the thematic analysis was myself with the research data, which involved reading and re-reading the data, and generating the very first or initial code ideas. This began by examining the raw data for common threads. The collected codes gathered from the relevant data were then used again in a deliberate search to see if there were emergent themes. As the framework of this part was thematic analysis, to further check to see if the themes worked in relation to the codes, extracts were again read and re-read, to generate what Merriam (1998) refers to as a thematic map. The next step was to develop appropriate headings or use a metaphor in the data for the special threads, as in naming or defining the themes (Lander, 2000).

4.6 Student Community Survey:

A paper invitation with participant information was given to 50 Students enrolled in the Histology/Cytology course at AUT. The survey for the students was handed out on the last day of the course and students were invited to visit the online www.surveymonkey.com to participate in the research.

Only 16% of the enrolled students participated in the survey (8 students).

Only 75% of the participants finished the survey and responded with answers, to the open-end questions (6 students).

Student survey questionnaire:

Q1: What year of the Bachelor of Medical Laboratory Science are you studying?

More than half of the total participants were first year students (87.50%). A smaller group of participants were in their second year (12.5%). See below on page 28 and Table 4.6-1 Auckland University of Technology student survey question- 1.

Q2: Did the online platform www.cytologystuff.com enhance your learning experience?

The majority of participants (62.5%) responded positively that their experience of the online platform enhanced their learning. The remaining group of participants (37.5%) responded with “yes partially”. See below on page 29 Figure 4.6:2 and Table 4.6-2 Auckland University of Technology student survey question- 2.

Q3: Was it difficult to use the www.cytologystuff.com platform?

Of the undergraduate students who participated in this study, 62.5% indicating that it is “Not really difficult”. Two participants, (25.0%) highlighted that using of the platform was “Definitely not hard”. However, one of the participants did find the use of the platform “Partially difficult”. See below on page 30 Figure 4.6:3 and Table 4.6-3 Auckland University of Technology student survey question- 3.

Q4: Would you recommend the platform www.cytologystuff.com to other students studying the Bachelor of Medical Laboratory Science degree?

All participants identified value in the using of the platform and would recommend the platform to other students enrolled in the course. See below on page 31 below Figure 4.6:4 and Table 4.6-4 Auckland University of Technology student survey question- 4.

Q5: On the basis of your use of www.cytologystuff.com, how likely is that you would explore making use of other virtual learning tools?

Most of the participants indicated a positive feedback, only one participant selected “Don’t know”. See on page 32 below Figure 4.6:5 and Table 4.6-5 Auckland University of Technology student survey question- 5.

Q6 Was using the www.cytologystuff.com platform an efficient use of your study time?
At the end of the course, the students were asked to respond in an online survey on their virtual microscopy experience. Half of the participants selected “Yes definitely” and the other half selected “Yes partially”. The overall response indicates that participants were considering the virtual cytology a definitely or partially efficient teaching tool. See on page 33 below Figure 4.6:6 and Table 4.6-6 Auckland University of Technology student survey question- 6.

Q7 Would you use the online teaching resources for any future pathology paper?
Three groups showed the following: “Yes definitely” (50%), “Yes partially” (37.5%) and “Don’t know” (12.5%) The overall response was positive. Participants indicated the possibility of using the same learning environment for pathology or any other web-based platform for the digital aspects of learning. See on page 34 below Figure 4.6:7 and Table 4.6-7 Auckland University of Technology student survey question- 7

Q8: Do you think that you will continue to use the www.cytologystuff.com site when you have completed your Bachelor of Medical Laboratory Science degree?
More than half of the participants respond with “yes” for using the platform. However, one participant responded “Definitely Not” other two responded “Not really” and “Don’t know”. See on page 35 below Table 4.6-8 and Table 4.6:8 of Auckland University of Technology student survey question- 8.

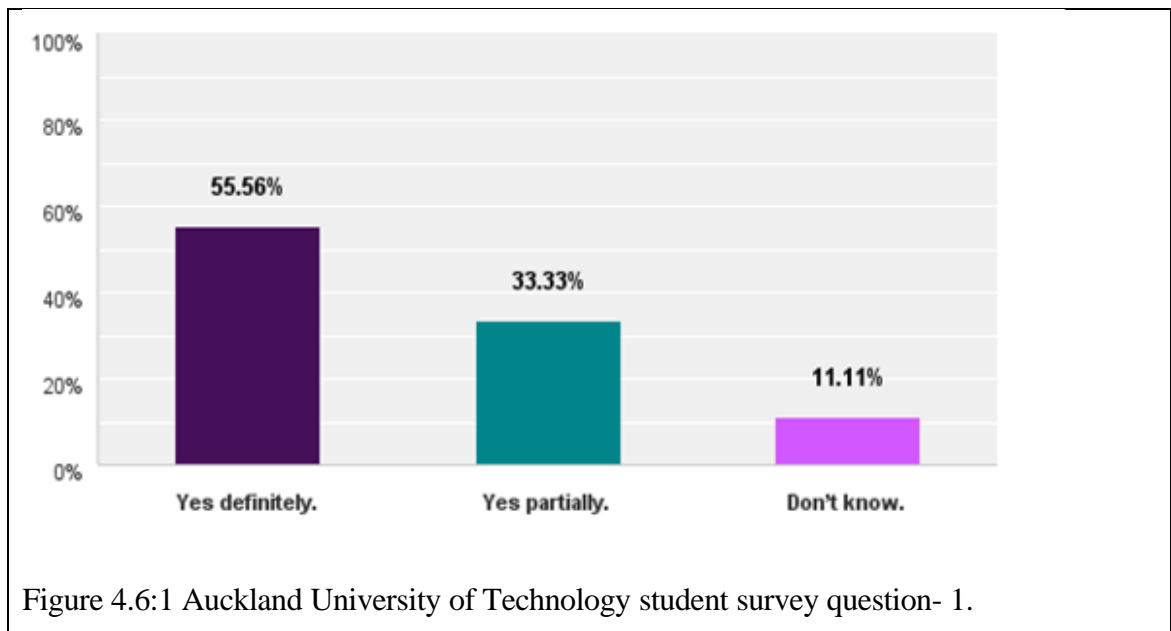


Table 4.6-1 Auckland University of Technology student survey question- 1.

| Answer Choices | | Responses | | |
|----------------------|---------|-----------|------|--------------------|
| 2nd year (2) | | 12.50% | | 1 |
| 1st year (1) | | 87.50% | | 7 |
| Total Respondents: 8 | | | | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 2.00 | 1.00 | 1.13 | 0.33 |

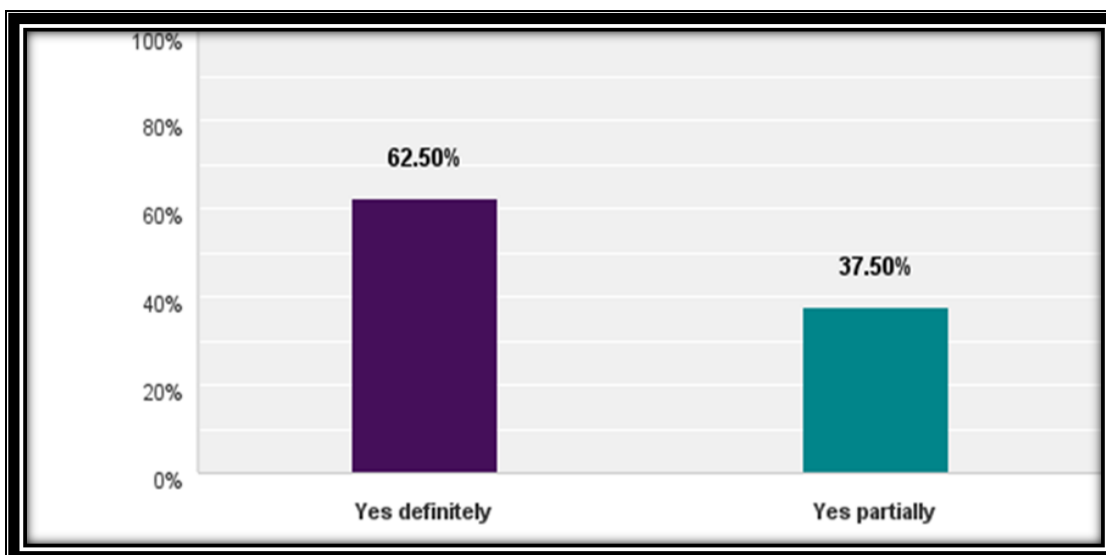


Figure 4.6:2 Auckland University of Technology student survey question- 2.

Table 4.6-2 Auckland University of Technology student survey question- 2.

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 62.50% | 5 | |
| Yes partially (2) | | 37.50% | 3 | |
| Total | | | 8 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 2.00 | 1.00 | 1.38 | 0.48 |

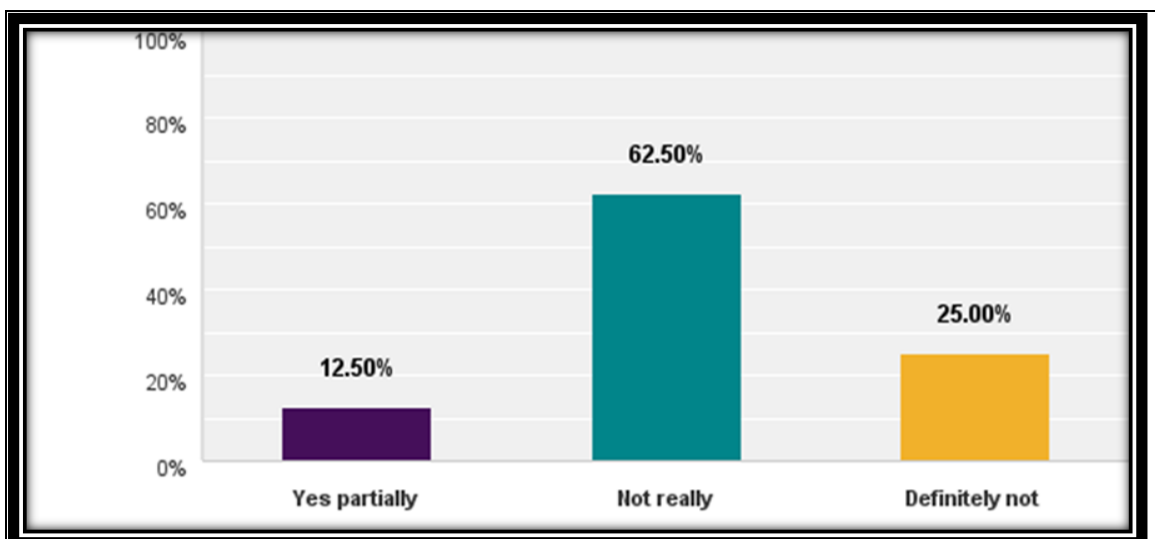


Figure 4.6:3 Auckland University of Technology student survey question- 3.

Table 4.6-3 Auckland University of Technology student survey question- 3.

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes partially (2) | | 12.50% | 1 | |
| Not really (3) | | 62.50% | 5 | |
| Definitely not (4) | | 25.00% | 2 | |
| Total | | | 8 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 2.00 | 4.00 | 3.00 | 3.13 | 0.60 |

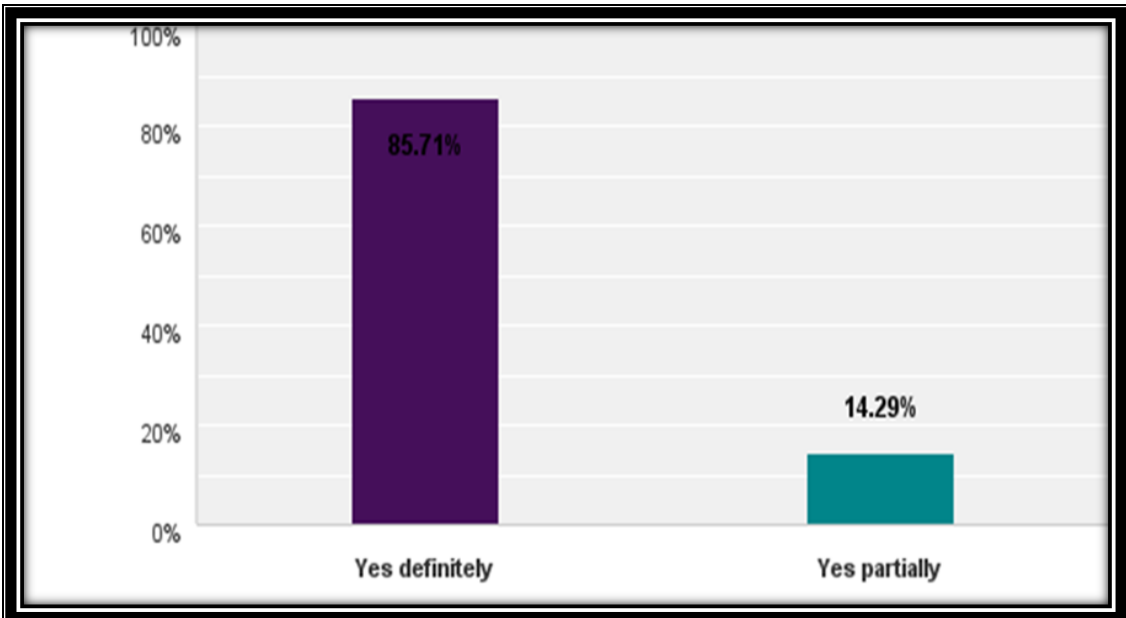


Figure 4.6:4 Auckland University of Technology student survey question- 4.

Table 4.6-4 Auckland University of Technology student survey question- 4.

| Answer Choices | | Responses |
|--------------------|---------|--------------------|
| Yes definitely (1) | | 85.71% 6 |
| Yes partially (2) | | 14.29% 1 |
| Total | | 7 |
| Basic Statistics | | |
| Minimum | Maximum | Median |
| 1.00 | 2.00 | 1.00 |
| Mean | | Standard Deviation |
| 1.14 | | 0.35 |

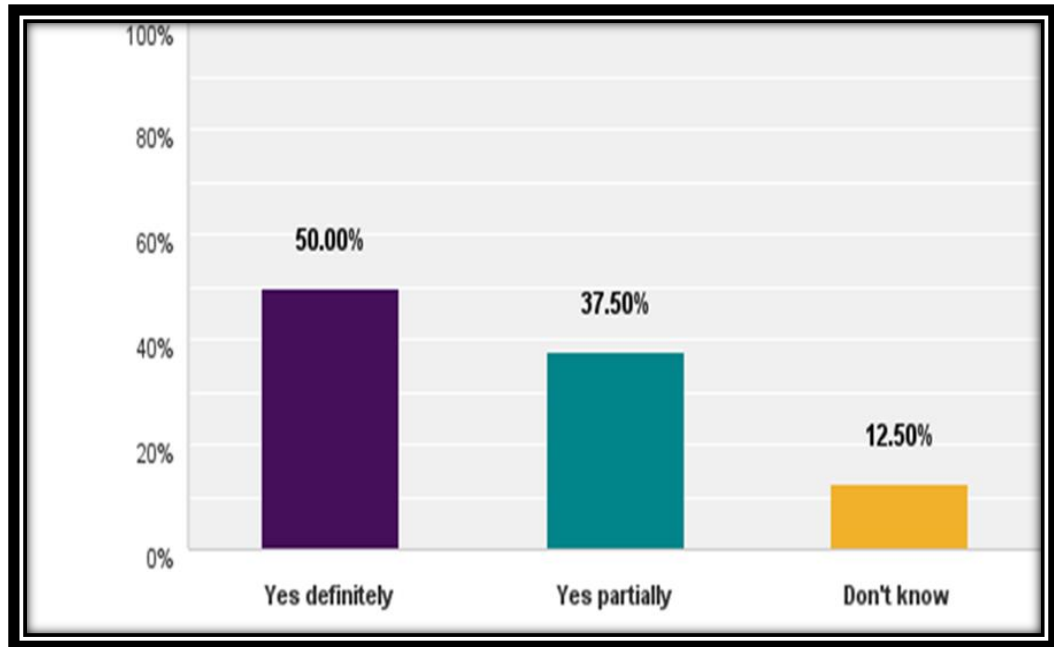


Figure 4.6:5 Auckland University of Technology student survey question- 5.

Table 4.6-5 Auckland University of Technology student survey question- 5.

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 50.00% | 4 | |
| Yes partially (2) | | 37.50% | 3 | |
| Don't know (5) | | 12.50% | 1 | |
| Total | | | 8 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 5.00 | 1.50 | 1.88 | 1.27 |

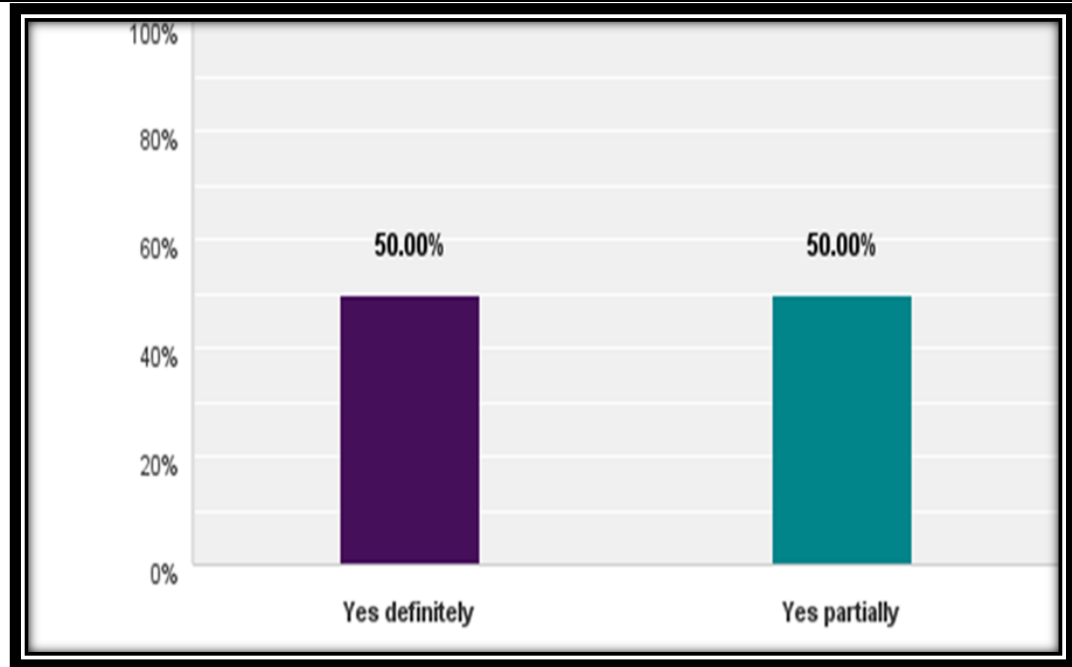


Figure 4.6:6 Auckland University of Technology student survey question- 6

Table 4.6-6 Auckland University of Technology student survey question- 6.

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 50.00% | 4 | |
| Yes partially (2) | | 50.00% | 4 | |
| Total | | | 8 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 2.00 | 1.50 | 1.50 | 0.50 |

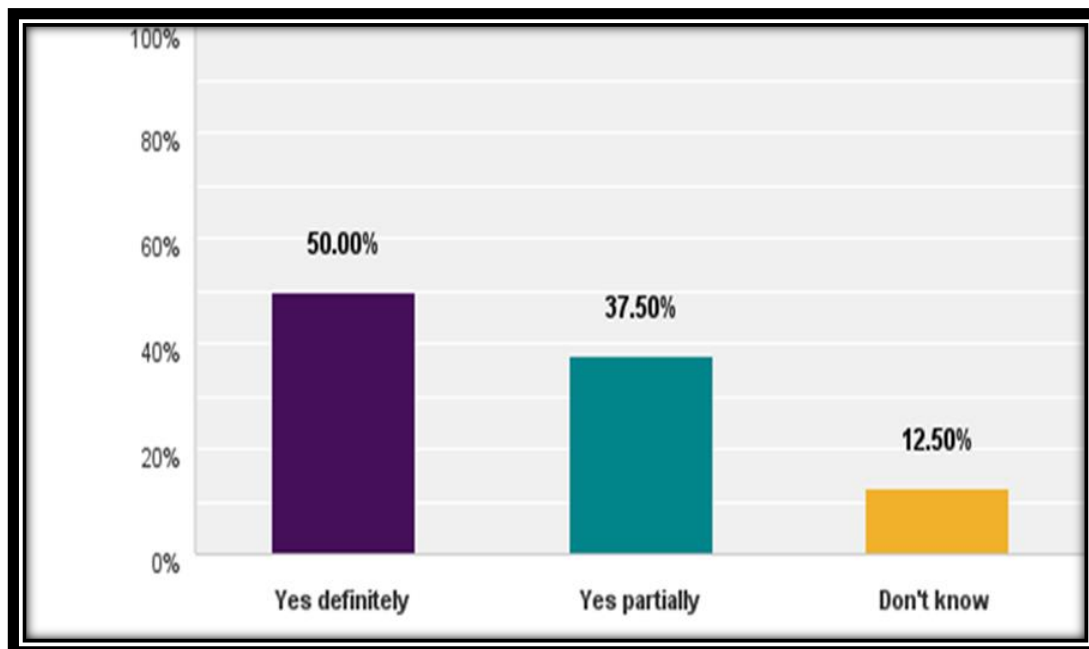


Figure 4.6:7 Auckland University of Technology student survey question- 7.

Table 4.6-7 Auckland University of Technology student survey question- 7

| Answer Choices | | Responses | |
|--------------------|---------|-----------|--------------------|
| Yes definitely (1) | | 50.00% | 4 |
| Yes partially (2) | | 37.50% | 3 |
| Don't know (5) | | 12.50% | 1 |
| Total | | | 8 |
| Basic Statistics | | | |
| Minimum | Maximum | Median | Mean |
| 1.00 | 5.00 | 1.50 | 1.88 |
| | | | Standard Deviation |
| | | | 1.27 |

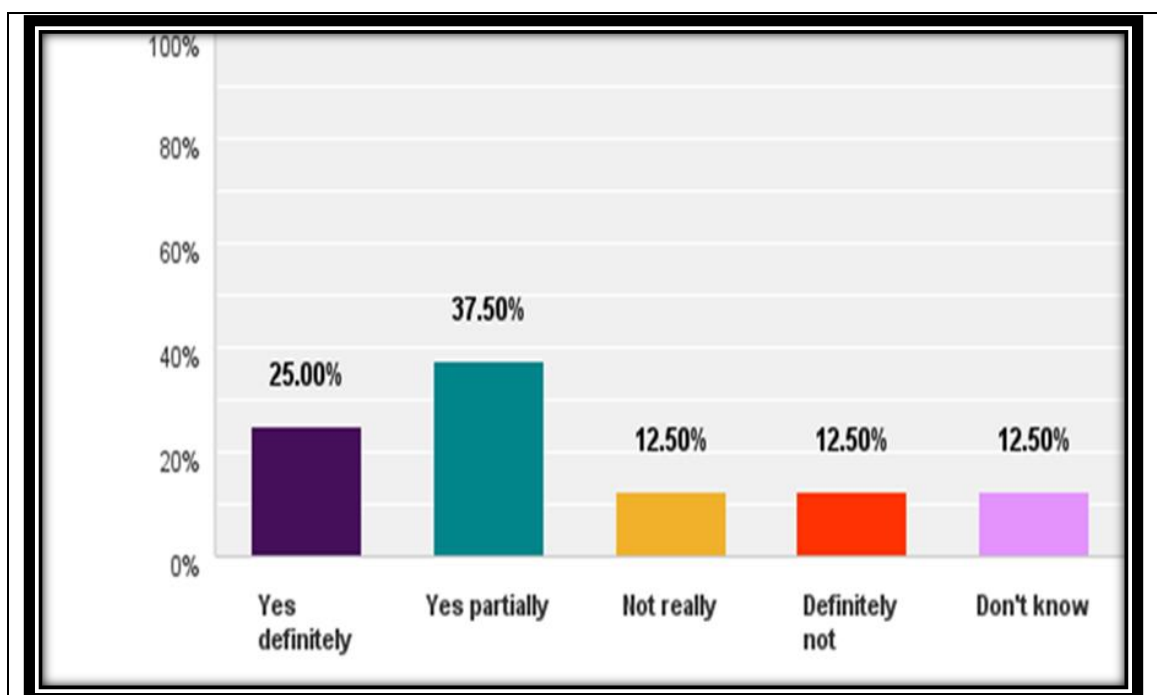


Figure 4.6:8 Auckland University of Technology student survey question- 8.

Table 4.6-8 Auckland University of Technology student survey question- 8

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 25.00% | 2 | |
| Yes partially (2) | | 37.50% | 3 | |
| Not really (3) | | 12.50% | 1 | |
| Definitely not (4) | | 12.50% | 1 | |
| Don't know (5) | | 12.50% | 1 | |
| Total | | | 8 | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 5.00 | 2.00 | 2.50 | 1.32 |

4.7 Cytotechnologists' Community Survey:

Cytotechnologists' survey questionnaire:

The first three demographic questions of the community survey questions are:

Ten participants out of 14 completed the survey. Participants consisted of eight females and two males. See below Figure 4.7:1 Auckland Cytotechnologists' community survey question- 1

The participants are from various age groups; over 60 years (20%), 50-60 years (40%) and 40-50 years (40%). Their experience ranged from 30 years (10%), 25-30 years (30%), and 20-25 years (20%). See on page 37 below Figure 4.7:2 Auckland Cytotechnologists' community survey question- 2

The results provide confirmatory evidence that employees at Diagnostic MedLab had arrange of breadth of years of experience in those who responded. See on page 37 below Figure 4.7:3 Auckland Cytotechnologists' community survey question- 3.

Q1 What is your gender?

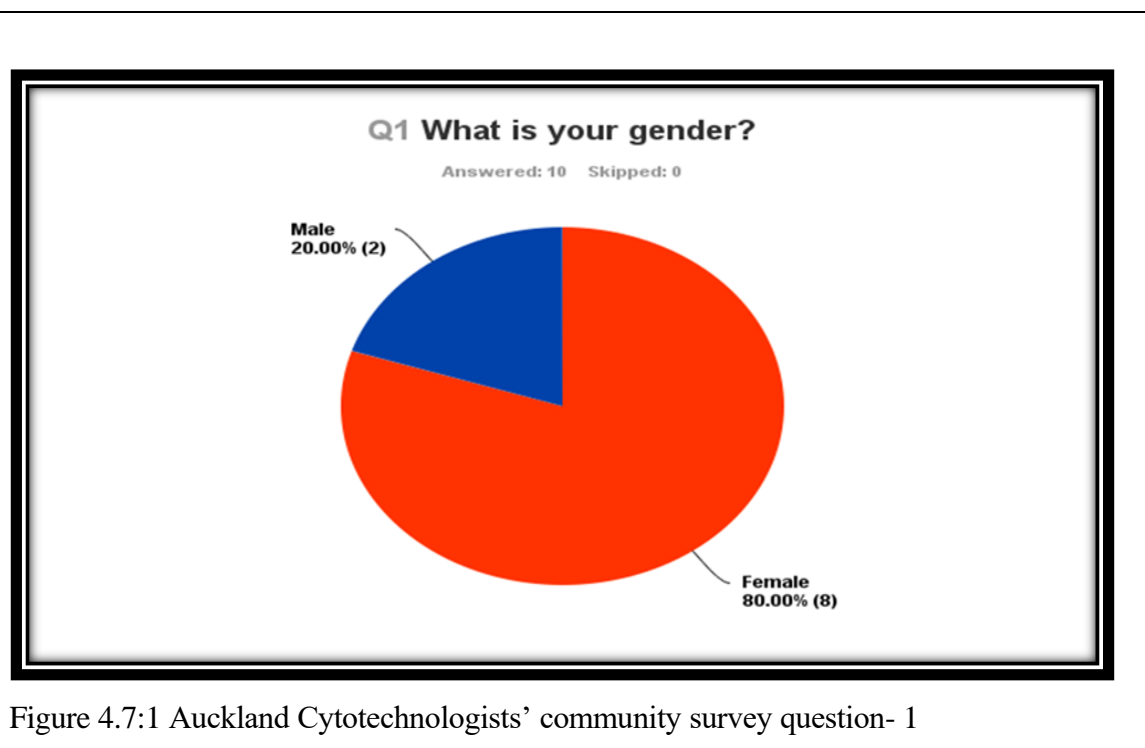


Figure 4.7:1 Auckland Cytotechnologists' community survey question- 1

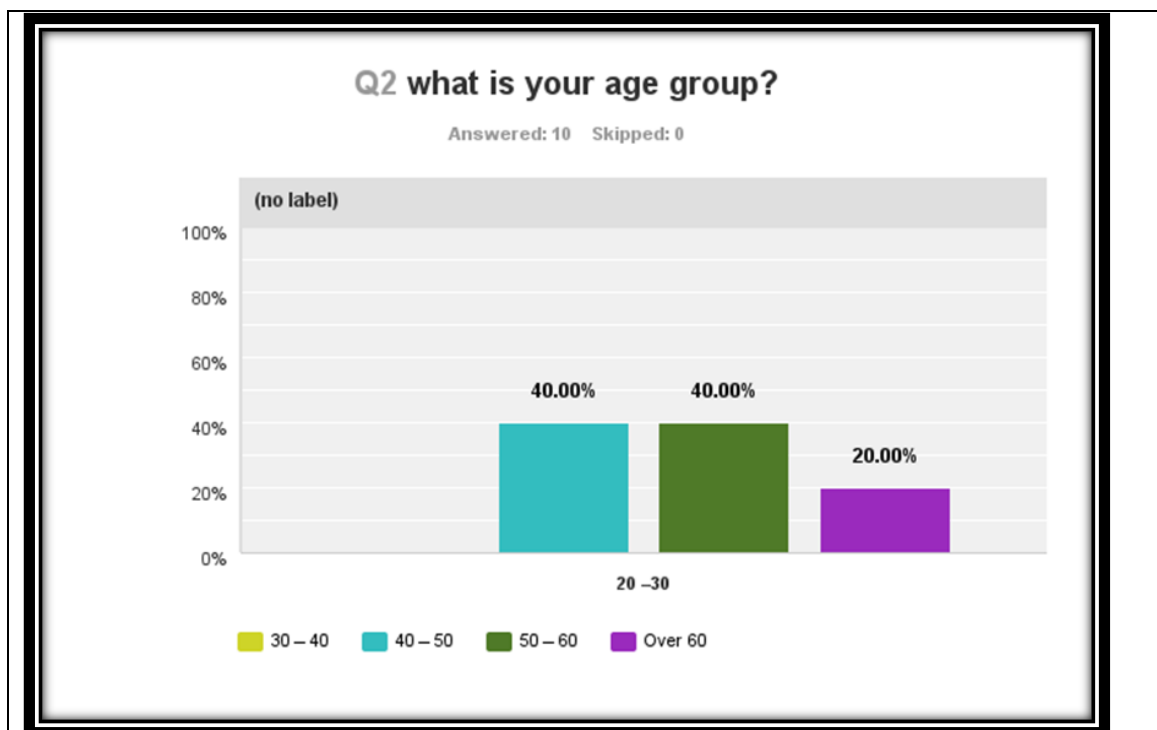


Figure 4.7:2 Auckland Cytotechnologists' community survey question- 2

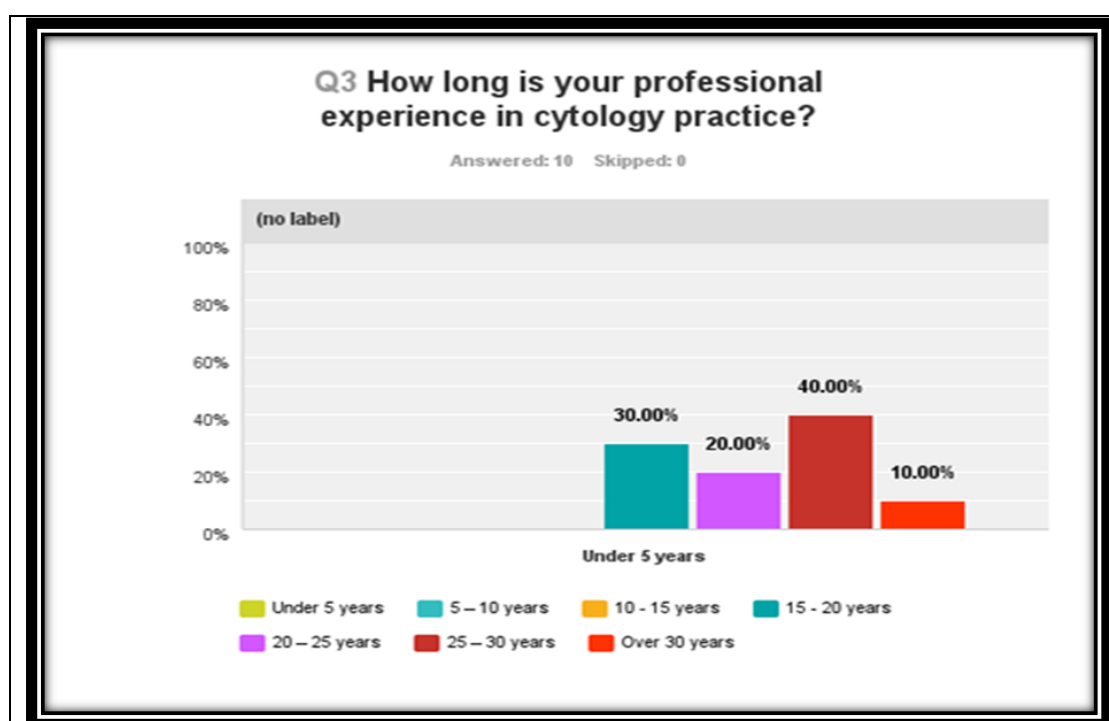


Figure 4.7:3 Auckland Cytotechnologists' community survey question- 3.

Q4 Do you use the virtual cytology educational material on the free platform www.cytologystuff.com?

As it can be seen from the graph, about 60% of the responses were “not really”, despite the question being neutral. It is actually a neutral answer, because the question was not specific enough.

See on page 39 below Figure 4.7:4 and Table 4.7-1 Auckland Cytotechnologists’ community survey question- 4

Q5 Is it easy to use the virtual cytology resources on the website platform; www.cytologystuff.com?

The responses indicated that 50% of the participants found the website platform easy to use, and 10% were neutral in their answers. On the other hand, 40% responded “Don’t know”. It is interesting to find that two thirds of the 60% “Not Really” responses from previous question did not use the website platform in their work routine. See on page 40 below Figure 4.7:5 and Table 4.7-2 Auckland Cytotechnologists’ community survey question- 5

Q6 Do you use the virtual cytology resources of the website platform www.cytologystuff.com to support your ongoing cytology learning?

Only one person (10.0%) is definitely using the cytology online platform for their ongoing cytology learning. A second group of 20.0% indicated they only partially use the platform. However, the two groups make up less than half of the participants. On the other hand, one person is definitely not using the platform. More than half of the participants (60.0%) are “Not really” using the platform for their ongoing learning.

See on page 41 Figure 4.7:6 and table 4.7:3 Auckland Cytotechnologists’ community survey question- 6

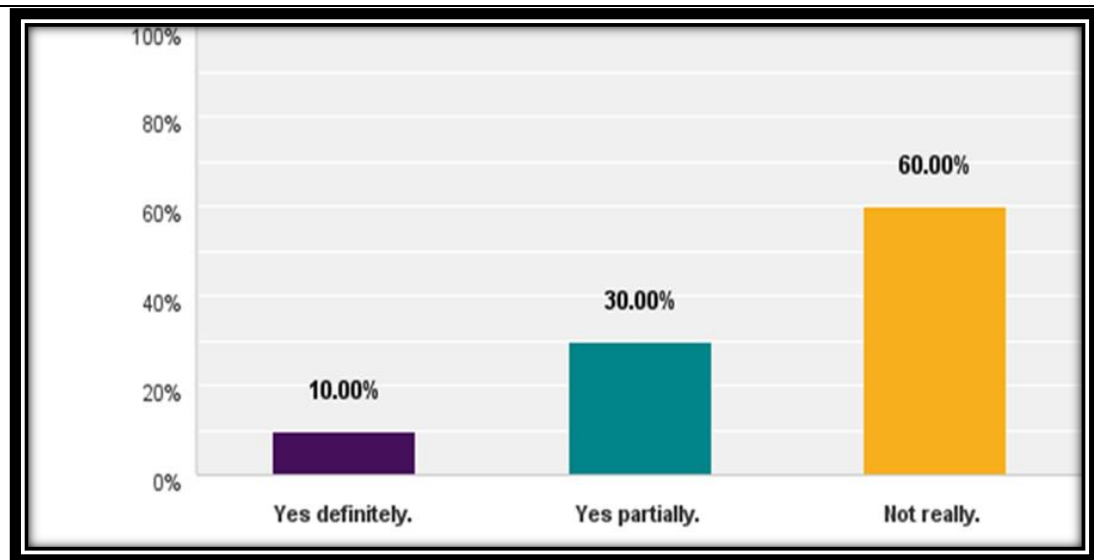


Figure 4.7:4 Auckland Cytotechnologists' community survey question- 4.

Table 4.7-1 Auckland Cytotechnologists' community survey question- 4

| Answer Choices | | Responses | | |
|-----------------------|---------|-----------|------|--------------------|
| Yes definitely. (1) | | 10.00% | | 1 |
| Yes partially. (2) | | 30.00% | | 3 |
| Not really. (3) | | 60.00% | | 6 |
| Total Respondents: 10 | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 3.00 | 3.00 | 2.50 | 0.67 |

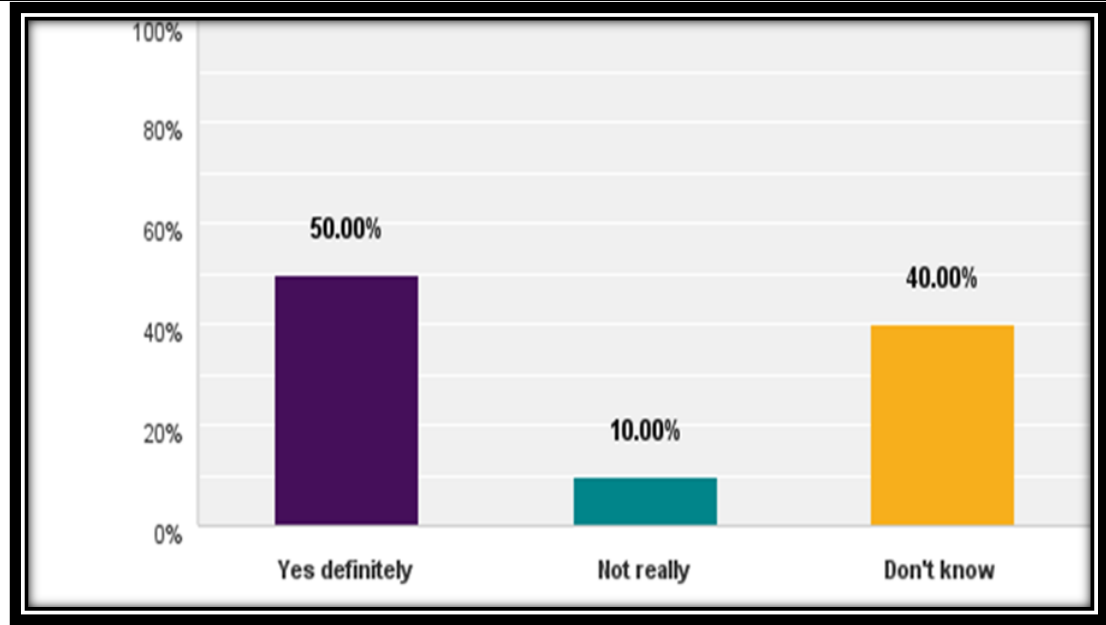


Figure 4.7:5 Auckland Cytotechnologists’ community survey question- 5

Table 4.7-2 Auckland Cytotechnologists’ community survey question- 5

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 50.00% | 5 | |
| Not really (3) | | 10.00% | 1 | |
| Don't know (5) | | 40.00% | 4 | |
| Total | | | 10 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 5.00 | 2.00 | 2.80 | 1.89 |

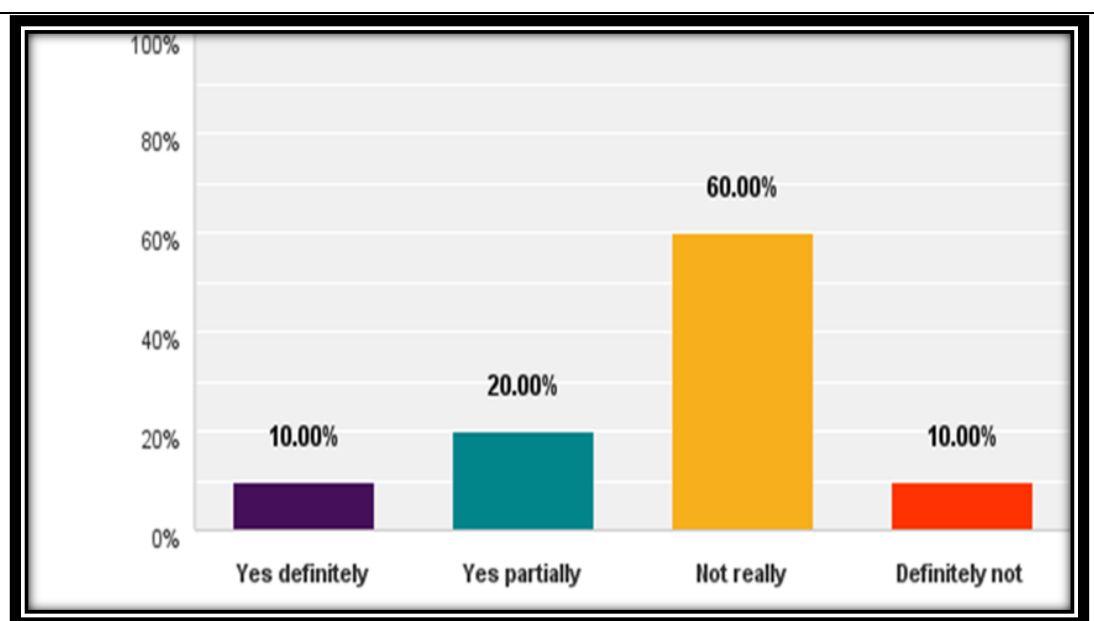


Figure 4.7:6 Auckland Cytotechnologists' community survey question- 6

Table 4.7-3 Auckland Cytotechnologists' community survey question- 6

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 10.00% | 1 | |
| Yes partially (2) | | 20.00% | 2 | |
| Not really (3) | | 60.00% | 6 | |
| Definitely not (4) | | 10.00% | 1 | |
| Total | | | 10 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 4.00 | 3.00 | 2.70 | 0.78 |

Q7 Do you use the virtual cytology resources on the website platform www.cytologystuff.com in problem-based cytology learning?

The responses indicated that 44.0% of the participants, which is the sum of (11.11%+33.33%) are actively using the resources of the website platform in their cytology learning. The group that answered “Not really” is represented in the 44.0% also. This is an important finding, only one quarter of those who responded with “Don’t know” in the previous question five, have shown a new group of the “Definitely Not”, as shown in grey in the following chart. See on page 43 below Figure 4.7:7 and Table 4.7-4 Auckland Cytotechnologists’ community survey question- 7

Q8 Do you use the virtual cytology resources in the website platform; www.cytologystuff.com to improve your skills in diagnostic cytology?

The response indicated that 44.0% of the participants use the resources of the website platform to improve their skills in diagnostic cytology. The neutral OR non-specific group answered “Not really” is again represented in the 44.0%. The “Don’t know” group of previous question five have again confirmed opposition to the new technology, selecting “Definitely not”. See on page 44 below Figure 4.7:8 and Table 4.7-5 Auckland Cytotechnologists’ community survey question- 8

Q9 Do you use the virtual cytology resources in the website platform www.cytologystuff.com in your ongoing professional development?

The response indicated that 55% of the participants think that the website platform is a rich resource for ongoing professional development, and 22% are still in the neutral zone of “Not really”. About one fifth of the professional cytotechnologists do not envisage the website platform as contributing to their professional development. See on page 45 below Figure 4.7:9 and Table 4.7-6 Auckland Cytotechnologists’ community survey question- 9

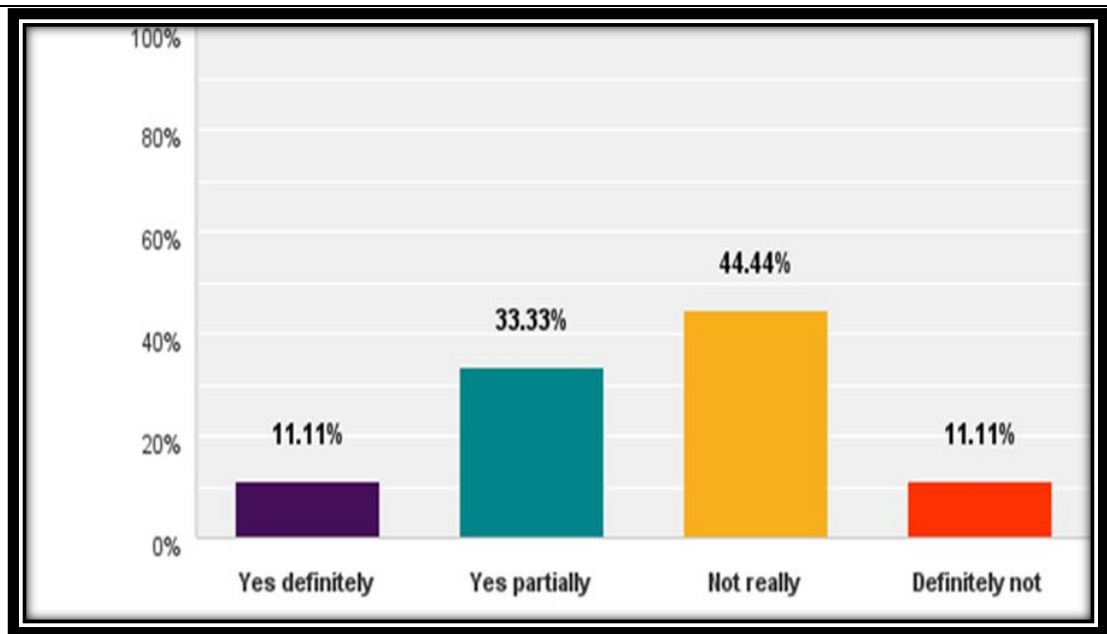


Figure 4.7:7 Auckland Cytotechnologists’ community survey question- 7

Table 4.7-4 Auckland Cytotechnologists’ community survey question- 7

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 11.11% | 1 | |
| Yes partially (2) | | 33.33% | 3 | |
| Not really (3) | | 44.44% | 4 | |
| Definitely not (4) | | 11.11% | 1 | |
| Total | | | 9 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 4.00 | 3.00 | 2.56 | 0.83 |

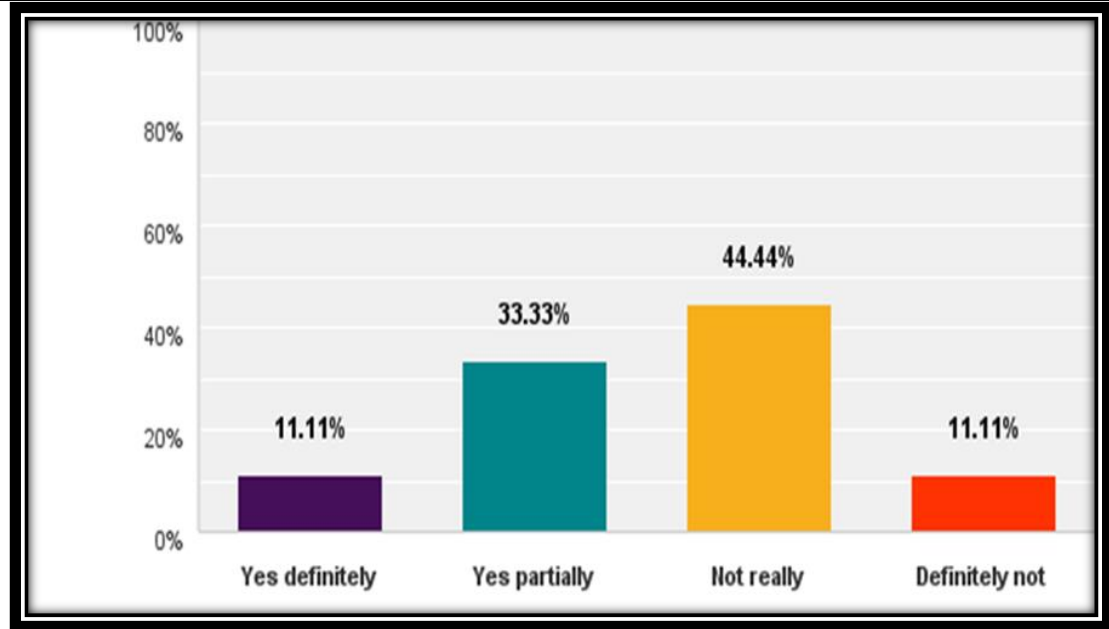


Figure 4.7:8 Auckland Cytotechnologists’ community survey question- 8

Table 4.7-5 Auckland Cytotechnologists’ community survey question- 8

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 11.11% | 1 | |
| Yes partially (2) | | 33.33% | 3 | |
| Not really (3) | | 44.44% | 4 | |
| Definitely not (4) | | 11.11% | 1 | |
| Total | | | 9 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 4.00 | 3.00 | 2.56 | 0.83 |

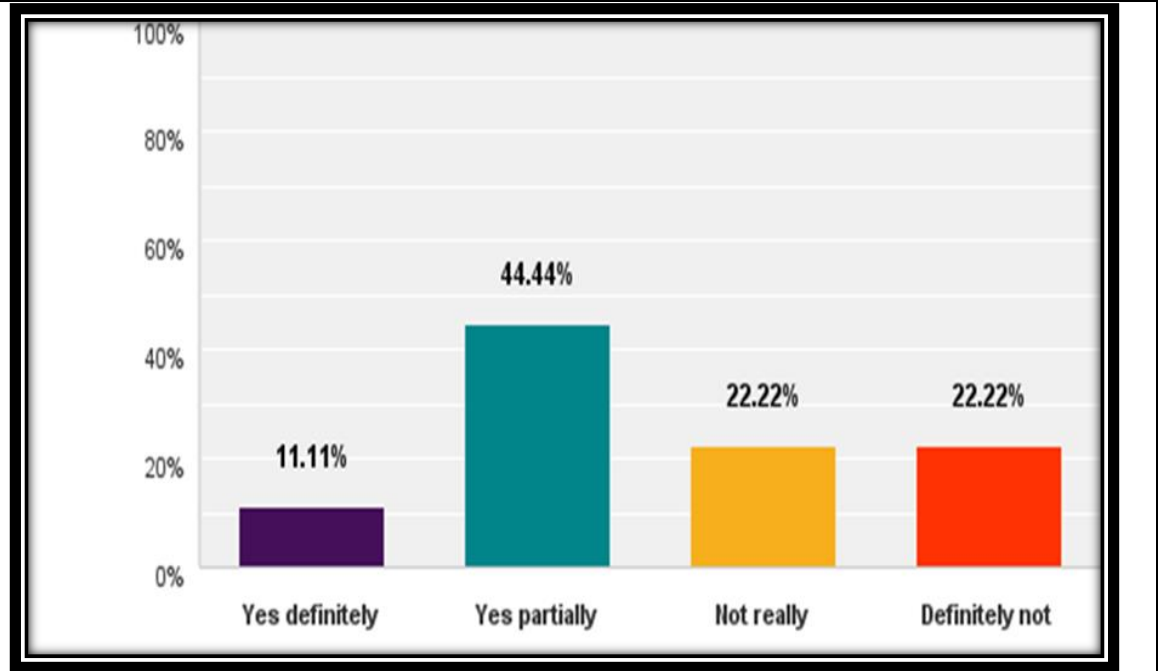


Figure 4.7:9 Auckland Cytotechnologists' community survey question- 9

Table 4.7-6 Auckland Cytotechnologists' community survey question- 9

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 11.11% | 1 | |
| Yes partially (2) | | 44.44% | 4 | |
| Not really (3) | | 22.22% | 2 | |
| Definitely not (4) | | 22.22% | 2 | |
| Total | | | 9 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 4.00 | 2.00 | 2.56 | 0.96 |

Q10 Do you feel more confident in your daily work after your learning experience using virtual cytology in the website platform www.cytologystuff.com?

The response to this question showed the neutral zone having a 44% share. This perhaps is an indication of confusing elements in their view of the new technology. However, one fifth of the professional cytotechnologists is very confident and shows a great sense of adaptability and willingness to harvest the fruits of the website platform. It is possible that about 10% of the professional cytotechnologists are more confident with the traditional learning methods and are reluctant to explore the alternative technological method on page 47 Figure 4.7:10 Table 4.7-7 Auckland Cytotechnologists' community survey question-10

Q11 Do you believe that you have improved your professional skills by using the free virtual cytology resources in the platform www.cytologystuff.com?

The response to this question showed an overwhelming acknowledgment for the effect of virtual cytology in improving the professional skills of cytotechnologists, with response of 55%. About one third of those professional cytotechnologists responded that the website platform would not improve their skills. One tenth responded as not sure. See on page 48 Figure 4.7:11 and Table 4.7-8 Auckland Cytotechnologists' community survey question-11

Q12 Do you find the virtual cytology education material of the web platform website www.cytologystuff.com compatible to the traditional material used in teaching cytology? The response to the two questions showed an overwhelming acknowledgment for the compatibility of the teaching material of the website platform with the traditional material, with response of 55%. However, about one tenth of those professional cytotechnologists responded that the teaching material of the website platform was not compatible with traditional materials and one third still responded as ““Don't know””.

See on page 49 Figure 4.7:12 and Table 4.7-9 Auckland Cytotechnologists' community survey question-12

Q13: Would you recommend the use of virtual cytology resources on the website platform www.cytologystuff.com as a learning strategy for students?

The effect of using the virtual cytology platform as a learning strategy for students, with the response up to 95%, again only one participant did respond “Don't know”.

See on page 50 Figure 4.7:13 and Table 4.7-10 Auckland Cytotechnologists' community survey question- 13

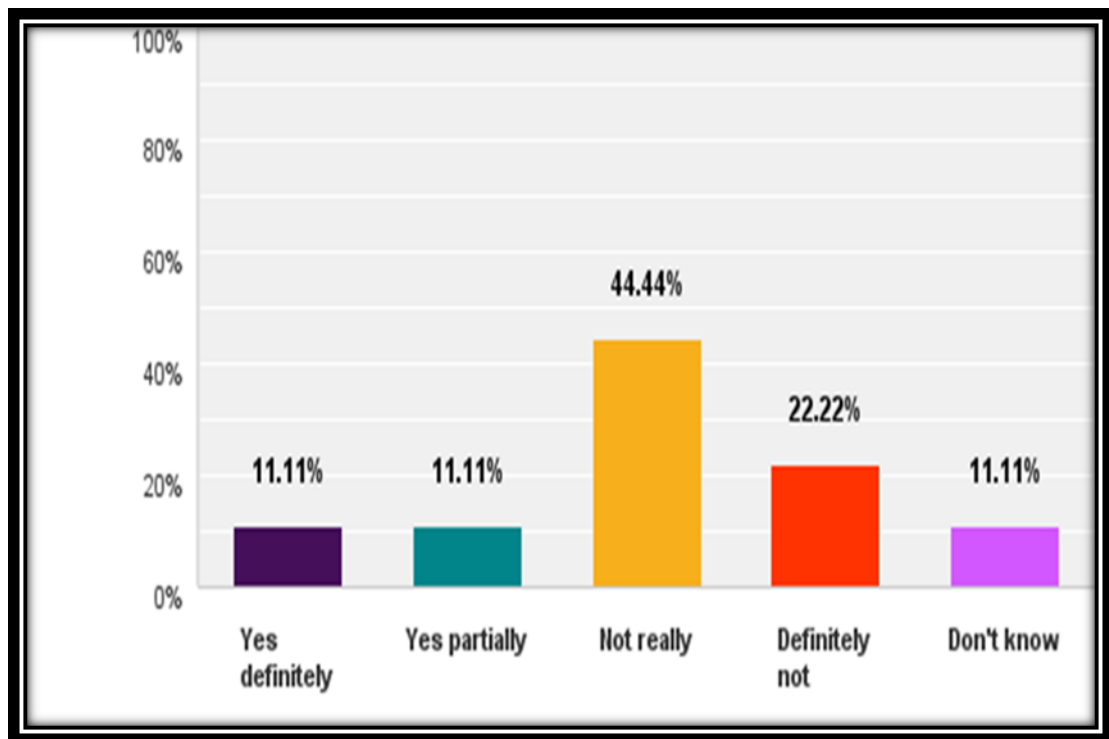


Figure 4.7:10 Auckland Cytotechnologists' community survey question-

Table 4.7-7 Auckland Cytotechnologists' community survey question-10

| Answer Choices | | Responses | | |
|--------------------|---------|-----------|------|--------------------|
| Yes definitely (1) | | 11.11% | 1 | |
| Yes partially (2) | | 11.11% | 1 | |
| Not really (3) | | 44.44% | 4 | |
| Definitely not (4) | | 22.22% | 2 | |
| Don't know (5) | | 11.11% | 1 | |
| Total | | | 9 | |
| | | | | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 5.00 | 3.00 | 3.11 | 1.10 |

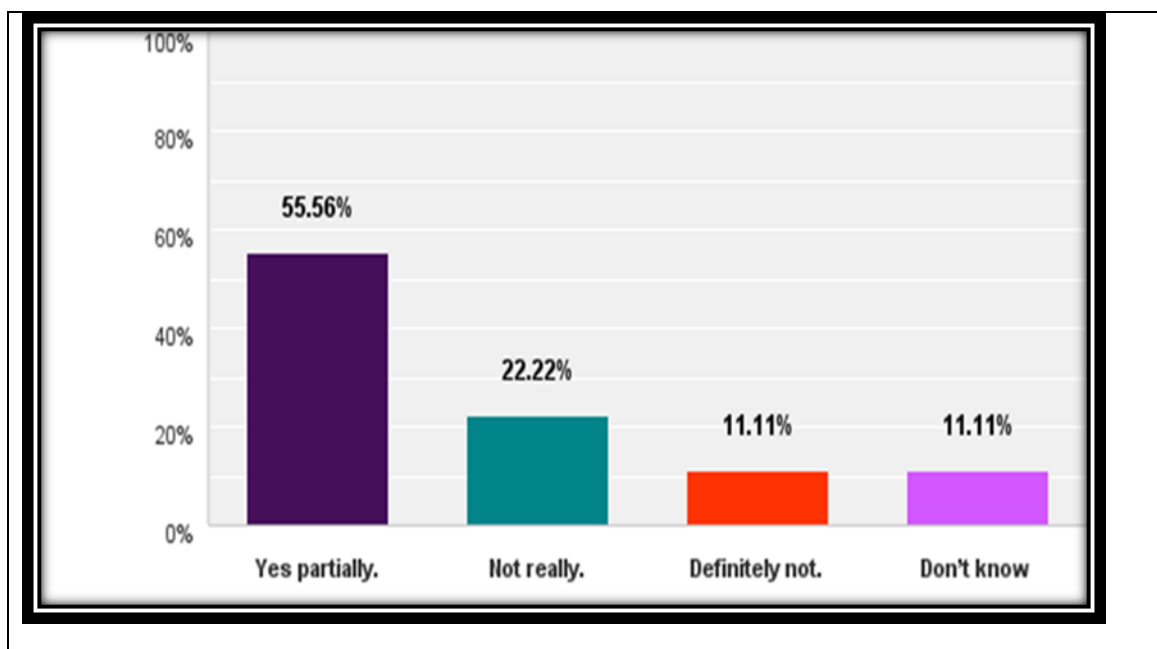


Figure 4.7:11 Auckland Cytotechnologists' community survey question-11

Table 4.7-8 Auckland Cytotechnologists' community survey question-11

| Answer Choices | | Responses | |
|---------------------|---------|--------------------|------|
| Yes partially. (2) | | 55.56% | 5 |
| Not really. (3) | | 22.22% | 2 |
| Definitely not. (4) | | 11.11% | 1 |
| Don't know (5) | | 11.11% | 1 |
| Total | | | 9 |
| Basic Statistics | | | |
| Minimum | Maximum | Median | Mean |
| 2.00 | 5.00 | 2.00 | 2.78 |
| | | Standard Deviation | |
| | | 1.03 | |

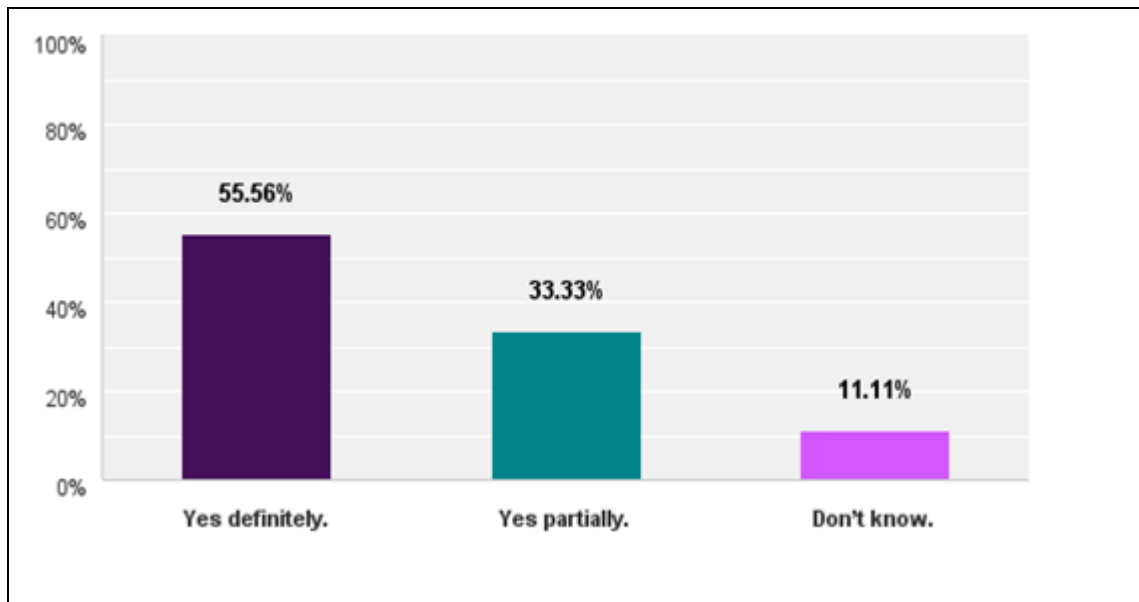


Figure 4.7:12 Auckland Cytotechnologists' community survey question-12

Table 4.7-9 Auckland Cytotechnologists' community survey question-12

| Answer Choices | | Responses | | |
|---------------------|---------|-----------|------|--------------------|
| Yes definitely. (1) | | 55.56% | 5 | |
| Yes partially. (2) | | 33.33% | 3 | |
| Don't know. (5) | | 11.11% | 1 | |
| Total | | | 9 | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 5.00 | 1.00 | 1.78 | 1.23 |

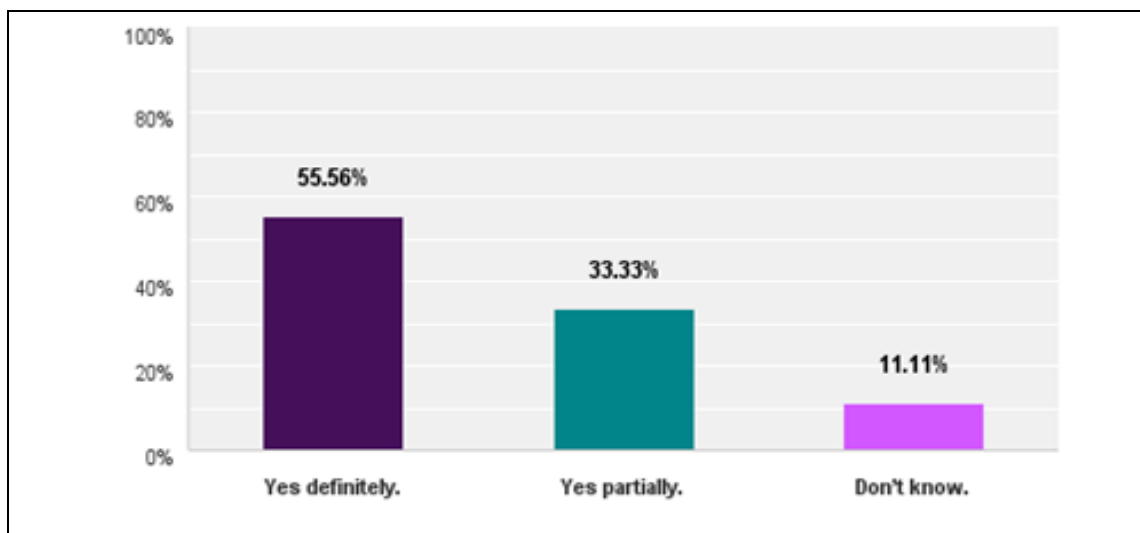


Figure 4.7:13 Auckland Cytotechnologists' community survey question- 13

Table 4.7-10 Auckland Cytotechnologists' community survey question- 13

| Answer Choices | | Responses | | |
|---------------------|---------|-----------|------|--------------------|
| Yes definitely. (1) | | 55.56% | 5 | |
| Yes partially. (2) | | 33.33% | 3 | |
| Don't know. (5) | | 11.11% | 1 | |
| Total | | | 9 | |
| Basic Statistics | | | | |
| Minimum | Maximum | Median | Mean | Standard Deviation |
| 1.00 | 5.00 | 1.00 | 1.78 | 1.23 |

4.8 Themes:

Following my being immersed in the data, two particular themes were identified. One of the themes related to reflecting on what seemed to be knowledge already held, which I named “Reflections of Knowing”. The other “Knowing with a new eye” reflects the experiences where a change in knowing was expressed.

Both themes are expanded upon in chapter six.

The results where most agreement indicates that the cytotechnologists' participant saw value in this site for student learning but for their own learning the results were less clear. In contrast, the responses from students participants was positive and all the participant indicated there was value in making use of this site such that they would recommend it to other students undertaking a course in cytology.

5 CHAPTER FIVE: SELF-REFLECTION; THE RESEARCHER'S PERSONAL EXPERIENCE

5.1 Introduction:

Research cannot help but be partial in terms of only being able to account for some, not all, of a network, and in that it cannot help but reflect the researcher's own bias (Haxell, 2013). In undertaking research that draws on actor-network theory, being a situated researcher is important. In this journey, my own part in this network is therefore brought forward.

The study involves a small slice of time for people who experienced an online platform when learning cytology practice. This descriptive account provides a limited account (as all studies do) because it can only talk of a slice in time investigating the use of the online platform. It is also partial in that some aspects are focused upon while others are thrown into a shadow, in addition to partiality due to the author's own bias. However, researcher and other inherent biases can be managed within actor network theory by studying the actors entwined within the network being studied.

This section is a self-reflection, which comprises one user's experience of the study online platform www.cytologystuff.com. It is appropriate at this point to disclose some personal information pertinent to this self-reflection. My name is Ghada Alnajjar; this is an Arabic name, and I was born in the city of Baghdad, Iraq, where I went to school and graduated from Baghdad University, finishing my training in Veterinary Medicine in 1990, before working in Jordan. Mesopotamia has always been acknowledged as a cradle of civilization, and Baghdad was established as a great centre of learning and development, *Madinat al-Salaam* (the City of Peace), by the Abbasids on the banks of the immortal Tigris. However, during my lifetime the fabric of Iraq has been ripped apart by three devastating wars, sanctions and on-going civil war. I migrated to New Zealand in 1995, with my family, making New Zealand my home. Here, I achieved my Bachelor of Medical Laboratory Science from Massey University in Palmerston North in 2000, and worked in Auckland.

5.2 The Project:

“The future is already here – it’s just not evenly distributed.” William Gibson, quoted in The Economist, December 4, 2003 (Crean, 2012).

I came across this quote for the first time when my primary supervisor saw the connection between my introduction of cytology and the aims for this research. In the same meeting we discussed some parameters that have an influence on this research and how they could be explained.

This study explores the user experience of an online platform www.cytologystuff.com in the student and cytotechnologist communities and the researcher’s own experiences of the platform website. Mixed methods were used in this study investigation strategy. The survey questionnaire explores three main points: awareness, complexity and perceived values of using the online platform www.cytologystuff.com. The mixed methods approach demonstrates the networks brought together in this study, which relate to different knowledges, including those supported by quantitative or more qualitative orientations, and the mixture of the research strategies can throw light on the research phenomena. However, mixed methods are not necessarily comfortable companions in a research study, and the use of data from which inferences or generalisations might be made is at odds with data from personal experiences, nonetheless each illuminates aspects of the research subject in different ways.

It should be noted that those who participated in the cytotechnologists’ survey, as discussed in the previous chapter, are not a homogenous group; some participants will have more, or less learning experience when making use of the platform www.cytologystuff.com. The experiences are individual and any aggregating of their data in terms of simple statistics only provides a crude measure of how differing groups experienced this one site. The researcher’s own user experiences of the platform www.cytologystuff.com is different again.

Gibson’s quote throws light on how very different people’s experiences can be. This has clear relevance to this study, in that it explores a variety of user experiences in making use of an online platform such as the one www.cytologystuff.com provides. However, technological availability and familiarity is not distributed evenly and the “future” comes to different people at

varying speeds. For example, in the 1960s the cervical screening program for cancer in New Zealand, as discussed in the first chapter, was at odds with the norms of treatment options offered in other countries such as Australia and the United Kingdom. This is similar for the “future” of cytology learning techniques. Looking at a map of the world illuminating areas with the most internet traffic, this becomes very clear. The “black holes” are where access to the internet is not prevalent and this is not distributed evenly. People in those black holes have less technology available to them, they have less connectivity globally, for myself it is significant that Iraq is not included in this connected world, as seen on page 57 below Figure 5.2:1 Image capture of creative commons window.

My experience of being a woman growing up in Iraq was of a country that had no cervical screening programme. While New Zealand has had cervical screening since the 1990s, Iraq had to wait almost twenty years longer. In 2008, an authenticated pilot programme in Iraq by the Ministry of Higher Education Scientific Research division established a cancer research and development unit for early detection of breast and cervical cancer. Implementation of the national programme led to cancer research in 2009 (Khalaf, Rasheed, & Hussain, 2015). This has important implications that raises questions regarding the future of Iraqi women and whether health care for women will or can follow the history of other nations.

The networks of health care and education intersect, with other networks such as cytology and cervical screening, and also this research bringing together as it does other actors of particular backgrounds. While the biggest impact on public health would be peace, other strategies for health are less easy to justify. However, there remains a hope that a future allows for better health care initiatives and better prepared health professionals, including health promotion programmes such as cervical screening becoming standard in all nations. While this study is limited to a study of learning cytology in New Zealand, an online learning platform and community of practice such as that provided by www.cytologystuff.com may one day also be useful to learners elsewhere, such as in Iraq. My user experience of the platform is coloured by this hope.

It is important to note that looking for what is good or bad produces binaries that would close down a conversation as to what a website platform such as

www.cytologystuff.com may have to offer. This part of the analysis therefore explores what comes to light when using the platform website and notes that there is a level of complexity with which such a binary way of looking at things does not cope well. This research looks at several elements that influenced the project via many channels, which are: science, technology, teaching, learning perspectives and social networking. It then becomes easy to see the overlaps involved. The knowledge of science does not become known by future generations of scientists without education and such knowledge is developed within a community of practitioners, who may reside inside or outside of educational institutions.

Technologies are devised and constructed by those who use them. One does not get to be a microbiologist without having engaged with a microscope. In developing a community of practice, all of these aspects are similarly brought into play. Taking the metaphor of rivers and channels, I describe the obvious overlapping of channels. The starting point is determining which channel could act as a hub to encompass all other channels. Being familiar with the science, technology and teaching channels that feed a single river bears similarity to the Tigris River in my homeland; the learning channel by itself is the Euphrates, and both rivers meet in a single delta, while the last channel of social networking bears resemblance to the flow of Mesopotamian Civilisation

(LAL) in the Tigris-Euphrates valley (c. 3300 BC - c. 2000 BC); on page 57 below
Figure 5.2:2

From the humble start of the research idea, there is also the combining of further channels of interests. I had to discuss, convince and engage supervisors in the project. Aligning different actors into a research network, bringing together networks that do not often meet, includes bringing together the voices of cytotechnologists with the voices of students, reflecting my circulation within both groups.

Following a direct face-to-face meeting with a scientific supervisor, he observed that the science and technology aspects of the research project are not going to be the leading elements of the research idea, and agreed to join the research team as a secondary supervisor. A primary research supervisor was still needed; someone with more knowledge of education, of online learning and teaching methods, processes and technology. It was not an easy task to find someone with the required skills.

Considering the multiple elements involved in the project. I approached the Associate Dean (Postgraduate) and Research Office for their support.

Further networking communications then occurred leading to the appointment of a primary supervisor with less knowledge of science but who was more familiar with online media and education, and who had a research background that encompassed practice-based research. My proposal was initially reviewed on 12 September 2014 and was given the final approval by the faculty during their meeting on 23 September 2014. A further delay was associated with obtaining approval from the Ethical Committee at AUT for Part One of the research, and it is important to stress that the green light for my research idea was granted during the very last week of the undergraduate Histology/Cytology course at AUT.

This demonstrates an experience in networking, requiring active work in negotiating relationships with a variety of personnel that then expanded through discussions that extended to biostatisticians and the Chair of the Ethics Committee at AUT, before proceeding to establishing a relationship with the Manager of Diagnostic Medlab and the course convenor for the Histology/Cytology course. All of these relationships were needed to align with this research project before participants could be involved.

The ensuing enrolment of participants required establishing a contract with www.surveymonkey.com, to make this a functioning live link for students to respond to and for data to be entered. This was seen as an experience in networking, requiring active work in negotiating relationships with a variety of personnel as well as technologies. The research network then needed to expand further with engaging of ethics committees followed by participants in the research data collection. In writing this thesis there was also a need to engage with literatures regarding both the content under study (online learning platforms) as well as literature regarding methodologies. It was also about engaging with future readers of my research as an insider of this network. I am immensely grateful to all of the people who helped me in this network of study.

5.3 Networking Technology:

It is safe to assume that students in New Zealand are part of the 2.5 billion people worldwide who have access to the internet. This is a country that has internet access as evidenced by the map that follows. Technologies introduced in the first chapter, light microscopy and specimens are the primary teaching methods for the undergraduate Histology/Cytology course at AUT in New Zealand.

In this AUT course, two slide preparations, conventional smear and liquid based cytology slides, are taught within the non-gynaecological cytology section. Some students would ask me technical questions as a teacher's assistant, such as, "What is best or most useful technique used in the of non-gynaecology specimens?" This reminded me of my own questions when I was a student, such as "what is the best staining method?" This memory prompted further questions concerning what answer I could give in the context of technological changes in the field, what students perceive as learning, and whether it is more beneficial for students to receive answers to such questions or to be guided to work out solutions for themselves. It quickly became apparent that in addition to an understanding of what current technologies are important, an appreciation for how such knowledge is brought into being, sustained or changed must be considered.

What is available in terms of material resources? What learning has occurred about such options? These are not the only questions possible, but demonstrate how any action is shaped inside of socio-technical-political influences. At the same time there is also appreciation for how there are no socio-technical-political divisions.

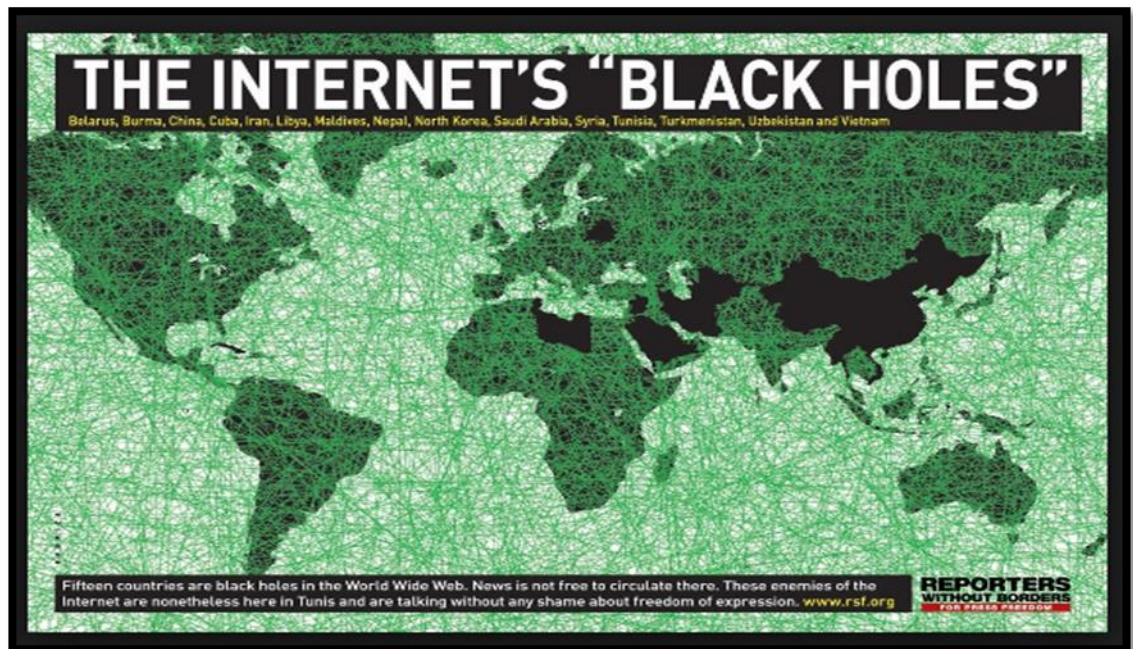


Figure 5.2:1 Image capture of creative commons window

<https://www.google.co.nz/search?q=internet+connection+in+iraq+wikipedia+images&biw=1366&bih=611&tbm=isch&imgil=VIIfTE1qG78eyM%253A%253Bmi2IHvISeUzWLM%253Bhttps%25253A%25252F%25252Fen>.

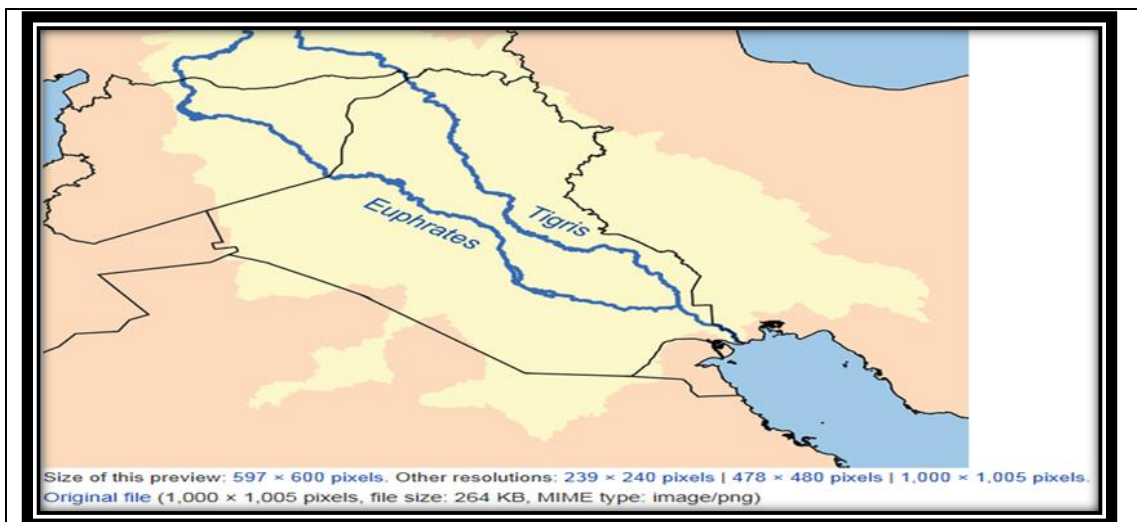


Figure 5.2:2 Tigris Euphrates Image capture of wikipedia

Creative commons licen window of <https://en.wikipedia.org/wiki/Tigris-Euphratesriversystem#/media/File:Tigris-euphrates.png>

5.4 Reflecting on my Experience in using www.cytologystuff.com

The World Wide Web opens a space for this research in the context of this technology; the study is an attempt to explore the user experience of an online platform www.cytologystuff.com when learning cytology.

Since this study was observing actors, human and otherwise, actor-network theory was seen as providing a means for investigating the experiences involved. This methodology presents change as seen as a series of translations. Taking the movements described by Callon (1986), the necessary translation steps would be problematization, interessement, enrolment and mobilisation of allies.

Problematization is evident in the connection between the issues involved in learning network and what the student needs to know. For example, identifying that there is a need to view and understand cells three dimensionally, identifying that students will need to learn how to make decisions between practice options is another example. The concerns then become a prompt toward aligning other actors into a sociology of translation. The site needs to be accessible, and the learners enticed. The detour of learning microscopy as it has always been done would need to be undone.

Interessement involves forming alliances with other actors in the problematization. In this study the ability to engage the course coordinator into having students involved on the site is one such process. However the timing of this was problematic, students were at the end of the semester and their use of the site was not required. At the time of the study, the cytotechnologist staff working with the Diagnostic Medlab were moving to a different institute and provider. The need to use such a site was not self evident for this cohort either, there was not a perceived need leading to interessement.

Without interessement, enrolment and mobilisation of allies did not occur and thus a stable network was not formed. This qualitative study is not intended to tell others what they should do, rather it investigates the authentic user experience of an online platform when learning cytology and the value of their experiences. Student participants' feedback on being involved with the site indicated that they found the site useful and of sufficient value to recommend www.cytologystuff.com to other students. Their ongoing use of the site remains unknown. Similarly the cytotechnologists participating also suggest that they saw value of the platform at least as far as recommending its use for

students. During my own use of the platform I found it to be enticing. However none of these actions of themselves stabilise the network of using this online platform for the ongoing education of students in the Histology-Cytology course at the AUT.

Enrolment would involve convincing others to embrace the use of the site as an ongoing initiative. For students to continue to make use of the site it would need to be further embedded within their course. If assessment drives learning this would suggest attaching use of the site as a necessary means to this end. For the cytotechnologists already in practice, a possibility might involve a regulated workforce, where ongoing evidence of professional development could occur with use of a site such as this. As it currently stands, neither students nor the cytotechnologists would experience the site as a necessary or obligatory passage point to such an end.

In this Actor-Network informed study, I have provided the broader picture in regard to what occurs for different actors, such as students introduced to the site, those within the profession using the site, and my own experience of making use of this site. However, in this research study I have only gone as far as exploring the user's experience. This study is a descriptive account. An actor-network analysis in providing a descriptive account may identify what else needs to be done in enrolling actors to be involved and to stabilise the use of this site as a stable learning network. It does not extend to the making of recommendations.

In Latour's *Reassembling the Social*, a "Good Actor Network Theory account is a narrative or a description or a proposition where all the actors do something and don't just sit there" (Latour, p. 138). In this account I have described how further activity would be required to stabilise use of the platform within learning and teaching endeavours for students or for cytotechnologist staff. In addition, there are activities required to use the site, technology does not have its own trajectory. There is work undertaken that would enable the use of reliable and functional computers and internet access. It was also indicated that for this online platform to be used more there must be a perception that what it provides is of value to the traditional learning methods to promote acceptance and engagement with the platform. Without any of these aspects, the site does not enrol others into a stable network.

5.5 Platform www.cytologystuff.com:

The technological experience is also different to any of the users involved. Having been there, the computer remembers the website platform and brings up the window before completely writing in the address! The cached bookmark that can remember website visits makes it more easily accessible, with search engines such as Internet Explorer, Chrome and Firefox are subtly adapting to learners' ongoing visits and study behaviour. Judgments about the way in which websites profile users (e.g. in terms of cookies) are contributing to the experience of those using the online platform www.cytologystuff.com.

Having arrived at the site, the site describes itself as: “*Your educational resource for all things Cytology*”. The excerpt from the search engine screen as displayed the top part of the first window is displayed below (see on page 62 below Figure 5.5:1 Adapted image is a screen capture, top part window of www.cytologystuff.com). The top part of the first window from the cytology website www.cytologystuff.com provides information about the site. There are several pop-up menus to choose from on the home page. The available options include: Study, Watch, Learn and Interact. Each of these options lead to sub-menus, with four main tabs; Molecular Stuff, Quarterly Calendar, Cytology Education Stuff (CE Stuff) and Other Stuff. The lower part of the first window shows further learning information and is presented as Cell Block Morphology Atlas, Case Presentation and Unknown Cases. The atlases are designed to assist cytotechnologists and pathologists to develop and refine their proficiency in the interpretation of gynaecologic and non-gynaecological cytology using the Thin Prep method. Excerpts from the search engine screen are displayed below (see on page 63 below Figure 5.5:2 Adapted image is a screen capture of the lower part of the window of www.cytologystuff.com).

The case presentation tab shows brief information about a case from spring 2015 in the northern hemisphere. The seasonal date is used for the time of the researcher navigation of the website to present this section to the reader with updated cases. Those seasons are referred to suggest the site is talking to a particular pool of people and may be alienating others.

The site allows for users of this site to submit case studies, providing cellular images as well as providing text-based discussion regarding a particular case. However, what is missing is perhaps an opportunity to enter into a discussion with such authors, via a

discussion board for example. The user is prompted with the option to learn more about the presented case, and can click on words that are hyperlinked to a new page. When the user moves a cursor arrow via a computer mouse or moves a finger on a track pad, particular words change colour and are underlined, indicating a hyperlink. Clicking on a hyperlink opens a new page. To learn more, the case is presented in detail starting with the case diagnostic name, the authors, clinically relevant patient history information, specimen type, cytology diagnosis, who provided the cases and images of Thin Prep cytology. Under the Unknown Cases tab, new unknown cases are posted monthly to test and hone diagnostic skills of the cytotechnologists' community. To view the currently displayed unknown case from April 2015, the user is prompted to "View the Unknown" and upon selection, the case is presented in detail in a similar fashion to that under the case presentation tab. "Viewing the unknown" is not a particularly enticing tab. The human actors may not be persuaded to look at something just out of curiosity.

The platform can be viewed in eight languages (the original English version and Chinese, Dutch, French, German, Italian, Japanese and Spanish). The seven international sites contain a major subset of the English language version and are updated periodically to include a larger subset. The website appears inclusive, as it presents itself as able to be used by non-English speakers. Such languages include five from European countries, and languages of two major Asian countries, China and Japan. There are no Middle Eastern or African languages represented, nor any from the South Pacific region. My own first language, Arabic, is not represented; thus, with over 300 million other native Arabic speakers, I find myself constrained. The anywhere, anytime online platform suggests global freedom in relation to an international community of practitioners who might learn from each other, in their own time (and time-zones). Yet there are obvious limitations on this.

The platform allows for self-paced tests and measures the knowledge acquired from reading and engaging with the site. An excerpt from the search engine screen is displayed

(See on page 63 Figure 5.5:3 Adapted image is;

Screen capture of the Cytologystuff window of www.cytologystuff.com below).

The time that professionals used exploring the Cytology Stuff platform can be documented and declared electronically for example for professional development purposes and continuous education. The website makes this possible as an ongoing

learning environment and this activity connects the user to a learning hub network for cytology. When the user completes the activity, they can simply click on the “CE Stuff” menu on the home page then the “Print Certificate” button on the toolbar at the bottom of that page and fill in their name and number of hours of involvement in that activity. An excerpt from the search engine screen is displayed below (see on page 65 below Figure 5.5:4 Adapted image is a screen capture, window of “CE stuff” of www.cytologystuff.com.) The measure of time on the site might be used as a proxy for learning, but this is an extremely crude measure. What happens if someone simply accesses the site and leaves it open? Such a measure of the usefulness of the site is seriously flawed.

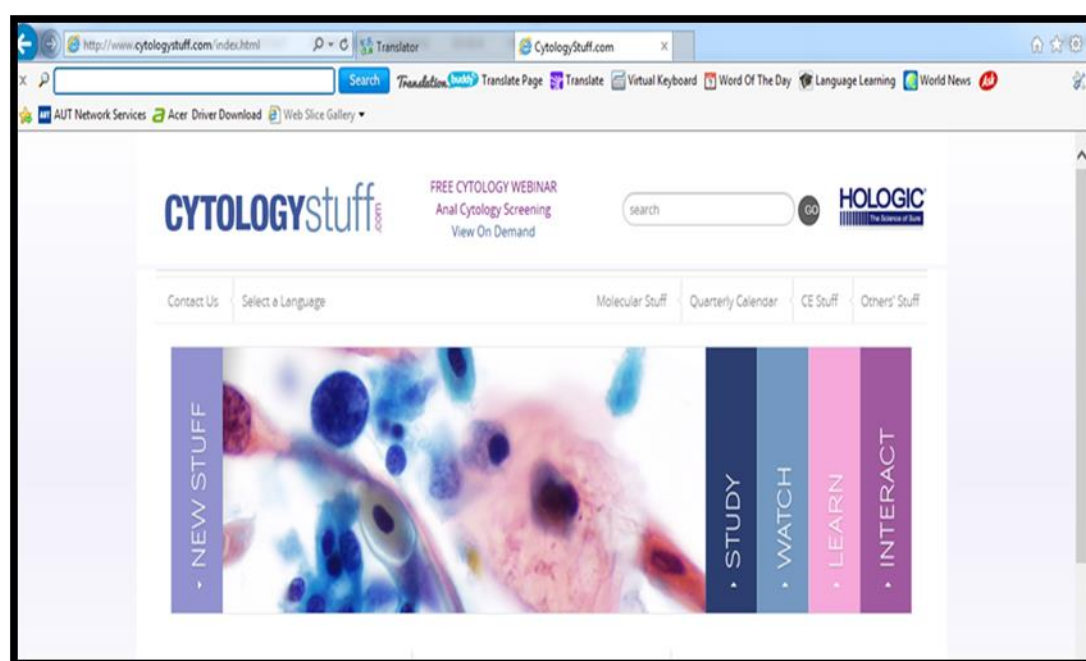


Figure 5.5:1 Adapted image is a screen capture, top part window of www.cytologystuff.com.

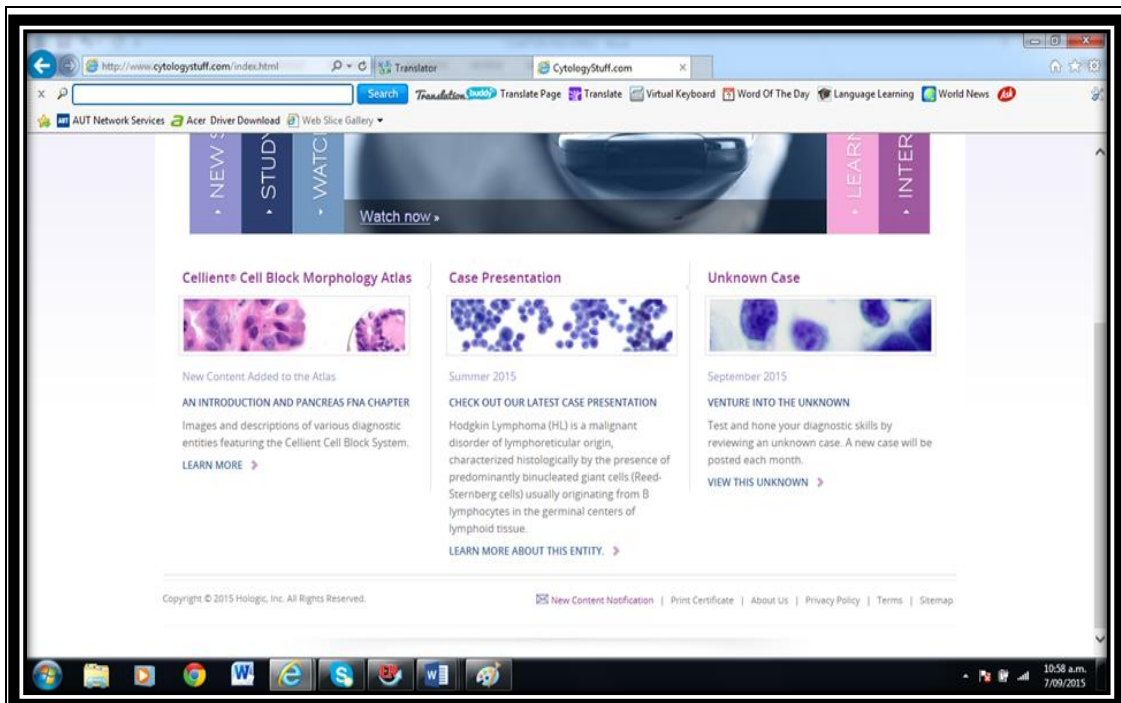


Figure 5.5:2 Adapted image is a screen capture of the lower part of the window of www.cytologystuff.com.

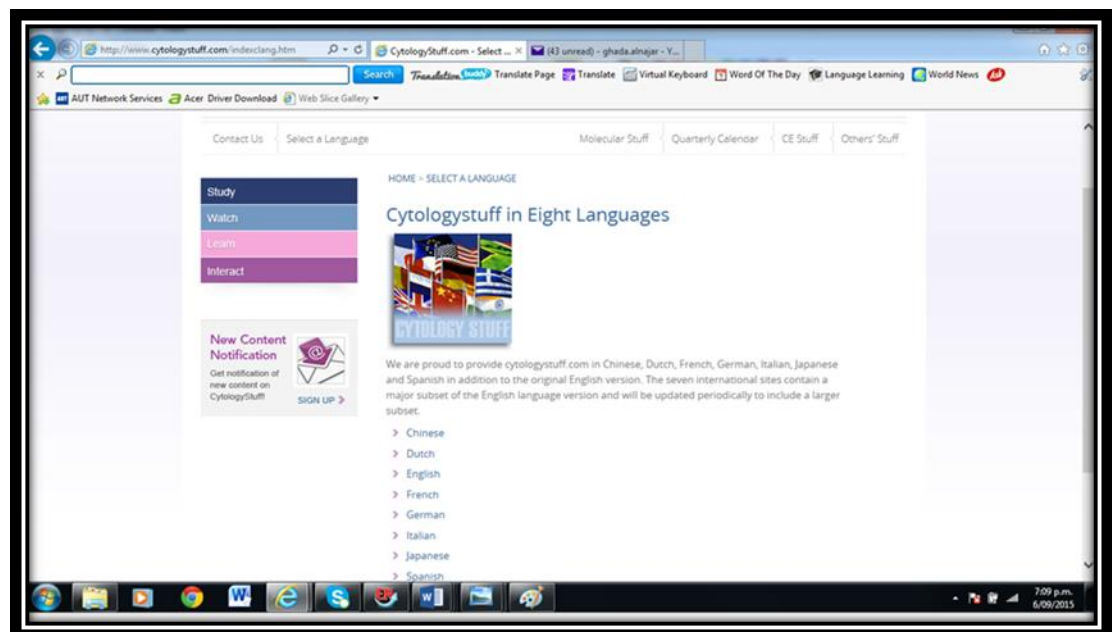


Figure 5.5:3 Adapted image is;
Screen capture of the Cytologystuff window of www.cytologystuff.com

Under the “Others’ Stuff” tab, there is a list of other cytology-related organisations throughout the world. The user can click on any of the highlighted links to display the respective website by pressing “Other Peoples’ Stuff”. An excerpt from the search engine screen is displayed below (see on page 65 below Figure 5.5:5 Adapted image is a screen capture, window of” Other Peoples’ Stuff”). I found navigating the website straightforward and time efficient. As a cytotechnologist I found it to be clear and accurate, with options ranging from presentations, workshops, review scope, virtual reviews and implementations of new tests as being relevant for ongoing professional development. The linked cytology organisations were predominantly in North America, Europe, Japan and China, none were listed from New Zealand or Iraq.

An excerpt from the search engine screen is displayed below (see on page 66 below Figure 5.5:6 Adapted image is a screen capture, window of select “Interact”. www.cytologystuff.com).



Figure 5.5:4 Adapted image is a screen capture, window of “CE stuff” of www.cytologystuff.com

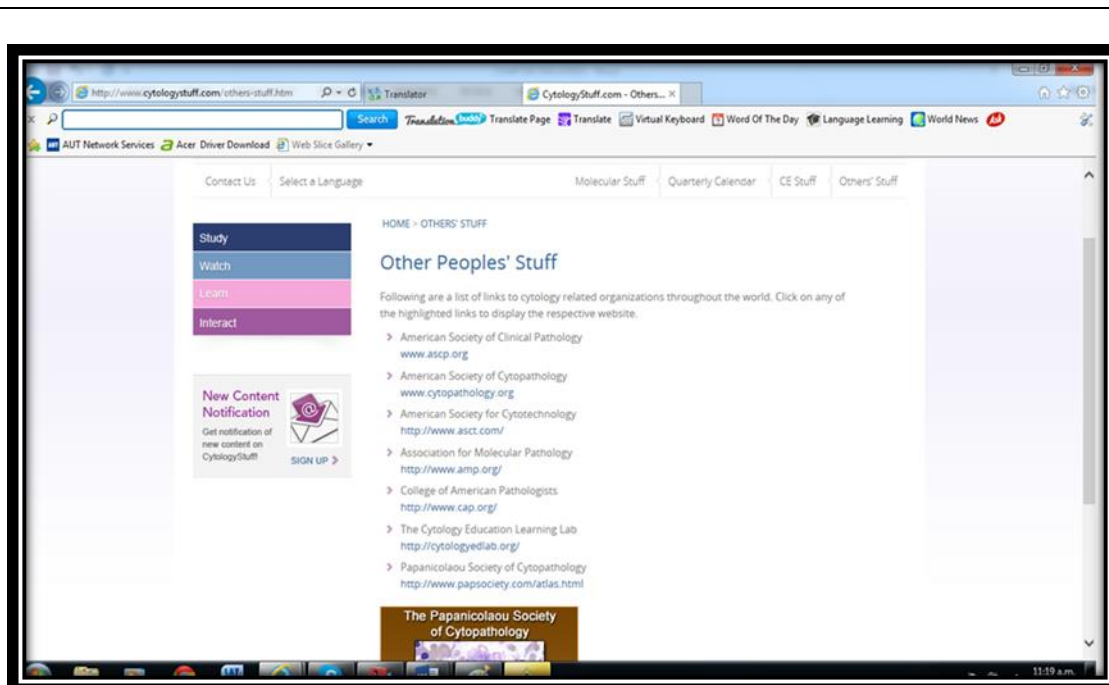


Figure 5.5:5 Adapted image is a screen capture, window of” Other Peoples’ Stuff” www.cytologystuff.com

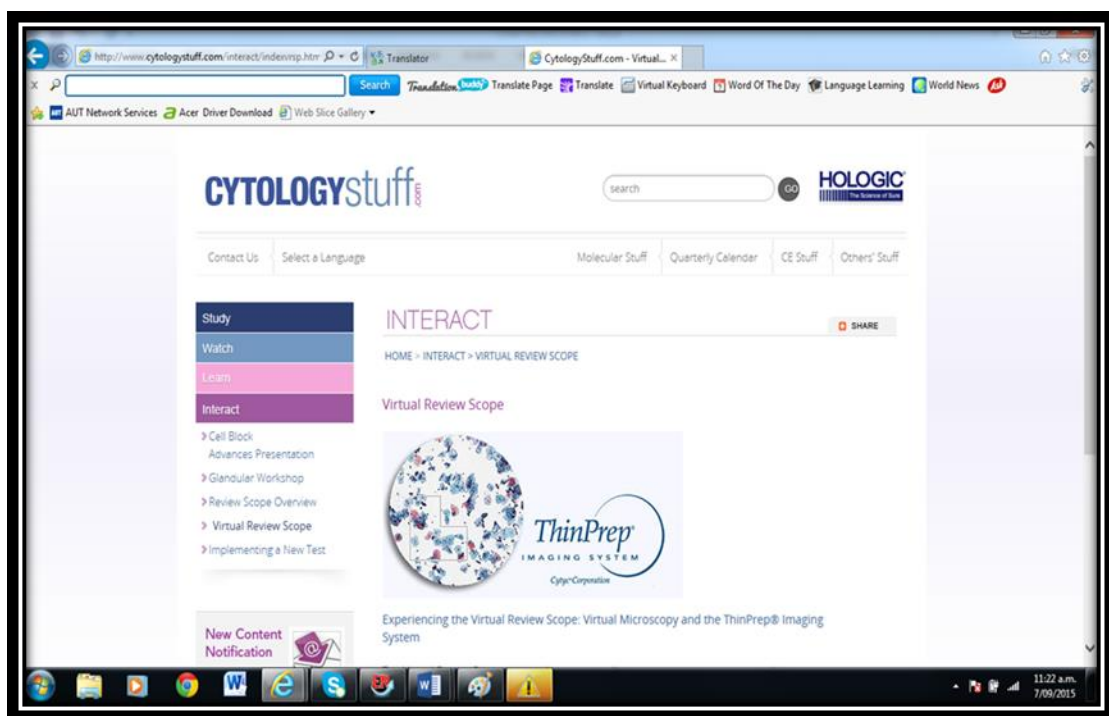


Figure 5.5:6 Adapted image is a screen capture, window of select “Interact”.
www.cytologystuff.com

The site not only provided a measure of how much time was spent supposedly learning here, but also provided tests where I could check my learning, and print these as evidence of professional development that I might be able to provide to an employer to demonstrate my ongoing commitment to professional development. However, to make use of the site one would need prior knowledge of how to use a computer, the internet, and know about hyperlinks, and be able to use common webpage features including a back button or search function. The manual on how to navigate the site is embedded within the site, accessing this requires a certain confidence in navigating a multi-paged web-based platform.

An excerpt from the search “Virtual Review Scope” is displayed below (see on page 67 below) and the specifically designed tutorial material “Virtual Review Scope” can be used through simulation for users to interact with a case slide as if they were using the Thin Prep® Imaging System Review Scope. The virtual review simulation begins with a pop-up screen showing the simulator information with demonstrations involving ten study cases and instructions on how to use the simulator engine.

The website offered a significant range of information relating to a multitude of cases, however it might be a point to address if a student were to make use of the site, a beginning understanding of the terms related to the written text of medical terminology abbreviations and some help in navigating the site easily. An excerpt from the search engine screen is displayed below (see on page 68 Figure 5.5:8 Adapted image is a screen capture window of gynaecology Atlas) and

Figure 5.5:9 Adapted image is a screen capture “Gynaecology Non-Atlas Table of Contents” from www.cytologystuff.com on page 68



Figure 5.5:7 Adapted image is a screen capture of select study cases of www.cytologystuff.com.

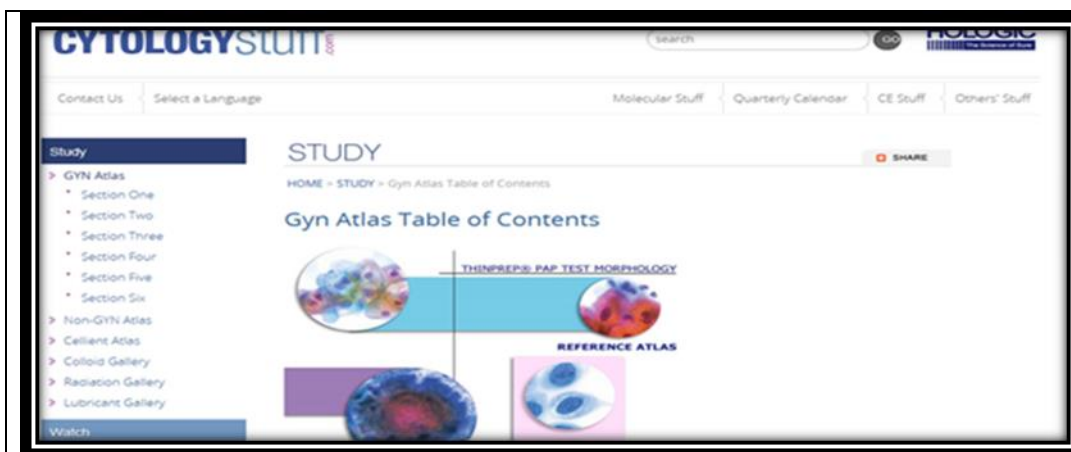


Figure 5.5:8 Adapted image is a screen capture window of gynaecology Atlas Table of Contents” from www.cytologystuff.com.



Figure 5.5:9 Adapted image is a screen capture “Gynaecology Non-Atlas Table of Contents” from www.cytologystuff.com.

Clicking on the Molecular Stuff tab, the items that can be explored are listed as Cell Biology, Molecular Biology, Biology of Infection, Instrumentation Regulations and Licensure. An excerpt from the search engine screen is displayed below (see on page 70 below Figure 5.5:10 Adapted image is a screen capture; “Molecular Stuff” from <http://www.cytologystuff.com/> www.cytologystuff.com).

When I click on the molecular part under the “Learn” tab, there is a list of several options such as cell biology, identify the organelle. The cell is presented as three dimensional, as if sliced through but still retaining depth. The user of this site can click

on links to a cell that is presented with the appearance of being three dimensional and can enter into the cell, clicking on aspects that are then named via a pop-up window, and where the function is described. Moving one's cursor over different parts of the cell such as the mitochondria, cytoplasm and nucleus brings up specific information on that particular aspect of a cell's function. An excerpt from the "Identify the Organelle" screen is displayed below (see on page 70 below Figure 5.5:11 Adapted image is a screen capture of "Cell Biology" from www.cytologystuff.com).

Moving my mouse over the image brings forward other options such as clicking any label on the image to go to another detailed description: Molecular Biology Download Text, Test your Knowledge and References. The user can, within the same section, be presented with the option to take a test on cell biology. An excerpt from the "Molecular Biology" page is displayed below (see on page 71 below Figure 5.5:12 Adapted image is a screen capture of "Molecular Biology" from www.cytologystuff.com.)

Within the same section of the Molecular stuff tab a window provides access to readable online book called *Guide of the Molecular Pathogenesis* of any selective infection within the learn tab, an excerpt from the window "Molecular Pathogenesis of Selected Infections", is shown in the figure below (see on page 71 below Figure 5.5:13 Adapted image is a screen capture window from "Molecular Stuff" from the readable Online platform www.cytologystuff.com).

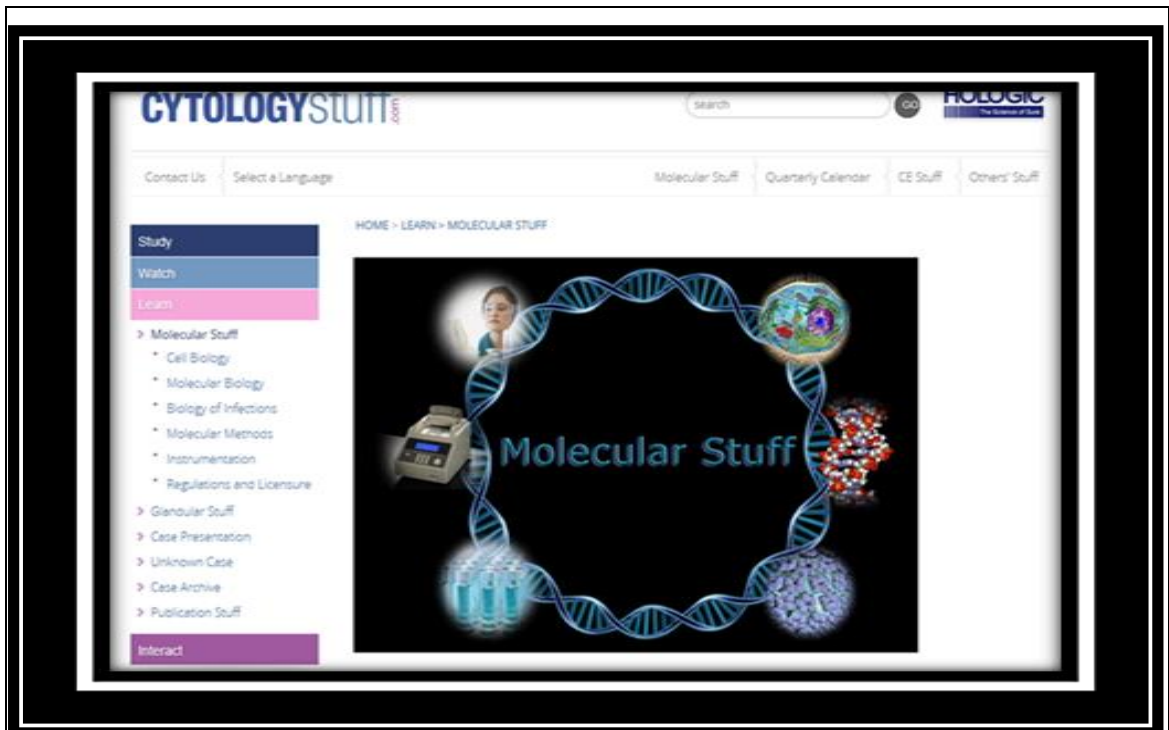


Figure 5.5:10 Adapted image is a screen capture; “Molecular Stuff” from <http://www.cytologystuff.com/> www.cytologystuff.com.

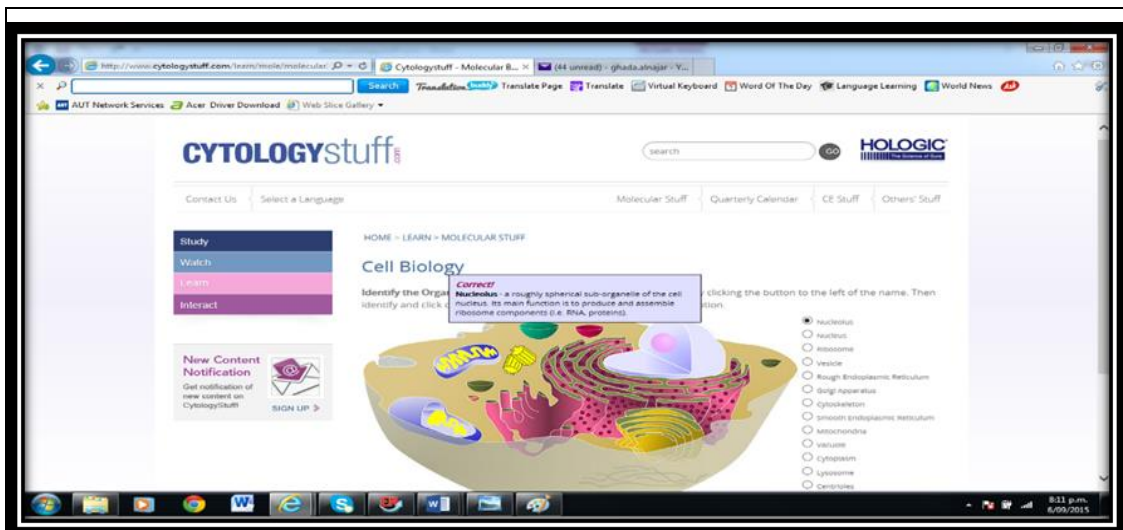


Figure 5.5:11 Adapted image is a screen capture of “Cell Biology” from www.cytologystuff.com.

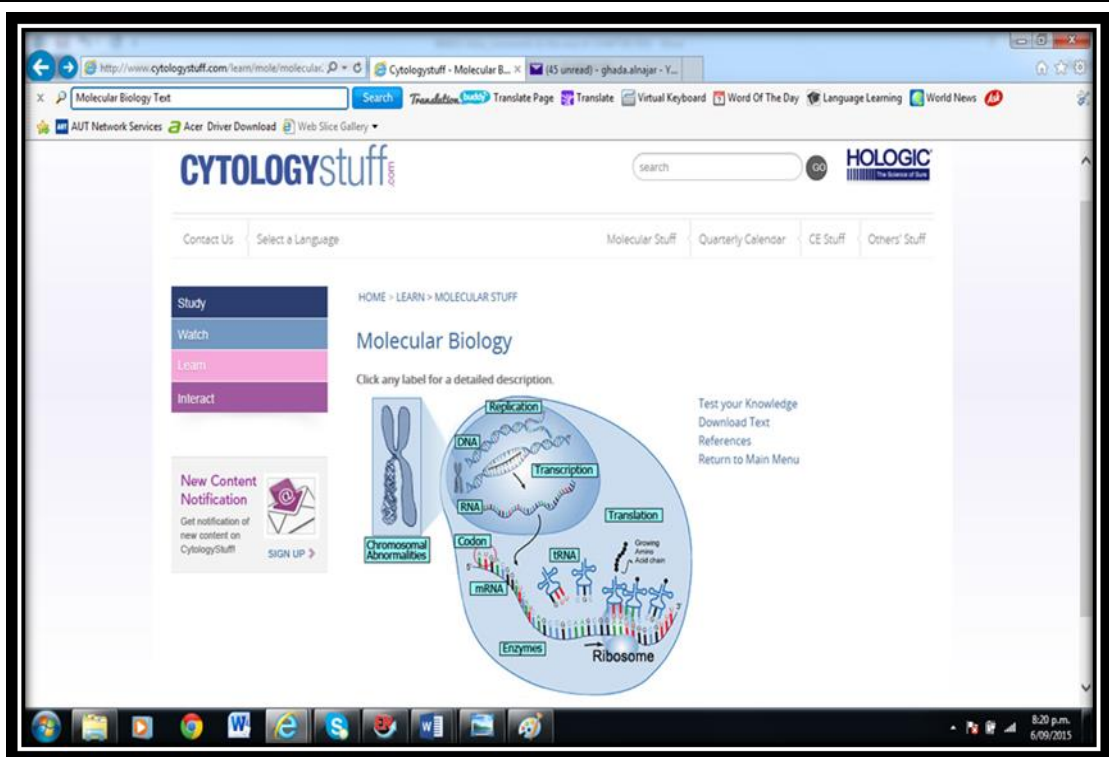


Figure 5.5:12 Adapted image is a screen capture of “Molecular Biology” from www.cytologystuff.com.

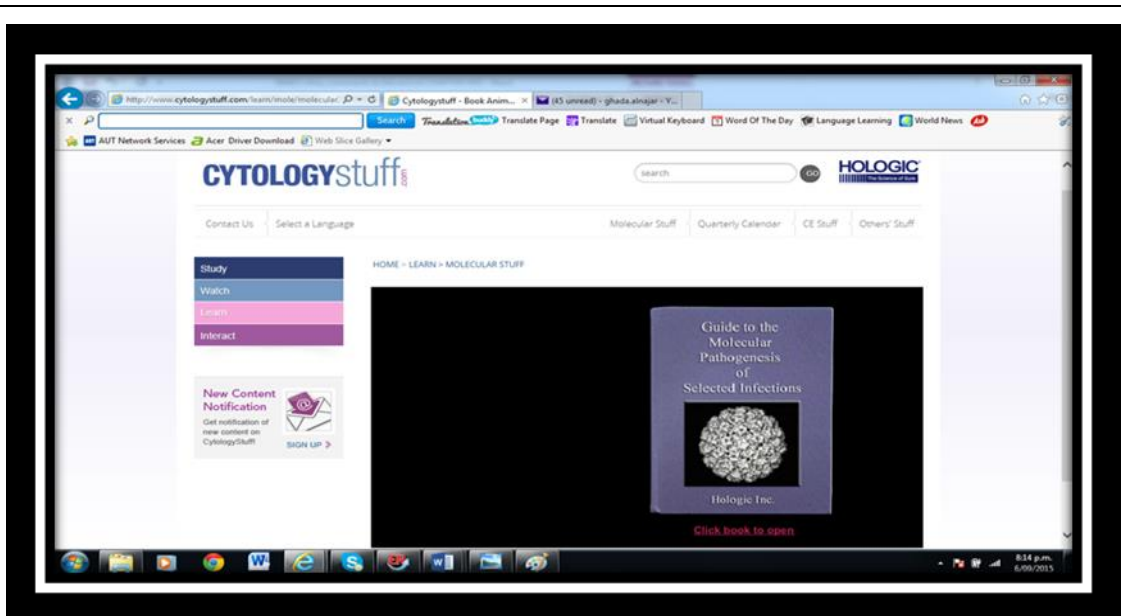


Figure 5.5:13 Adapted image is a screen capture window from “Molecular Stuff” from the readable Online platform www.cytologystuff.com.

When selecting the “Instrumentation” option under the “Molecular Stuff” tab, a pop-up screen appears showing three doors to represent the entrance to different laboratories. Clicking on a door allows the user to enter each one. Opening a door, I can enter into Fluorescence in Situ Hybridization (FISH), Electrophoresis and Amplification Instrumentals of Laboratories”. An excerpt from the search engine screen is displayed below (see on page 73 below Figure 5.5:14 Adapted image is a screen capture of” Window Instrumentation” from www.cytologystuff.com.)

Entering the first door, I find myself in a Fluorescence laboratory. The website provides constructive knowledge to wide spectrum of users such as fluorescence in Situ Hybridization. Selecting the first door, the space shows what it would be like to walk into a room and turn around to see the range of equipment available. An excerpt from the Fluorescence In Situ Hybridization Lab, selecting the first door search engine screen is displayed below (see on page 73 below Figure 5.5:15 Adapted image is a screen capture window of Instrumentation: “Fluorescence In Situ Hybridization” from www.cytologystuff.com.).

Moving the cursor results in approaching the instruments. As one comes closer to any instrument, a pop-up then occurs, to let the user know what it is they are viewing. Clicking on the number provides access to further information. The technology in Electrophoresis is displayed when selecting the second door, as shown within the excerpt below (see on page 74 below Figure 5.5:16 Adapted image is a screen capture window of instrumentations: “Electrophoresis” from www.cytologystuff.com).

The Amplification lab door explains the extraction technique of removing nucleic acids (DNA and/or RNA) from surrounding cellular material, which is the first step before subsequent molecular analysis. An excerpt from the Amplification lab, selecting the third door search engine screen, is displayed below (see on page 74 below Figure 5.5:17 Adapted image is a screen capture window of Instrumentations: “Target Amplification Equipment” from www.cytologystuff.com.)

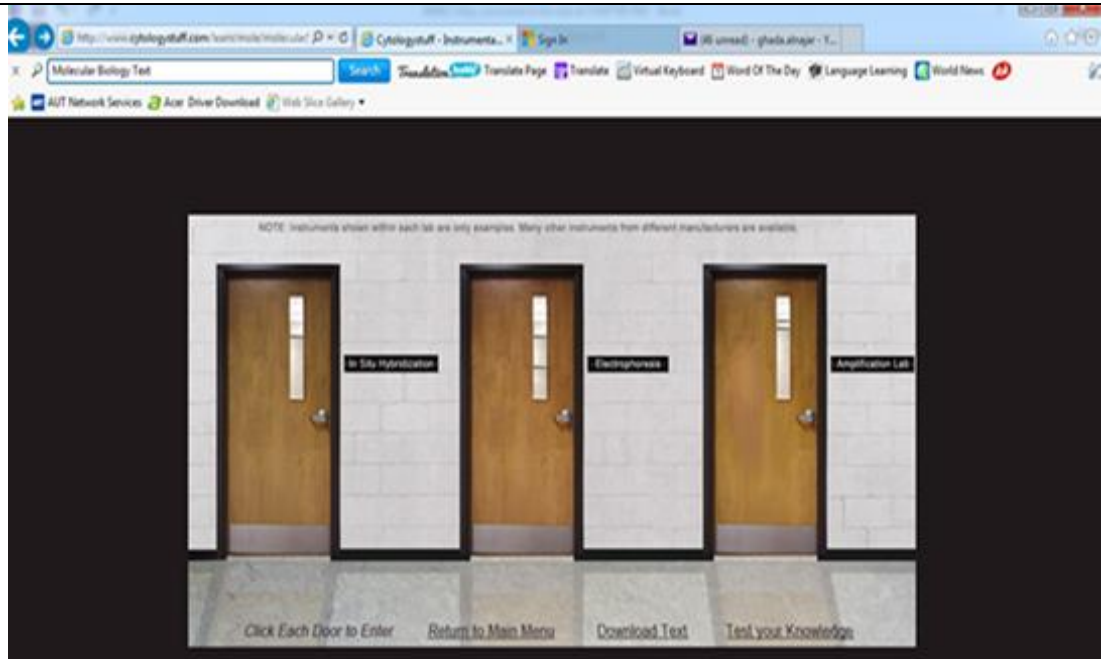


Figure 5.5:14 Adapted image is a screen capture of” Window Instrumentation” from www.cytologystuff.com.



Figure 5.5:15 Adapted image is a screen capture window of Instrumentation: “Fluorescence In Situ Hybridization” from www.cytologystuff.com.

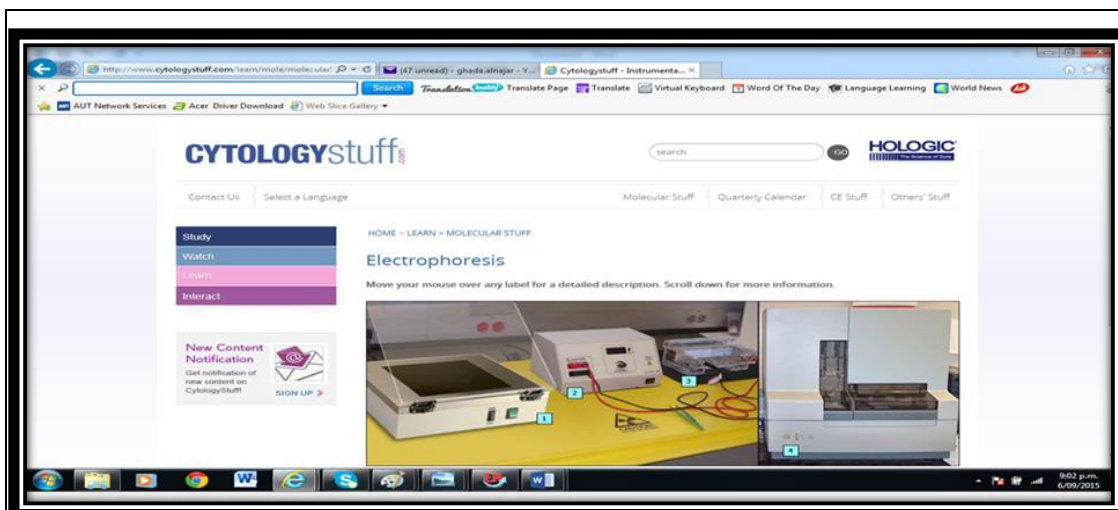


Figure 5.5:16 Adapted image is a screen capture window of instrumentations: “Electrophoresis” from www.cytologystuff.com

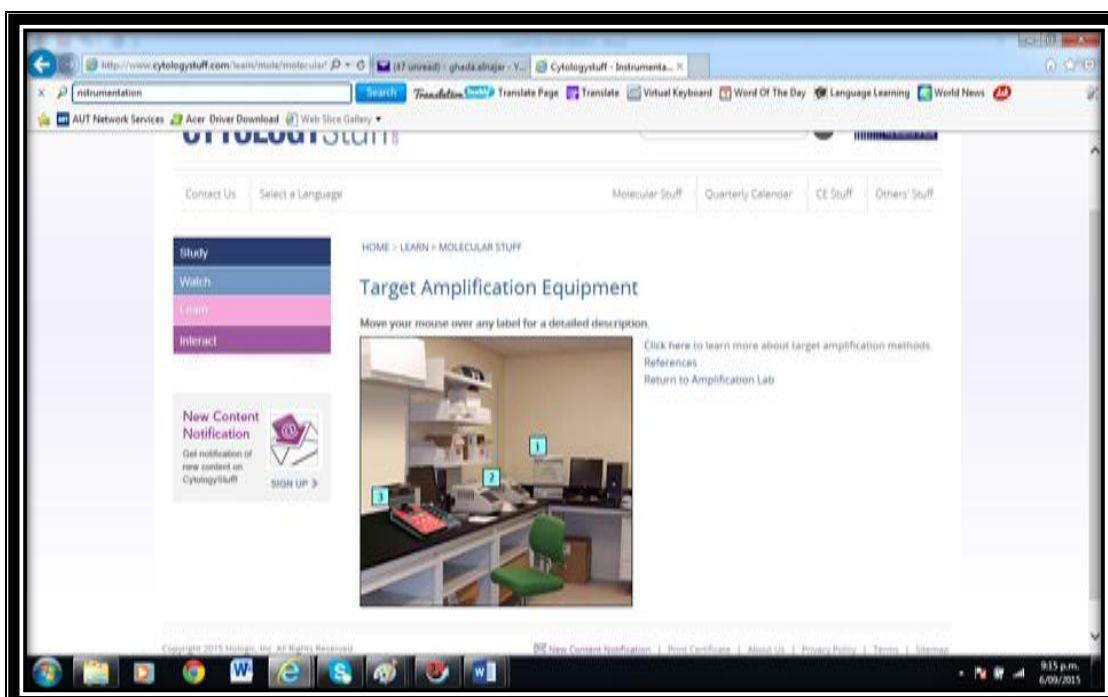


Figure 5.5:17 Adapted image is a screen capture window of Instrumentations: “Target Amplification Equipment” from www.cytologystuff.com.

5.6 The 3D cell experience:

“The real voyage of discovery consists not in seeking new landscapes, but in having new eyes.” (Attributed to Marcel Proust)

The website platform introduces cell biology within a three dimensional imagery. This is a radical departure from previous two dimensional depictions as experienced with light microscope slides or images in books.

Clicking on the image, the viewer enters the virtual three-dimensional cell (see on page 76 below Figure 5.6:1 <http://vcell.ndsu.nodak.edu/animations/flythrough/movie-flash.htm>, this work is licensed under a Creative Commons Attribution Non-commercial No Derivatives 4.0 International License).

The site presents animation as an embedded flash movie simulating movement through the three dimensional virtual cell. The journey starts with a clear voice of a female welcoming the user to the virtual cell, saying:

“It’s time to climb into one of our cell submarines and take a virtual tour of our cellular landscape. Out on the horizon, was a large blue object? That is the nucleus of the cell. It will be our first stop today. The nucleus is uniquely recognizable by the system of pores embedded within its outer membrane. Biological materials move in and out through the pores. They are the communication channel between the internal world of the nucleus and the cellular cytoplasm.”

The voice-over at the end of the short flash movie journey concludes with the statement: *“There are many processes going on within our virtual cell, and this trip featured only a few of the major functions. We are always working to expand our collection, and we hope you will return to explore our newest additions.”*

Taking a journey through the three-dimensional virtual cell option introduced the user to different challenges. Navigating such a site involves costs and complexity. For example, how long did it take the site to buffer? How much patience does the computer or Internet platform demand? The speed of Internet connection and the bandwidth usage of the site may require some time to finish buffering. The user needed to be patient and allow the file to re-buffer if the movie should pause during playing. However, the perceived values in contrast to traditional classroom teaching (i.e. using a light microscope and the representations of virtual cells) was a refreshing opportunity to see things differently, seeing the same landscapes in a new way; to see as it were, with “new eyes”.

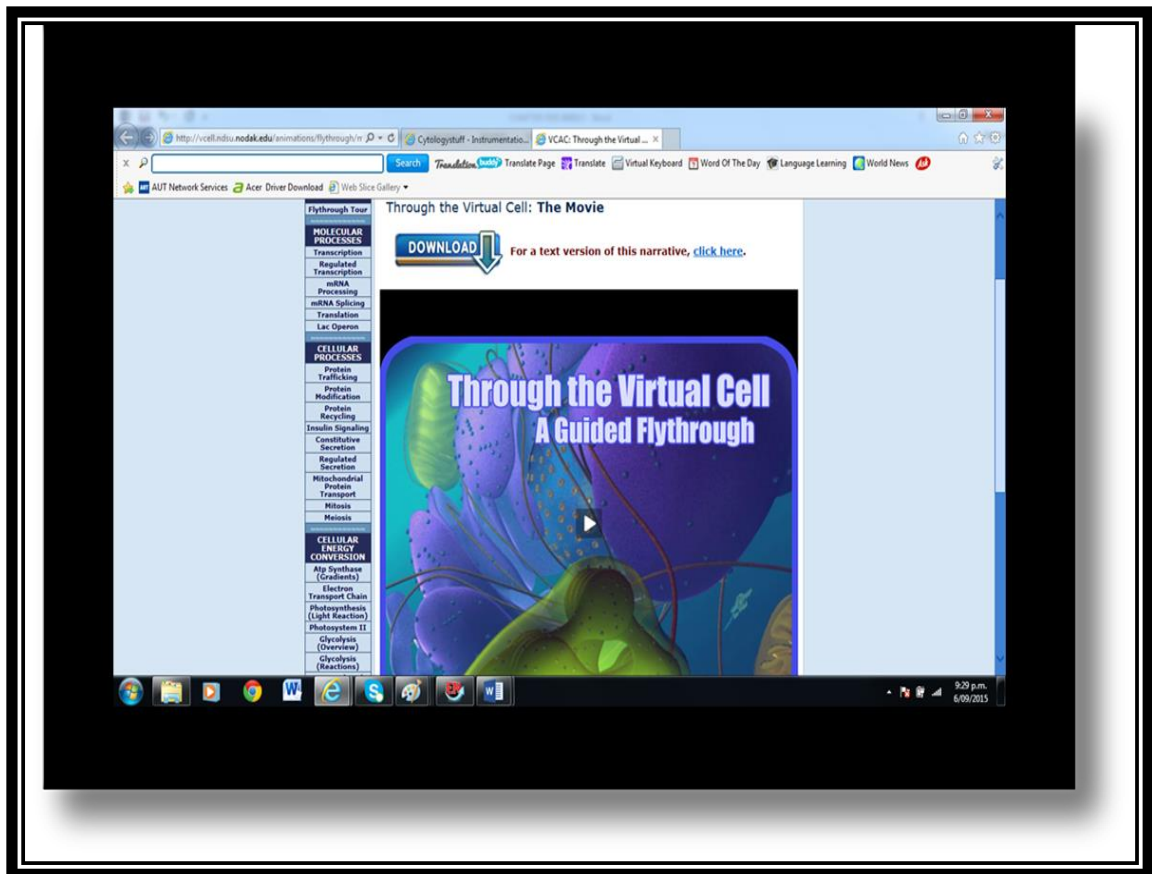


Figure 5.6: <http://vcell.ndsu.nodak.edu/animations/flythrough/movie-flash.htm>

With internet access, the capacity to revisit and learn again on subsequent occasions and so on, suggests great flexibility to users. As a repository of current knowledge, assuming one has reliable and fast internet access, this site allows for learning to occur at one's own pace. In addition, being a platform that is available internationally, and which has contributors from around the world, the site functions as a meeting place for a community of practitioners, and it encourages student participation. On this online platform, a community of cytotechnologist practitioners have been involved in providing images and case studies. They have worked alongside web page developers and provided a site that can be accessed in several languages. There is opportunity for the submission of further case studies.

When introducing the origins of cytology in the first chapter and the dramatic event in September 1665 involving the publication by the Royal Society of "*Micrographia*", the

author at that time had been asked by his colleagues to share his visual experiences and microscopic observation. With this technology there remains opportunity for the sharing of knowledge within a community of practioners. The site might then be considered as one that enables knowledge production. What seems to be missing, however is a dialogue with one's peers. And what it does provide, is the potential of seeing an online platform that prompted things differently, such as a curiosity and inquisitiveness about what might be behind a door and using the new technology's schematic approach and analyse typical cells. The learning still seems oriented toward a repository of knowledge that is disseminated, a web 1.0 phenomenon rather than a web 2.0 approach.

However, there remains of an opportunity foreseeing connectivity within a community of practitioners, and to consider if there might be evolution of the site to encompass real time discussion or asynchronous chat opportunities between communities of practice! I do not label the website platform www.cytology.com; as a positive or negative, just as books are not good or bad, nor is this site. What this study addresses is the link between the actors in a network and the aspects that I find enticing is the movement that the Actor-Network Theory talks about; of how we can form alliances, such alliances being with people or things (Latour, 2007).

This section of a self-reflection of a user's personal experience aimed to emphasise user responsibility and activity in learning, rather than having a focus on what might be learned. The study question was investigated in terms of user experience of an online platform when learning cytology. The network link involved two different systems, persons and objects. There is a demonstrated relationship that entwines both the technological system and the person. Both are involved in a network, one shaping the other, not in a linear way, but as an actor-network. The actor could not function without a network and the network consists of actors. So the network operates as an activity of all the heterogeneous elements.

6.1 Introduction:

In this chapter, the researcher is conducting a synthesis of the processes involved and presents to the reader a discussion that integrates the literature reviewed, the methodological approach taken, and the findings of the preceding chapters. The learning perspectives of the two communities involved in the surveys increasingly take over the main point, which is: What can be changed for a better and more effective learning experience?

This section does not follow a straight trajectory but is synthesizing a networked learning experience. The research question, “What is the user experience in making use of the online platform?” was explored to bring together knowledge not only of what was going on but also whether different people’s experiences were similar or different in important ways.

Two communities’ experiences were explored in addition to the researcher’s own user experience.

6.2 The Student Community:

The undergraduate Histology/Cytology course at Auckland University of Technology provides principles in cytological recognition of benign and malignant conditions of the female genital tract, and other cytological conditions that affect body sites of both males and females.. A participant information sheet and invitation to participate in the research information was sent to 50 students enrolled in the Histology/Cytology paper at Auckland University of University. The lecturer of the non-gynaecology section of the Histology/Cytology course presented the website platform on the screen of the laboratory and highlighted the part that students could explore to enhance their learning via the Study tab/Atlas for gynaecology and non-gynaecology (respiratory cytology and urinary cytology) sections.

Only 16% of the enrolled students participated in the survey (8 students) responded on the survey asking of their experiences of the site and of these only 75% responded in answering the open-end questions (6 students).

All the participants were in either year one or two of the Medical Laboratory Science degree. All students indicated that the website platform was easy to follow, engaging, enhanced their learning and they recommended it for future students enrolled in the histology/cytology course. However, more than half of the student participants indicated that they would not use it in the future.

For the sake of discussion, I would like to discuss main points that may explain the low response rate.

The author of *New Directions Teaching and Learning*, Johnson (2003), examines important issues related to online reporting of student survey results, arguing:

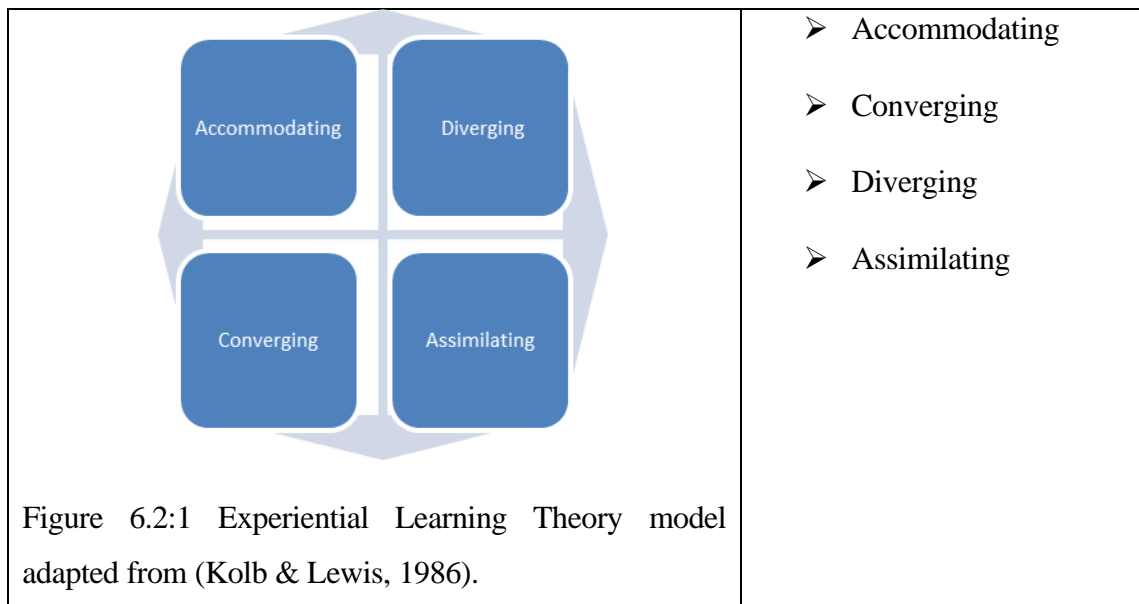
“Online student rating has many potential benefits, including ease of administration; more complete data collection; longer, more thoughtful student responses; reduced processing time and costs, more accurate data collection and reporting and more detailed, user-friendly reports. There are also some major obstructions to successful implementation of online rating, most notably, that of abstaining adequate response rates”(Johnson, 2003 p.49). The underlying argument is in favour of online surveys for students, as other studies show that using new technology such as electronic text communication requires fewer resources and provides faster responses than traditional paper and pencil methods (Yun & Trumbo, 2000).

In the research undertaken for this thesis, the electronic medium was useful in that students could provide feedback after the course was completed, however participant response rates were low. The fact that this survey could be completed quickly was important, as the opportunity to research these students occurred very close to the end of their course as they entered into a study week prior to final assessments for the course.

The majority of the undergraduate students who participated in this study indicated that using the online platform was not difficult; two participants highlighted that the platform was definitely not hard to use, and only one of the participants found the use of the platform partially difficult.

Kolb’s learning theory (1974) addresses how people learn and what might be done to foster their learning, suggesting that an individual may exhibit a preference for one of four styles (Kolb & Plovnick, 1974)

See on page 80 below Figure 6.2:1 Experiential Learning Theory model adapted from (Kolb & Lewis, 1986).



It is possible that the timing of the course contributed to the students seeing the site usefully as a study tool, resulting in the positive user experience expressed in responses generated. However, despite the positive feedback from the student community, one participant selected “do not know”.

Kolb and Lewis’s Experiential Learning Theory model suggests that a person’s preferred learning style can be developed to explain the participant’s experience, and for some people the preferred learning style is to observe and collect information before undertaking a task.

Relating this to the online platform as a learning site, there would be opportunity for the learner to have control over what they learn, revisiting this as needed before moving on. This would suggest the site would be useful to those who learn in this way. For those whose learning style is assimilating, Kolb and Lewis reason that for these learners, watching and having time to think things through would be important.

This learning site provides for this as information can be sought as needed and there is no time pressure. The divergent learner Kolb and Lewis describe as benefitting from seeing knowledge presented in a variety of ways.

The online platform provides for this also, however, the research design did not investigate learning styles and so this is only speculative.

6.2.1 Reflection of Knowing Theme:

The responses from the students suggests that their experience of the online platform might be described in Kolb and Lewis's terms as grasped rather than transformative. The theme identified in this research study of reflection of knowing fits with this, in that students described the online platform cytologystuff.com as easy to use.

The students were then able to make an abstract conceptualisation, which was useful to me and might be useful to others. The participant conceptualisation and concrete experience related specifically to the learning decisions from the last two open-end questions, and the grasping experience approach is the first theme.

See on page 82 Table 6.2-1 Students Reflection of knowing Theme.

6.2.2 Knowing with a New Eye Theme:

The second identified theme, knowing with a new eye theme, seems to support the findings of students as reported in the literature review in regard to other universities. AUT participant students expressed views similar to those expressed by students in the studies by Mills et al. (2007) and Sims et al. (2007), in which blended learning environments were involved. In each instance there was both light microscopy and a virtual or online learning for cytopathology. The view from this literature is that virtual learning environments do not demand a particular learning style.

The feedback from students suggests that navigating the site was not without problems. The amount of written information may have been at too difficult a level and/or may have been overwhelming.

While there was a timing issue, the feedback nonetheless should be considered. Students identified that finding the right information and making sense of the words used was problematic.

Rather than being transformative in a positive sense, this provided conflicting information. In terms of knowing with a new eye, the students' responses to the question "in what ways did the platform not support your learning?" generated reflective observations.

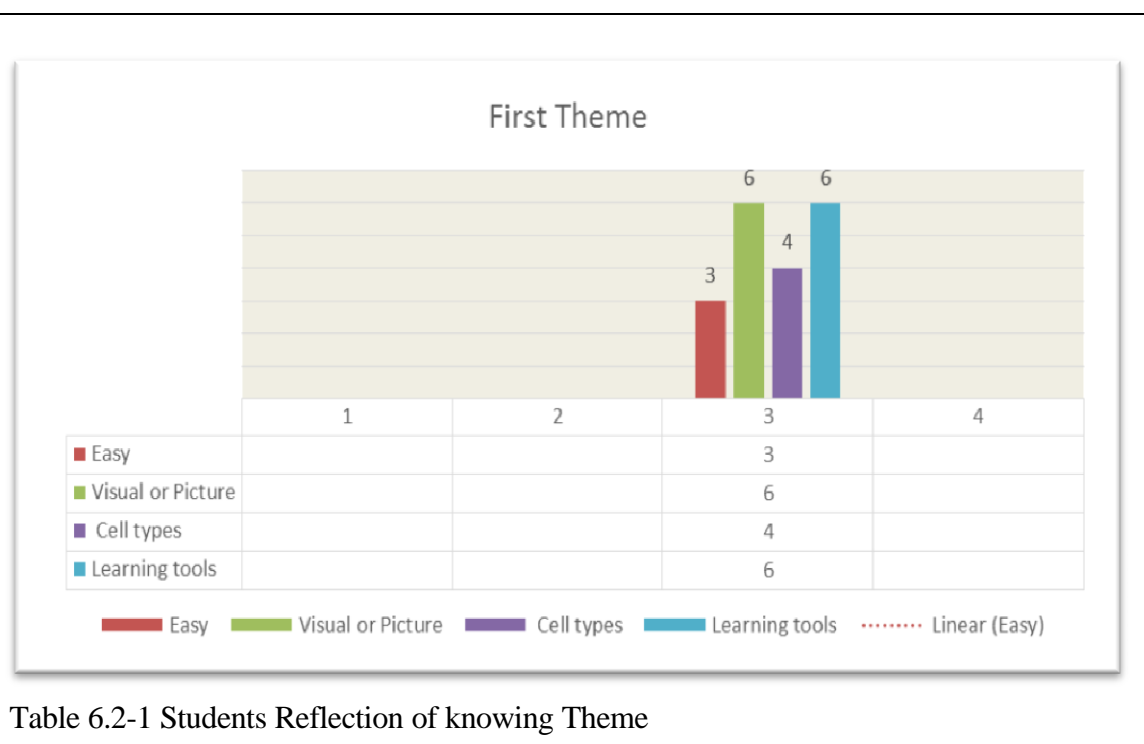
Given that the course learning outcomes for these students undertaking histology/cytology course requires differentiating between normal, pathogenic and abnormal cells, there is not yet sufficient data to be able to say whether or not accessing a site such as this one provides such knowledge.

However, as explained in chapter two and identified by Dee and Meyerholz (2007), in cytology teaching and learning for new learners, the requirements of twenty-first century use include both conventional and virtual cytology environments. Skills start by understanding structured information decision making, and both can be enhanced with coaching (Dee et al. (2011).

A more interactive site with dialogue opportunities would therefore be worth exploring. The present form of www.cytologystuff.com only provides for coaching in as much as self-paced tests are provided.

On the basis of the evidence currently available, it seems fair to suggest that engaging the students' interest starts by creating structured information and coaching utility of using virtual microscopy cytology education and testing applications (Dee & Meyerholz, 2007). See on page 83 Table 6.2-2 Knowing with A new Eye Theme.

Further studies could explore points such as whether the online platform was found to be too divergent or whether the timing of the study (one week before the end of the semester) influenced the likelihood of not seeing value for them in the immediate future.



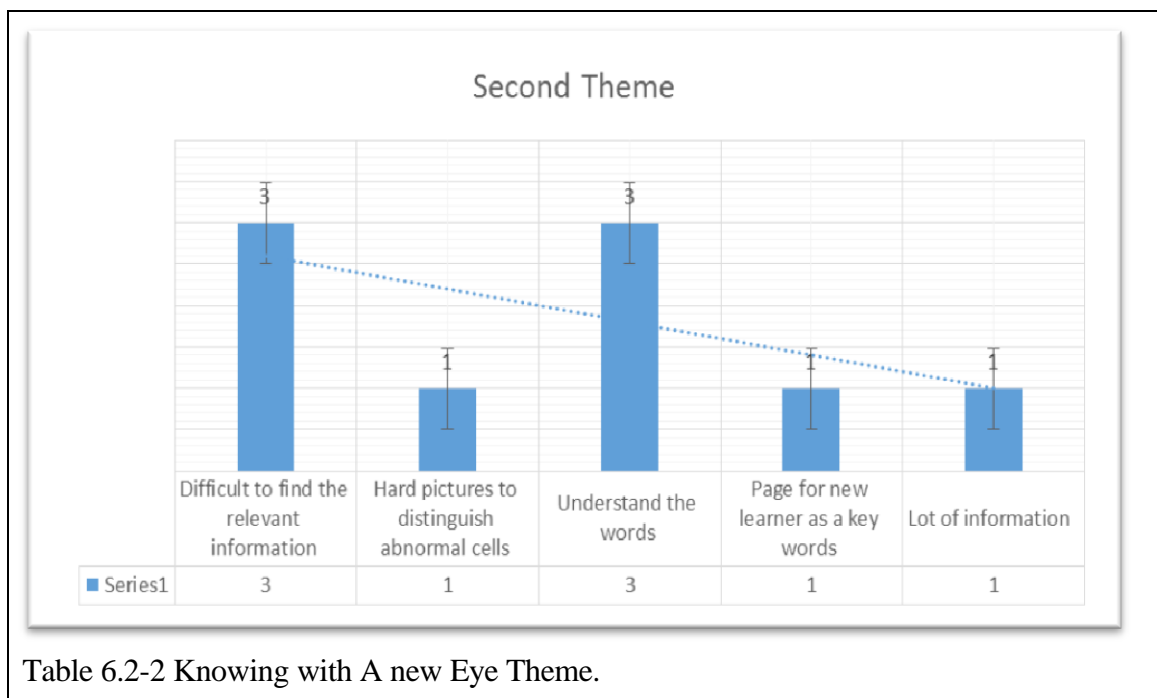


Table 6.2-2 Knowing with A new Eye Theme.

6.3 The Cytotechnologist Community:

The Cytology Department consists of staff with mixed backgrounds, knowledge and cultures with fifteen to thirty years' experience.

A hardcopy invitation with the participant information sheet and the questionnaire were handed to the manager and fourteen cytotechnologists in the Cytology Department at Diagnostic Medlab. A total of 10 participants (71%) of the invited cytotechnologists responded, 50% of who completed the questionnaire including the open-ended questions. More than half of the participants (60%) indicated that they do “not really” use the virtual cytology educational material of the free platform, www.cytologystuff.com.

This shows a higher response rate compared to that achieved in the paper survey study by Yun & Trumbo(2000).

It is interesting to note that over 60% of participants who indicated “not really”, responded as “do not know” concerning whether the website was easy to use, however 50% of the participants indicated that using the website platform was easy, and 10% were neutral. It is not possible from such responses to know how many had actually made use of the site.

6.3.1 Reflection of Knowing Theme:

Demographic information provided the distribution of this group by age and experience. The group aged 50 to 60 and those with seniority (20-30 years of experience), responded positively in regard to a positive user experience. The second age group (aged 35-45) and seniority (15-25 years of experience) showed passive to negative perceptions (“Not really”, “Dont know” and “Definitely not”) towards the use of the virtual learning website.

Almost half of the cytotechnologist community participants did not use the website for their professional development. The range of responses broken down by age and experience showed that those in the field for longer and who were more mature responded more positively to the online platform than did younger cytotechnologists, who also had less years of experience. Perhaps seniority provides confidence and knowledge of change or the rapid rate of change means that those with less confidence in their skills only relate to what is immediately of importance or value.

The different motivations are not known.

Had the study involved follow-up interviews, this might have been able to be explored further.

For the cytotechnologists, the theme identified as a reflection of knowing is also important. They identified strongly the value of the site for learning new knowledge, at least for undergraduate students. The different motivations are not known; had the study involved follow-up interviews, this might have been explored further.

6.3.2 Knowing with a New Eye Theme:

I. Problematisation:

Actor-Network Theory has been drawn on to inform this discussion Callon, (1986) identifies change as a series of translations, with the first step being problematisation, and all elements becoming indispensable to other actors. Problematisation encompasses the relationships and movements or detours that must occur and the alliances that must be forged (Callon, 1986).

As discussed previously, the first step in a series of translations to establish a new network, whether for learning and teaching, or otherwise, involves problematisation.

Such relationships in this instance would involve the cytotechnologists identifying a necessary relationship or alliance with this website.

Their introduction to the website through this survey was not sufficient.

The cytotechnologists surveyed had not previously used the site, and their responses suggest that they did not need to. While they identified the value of this site for students, they did not embrace the site as essential to their own professional development. This suggests that there was no alliance developed between themselves and the site; that problematisation did not occur, or at least not for themselves.

One of the participants had no idea about the platform when they replied to the survey question:

- In what ways did the virtual cytology resources of the website platform www.cytologystuff.com support your learning?

“I didn’t know the website existed until handed the questionnaire”

Bleakley (2014) describes the Actor-Network Theory as a useful method for knowing when networks have been initiated and are expanding healthily. He suggested that networks fail to develop when there is an over-reliance on intermediaries rather than mediators, and innovation is stifled. In this instance, the online platform might be considered an intermediary as it does not effect change, but is engaged with only in as much as it is a repository of knowledge. No ongoing or necessary alliance is formed.

In this instance, the website www.cytologystuff.com can be seen as an intermediary that does not develop into a lasting engaging relationship; there is no evidence for any sustained alliance having been formed.

This does not negate the potential for the site to be engaged with as a mediator, it merely means that this was not evident in this instance.

II. Interessement:

The survey into use of the online platform introduced at least one of the cytotechnologists to the site. However, there is no ongoing evidence as to whether this participant would have further interaction with the site or not. However their next response indicated that this is a possibility.

The next-end survey question asked, in what ways did the virtual cytology resources of the website platform, www.cytologystuff.com not support your learning?

The same participant replied:

“I didn’t know it existed and will definitely look up the website.”

The demographic information of the survey questionnaires gave an indication that the participant is a female, in the 60 age group and had up to 30 years of experience in the cytology field, and again the participant also replied for the survey question,

- In what ways can the virtual cytology resources of the website platform www.cytologystuff.com support the student learning?

“Every piece of new information that can be gathered whether in books or in the computer adds to a never ending learning experience.”

The statement made by this participant suggests willingness to engage in lifelong learning. However, their actual statement does not say that they will continue to use this site; they have simply acknowledged that there may be value in an ongoing sense. In response to the question:

- In what ways does the virtual cytology resources of the website platform www.cytologystuff.com not support the student learning?

The same participant went on to say,

“Time while looking down the microscope and seeing repeated patterns is the best way to learn cytology.”

The method by which they had themselves learned seemed to be what they saw as being necessary to future learners.

The reply for the last two questions:

- What might be done differently for the student when using virtual cytology resources of the website platform www.cytologystuff.com?

“Having an experienced cytologist or pathologist’s community at the same time and seeing that many different views exist.”

And

- Would you like to give further comments about the use of the virtual cytology resources of the website platform www.cytologystuff.com?

“I will study it in my spare time.”

This same participant recognised that differing views might exist when evaluating cellular changes, and therefore being exposed to how practicing cytologists and

pathologists might disagree or make different decisions, and how they negotiate ambiguity, is a particular value that offers something that the more traditional classroom and laboratory learning experiences might not.

The participant accepted a particular value of the site, at least for a student; putting them in closer connection with a community of cytologists and pathologists and commented at the end that they would study it in their spare time.

This suggests they see value in use of the site, and that interressment may have occurred. However, the data is not specific; rather it suggests that familiarity with the way that this cytotechnologist had learned was considered the most preferable way for students to continue to learn.

At most, this participant accepted that the way they had learned might be augmented by the addition of a further learning strategy, not one that replaces a prior means of learning. The cytotechnologist participants commented on aspects of interest and improving professional skills.

One participant's comments suggest a sense of play and enjoyment. The demographic information shows the participant was a senior professional with 25 years of experience, a male in the 50-60 age group. His feedback is listed below responding to the question:

- In what ways do the virtual cytology resources of the website platform www.cytologystuff.com not support students' learning?

"There are no limitations here, the possibilities are endless."

In contrast other participants of the cytotechnologist community see the platform as perhaps too simplistic:

"The content is too basic."

However, another individual participant replied,

"No matter how much experience someone has in cytology, they can always learn something new by looking in "Cytology-stuff."

These three quotes support the potential for interressment. Some cytotechnologist participants experienced the use of a website platform as too basic", others as having

“possibilities that are endless”. Obviously differing people experience the platform differently. Different actors then experience interresment differently.

III. Enrollment:

What is identified so far is that there is no universal way, no one way or single style that is useful for learning cytology. Enrollment only occurs when prior stages are positively addressed.

Some level of ambivalence is being expressed by at least one participant. For this participant there was resistance to abandoning previous known or tried and tested means, for one less familiar.

The tentative exposure to this novel way of learning is not sufficient to persuade such a person that any ongoing alliance would be anything more than vaguely helpful. For other cytotechnologists even though might not embrace the site for their own ongoing involvement in a community of practice, importantly they did see it as a useful addition for students.

This suggests a tentative movement toward allocating roles to others

The tentative exposure to this novel way of learning is not enough for the website to persuade those who engage with it that an ongoing alliance would be anything more than vaguely helpful.

IV. Mobilisation:

The mobilisation step is an authoritative voice developed through and defined by the network. When all of these happen, a stable network develops. While the responses suggest that problematisation and interresment were developing, there was no evidence of mobilisation or enrolment occurring. See on page 89

Figure 6.3:1 knowing With a New Eye Theme

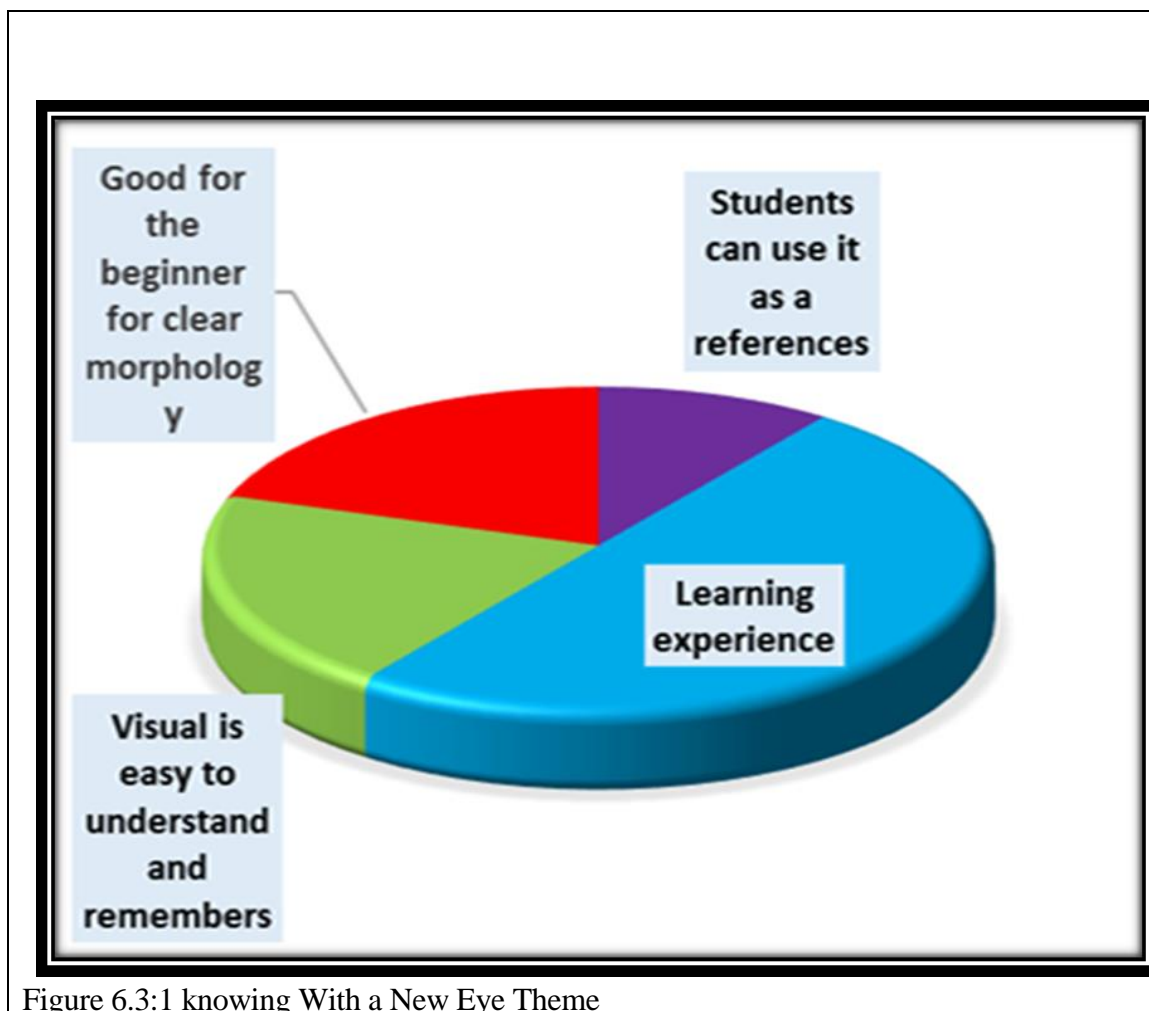


Figure 6.3:1 knowing With a New Eye Theme

6.4 Findings:

Taking an approach informed by the Actor-Network Theory, a newer learning and teaching network incorporating the use of the site www.cytologystuff.com has not stabilized, however as with any network there are relationships being continually renegotiated.

Given that the methodology involved a survey taken at a single point in time, there is no evidence to say whether relationships with this site are ongoing or not.

This study focused on identifying the user experience of an online platform www.cytologystuff.com exploring what might be enabling or disabling about the use of the platform when learning about cytology.

There was sufficient interest to explore the site but the site of itself did not form a strong attachment with these participants and there is no evidence that the participants formed a strong or ongoing attachment with the site.

There are multiple other actors that concurrently contribute to the forming (or not forming) of such relationships.

For the students, a potential relationship with the www.cytologystuff.com website came late in their course. There was no need for engagement beyond the suggestion given by their lecturer that they might find it of value, and there was no need to engage with the site to pass the course that they were currently enrolled in.

Similarly, the cytotechnologists had no definitive need to engage with the site beyond a provocation initiated by this survey regarding it as being potentially useful. Without ongoing benefits, a committed relationship does not last.

From the reflective account provided by the author's own user experience, it also becomes apparent that other heterogenic factors are also involved. The site is only accessible, for example, if one has a computer and Internet access. Such factors draw forward other issues such as affordability and availability.

In this regard, the technology involved is more and less accessible to particular actors.

The cytotechnologist participants found the virtual learning platform www.cytologystuff.com as not necessary for their own learning, but identified it as a positive space for new learner. The finding is similar to other studies, where skilled professionals are reluctant to adapt to the new technology (Khalbuss, 2012).

Some student and cytotechnologist participants suggested that they would continue use the website and recommend it. The technology of this online site does not persuade the cytotechnologists of practical utilization, or that an ongoing relationship would be essential.

There is no commitment evident that those who did find it more appealing would situate themselves within such a site uploading case studies and contributing to this community as active participants.

In the user experiences of www.cytologystuff.com, what seems to be missing is engagement, and in actor network terms, there was an absence of interressment. The actors, whether student or cytotechnologist participants, were not committed to any ongoing relationship with the site. However, the potential to engage with the site as part of one's own ongoing professional development might require other actors to be involved. If, for example, the New Zealand Institute of Cytology Professional Development or Cytology Profession Registration Board required evidence of professional development for

ongoing registration then sites such as this one might become more appealing to those already qualified.

6.5 Implications:

This study only involved participants in Auckland, New Zealand, and the interactions that these participants had with the website www.cytologystuff.com. What actor-network theorising would suggest is that problematising, interressment, enrolment and mobilisation requires work. In this instance it might be work with students, such as the timing of their exposure to the site being changed, with a clearer link between what the site has to offer and what work is needed for demonstrating learning. Similarly, commitment to professional development might need to be incentivised. Most strongly identified by the cytotechnologists' community is the learning value of the site for students, and the potential value of situating the students within a community of practitioners. The community is at present not so strongly evident, and while the site allows for the submission of case studies, there is not yet a space for entering into conversations. In a practice space where ambiguity occurs in the reading of cellular change, it is perhaps this area that would generate greater attraction or benefit for users.

What is also shown is that what works in some spaces does not translate well to others. While the site seems to have strong North American and European engagement, the factors that might increase its relationships with a wider cytotechnologist community of practitioners might also be enhanced. Being active within a community of practice where such discussions are occurring could be evidenced through a site such as www.cytologystuff.com.

For students, the role of a legitimate observer within a functioning community of practice might then also be enhanced. A major limitation of this study is that it was undertaken as a one-off survey of user's experiences.

To consider whether it has ongoing value, a different method would need to be involved that is more oriented toward observing how such communities function over time.

6.6 Reflection:

I had the privilege as a postgraduate student of assisting the teachers of the Histology/Cytology course at Auckland University of Technology. The main reason for choosing this project and incorporating it with the online learning platform was the potential benefit of having students situated within an online community of practitioners. This was something that qualified cytotechnologists similarly understood as having potential value, as it was strongly and favourably commented upon within the cytotechnologist's responses. I believe there are always opportunities to improve teaching of cytology by exploring different learning perspectives. Undertaking this research provided me with an opportunity to challenge my own learning processes and knowledge related to science, technology and the practice setting. The research also made me consider global educative practices.

The classic English concept of knowing one's onions, which means to know the subject in hand closely and in detail before making conclusions, is particularly apt for this research, which involved peeling through layers and a growing awareness that the layers do not exist in isolation.

Expanding on this metaphor, I can also appreciate that what might "grow" here involves a different set of relationships than what might also be grown elsewhere.

7 REFERENCES:

- Anic, V., & Eide, M. (2014). Survey of training and education of cytotechnologists in Europe. *Cytopathology*, 25(5), 302-306. doi: 10.1111/cyt.12168
- Attride-Stirling, J. (2001). Thematic networks: an analytic tool for qualitative research. *Qualitative research*, 1(3), 385-405.
- Avent, J., Patterson, J., Lu, A., & Small, K. (2009). Reciprocal scaffolding treatment: A person with aphasia as clinical teacher. *Aphasiology*, 23(1), 110-119.
- Azar, H. A. (1997). Rudolf Virchow, not just a pathologist: a re-examination of the report on the Typhus Epidemic in Upper Silesia. *Annals of diagnostic pathology*, 1(1), 65-71.
- Barr Fritcher, E., Kipp, B., Halling, K., & Clayton, A. (2014). FISHing for pancreatobiliary tract malignancy in endoscopic brushings enhances the sensitivity of routine cytology. *Cytopathology*, 25(5), 288-301.
- Battersby, S. L., & Verdi, B. (2015). The Culture of Professional Learning Communities and Connections to Improve Teacher Efficacy and Support Student Learning. *Arts Education Policy Review*, 116(1), 22-29.
- Beale, L. S. (1854). *The microscope, and its application to clinical medicine*: S. Highley.
- Bender, H. S., Lockee, B. B., Danielson, J. A., Mills, E. M., Boon, G. D., Burton, J. K., . . . Hilmer, K. M. (2000). Mechanism-Based Diagnostic Reasoning: Thoughts on Teaching Introductory Clinical Pathology. *Veterinary Clinical Pathology*, 29(3), 77-83.
- Bigum, C., & Rowan, L. (2004). Flexible learning in teacher education: Myths, muddles and models. *Asia-Pacific Journal of Teacher Education*, 32(3), 213-226.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Bryman, A. (2006). Integrating quantitative and qualitative research: how is it done? *Qualitative research*, 6(1), 97-113.
- Bunkle, P. (2015). Correcting Error in Academic Publishing: An Ethical Responsibility. *Journal of bioethical inquiry*, 1-9.
- Bunkle, P., & Coney, S. (1987). An unfortunate experiment at National Women's Hospital. *Metro June*, p47-65.
- Callon, M. (1986). Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St. Brieuc Bay. *Power, action, and belief: A new sociology of knowledge*, 32, 196-223.
- Cartwright, S. (1988). The report of the cervical cancer inquiry. *Auckland: Government Printing Office*.
- Chang, A. (1990). Carcinoma in situ of the cervix and its malignant potential. A lesson from New Zealand. *Cytopathology*, 1(6), 321-328.
- Choi, E., Lindquist, R., & Song, Y. (2014). Effects of problem-based learning vs. traditional lecture on Korean nursing students' critical thinking, problem-solving, and self-directed learning. *Nurse education today*, 34(1), 52-56.
- Cobern, W. W., Schuster, D., Adams, B., Skjold, B. A., Mug̃alog̃ lu, E. Z., Bentz, A., & Sparks, K. (2014). Pedagogy of Science Teaching Tests: Formative assessments of science teaching

- orientations. *International Journal of Science Education*, 36(13, 2014), pages 2265-2288. doi: DOI:10.1080/09500693.2014.918672
- Crean, J. (2012). The future is already here—it's just not evenly distributed. *Faculty Dental Journal*, 3(4), 178-178.
- Dee, F. R., Donnelly, A., Radio, S., Leaven, T., Zaleski, M. S., & Kreiter, C. (2011). Utility of 2-D and 3-D virtual microscopy in cervical cytology education and testing. *Acta cytologica*, 51(4), 523-529.
- Dee, F. R., & Meyerholz, D. K. (2007). Teaching medical pathology in the twenty-first century: virtual microscopy applications. *Journal of veterinary medical education*, 34(4), 431-436.
- Dijkstra, M. G., van Niekerk, D., Rijkaart, D. C., van Kemenade, F. J., Heideman, D. A., Snijders, P. J., . . . Berkhof, J. (2014). Primary hrHPV DNA testing in cervical cancer screening: how to manage screen-positive women? A POBASCAM trial substudy. *Cancer Epidemiology Biomarkers & Prevention*, 23(1), 55-63.
- Edwards, K. L. (2014). The insect and the image: visualizing nature in early modern Europe, 1500–1700. *Early Popular Visual Culture*(ahead-of-print), 1-2.
- Farahani, N., & Pantanowitz, L. (2015). Overview of Telepathology. *Surgical Pathology Clinics*.
- Fereday, J., & Muir-Cochrane, E. (2008). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International journal of qualitative methods*, 5(1), 80-92.
- Field, A., Geddie, W., Zarka, M., Sayed, S., Kalebi, A., Wright, C., . . . Kaaya, E. (2012). Assisting cytopathology training in medically under-resourced countries: Defining the problems and establishing solutions. *Diagnostic cytopathology*, 40(3), 273-281.
- Green, G. (1964). Cervical Carcinoma in Situ: True Cancer or Non-Invasive Lesion? *Australian and New Zealand Journal of Obstetrics and Gynaecology*, 4(4), 165-173.
- Green, G. (1966). Pregnancy following cervical carcinoma in situ. *BJOG: An International Journal of Obstetrics & Gynaecology*, 73(6), 897-902.
- Green, G. (1978). Cervical cancer and cytology screening in New Zealand. *BJOG: An International Journal of Obstetrics & Gynaecology*, 85(12), 881-886.
- Green, G. (1981). Cervical Cancer in New Zealand—A Failure of Cytology?—. *Asia-Oceania Journal of Obstetrics and Gynaecology*, 7(4), 303-313.
- Greene, J. C. (2007). *Mixed methods in social inquiry* (Vol. 9): John Wiley & Sons.
- Gundersen, H., Bagger, P., Bendtsen, T., Evans, S., Korbo, L., Marcussen, N., . . . Pakkenberg, B. (1988). The new stereological tools: disector, fractionator, nucleator and point sampled intercepts and their use in pathological research and diagnosis. *Apmis*, 96(7-12), 857-881.
- Hair, J. F., Money, A. H., Samouel, P., & Page, M. (2007). Research methods for business. *Education+ Training*, 49(4), 336-337.
- Haxell, A. (2013). *Enactments of change: Becoming textually active at Youthline NZ*. Deakin University. Retrieved from II
- Ironside, P. M. (2004). " Covering content" and teaching thinking: Deconstructing the additive curriculum. *Journal of Nursing Education*, 43(1), 5-12.
- Jamieson, S. (2004). Likert scales: how to (ab) use them. *Medical education*, 38(12), 1217-1218.

- Jervis, M. A. (2014). A zoologist's perspective on Robert Hooke's *Micrographia* (1665) studies of marine and terrestrial invertebrates, and his contemplations on invertebrate "generation" and mutability. *Journal of Natural History*, 48(23-24), 1375-1411.
- Johnson, T. D. (2003). Online student ratings: Will students respond? *New directions for teaching and learning*, 2003(96), 49-59.
- Jones, R., & Fitzgerald, N. (2004). The development of cervical cytology and colposcopy in New Zealand: 50 years since the first cytology screening laboratory at National Women's Hospital. *The New Zealand medical journal*, 117(1206), U1179.
- Khalaf, M. K., Rasheed, F. A., & Hussain, S. A. (2015). Association between Early Marriage and Other Sociomedical Characteristics with the Cervical Pap Smear Results in Iraqi Women. *Advances in Sexual Medicine*, 5(04), 73.
- Khalbuss, W. E. (2012). Whole slide imaging in cytopathology education. *Diagnostic Histopathology*, 18(8), 327-334.
- Khalbuss, W. E. (2014). Cytology Online *Practical Informatics for Cytopathology* (pp. 167-173): Springer.
- Khalbuss, W. E., Cuda, J., & Cucoranu, I. C. (2013). Screening and dotting virtual slides: A new challenge for cytotechnologists. *CytoJournal*, 10(1), 22.
- Knellwolf, C. (2001). Robert Hooke's *Micrographia* and the Aesthetics of Empiricism. *The seventeenth century*, 16(1), 177-200.
- Kolb, D. A. (1984). Experimental learning. *Experience as the source of learning and development*.
- Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*: FT Press.
- Kolb, D. A., & Lewis, L. H. (1986). Facilitating experiential learning: Observations and reflections. *New directions for adult and continuing education*, 1986(30), 99-107.
- Kolb, D. A., & Plovnick, M. S. (1974). The experiential learning theory of career development.
- LAL, S. (Cartographer). Ancient River Civilisations Retrieved from <http://www.mentorials.com/high-school-history-ancient-river-civilizations.htm>
- Lander, D. (2000). Mixed metaphors for reading and writing the qualitative thesis in adult education. *Studies in the Education of Adults*, 32(2), 148-165.
- Latour, B. (1999). On recalling ANT. *The Sociological Review*, 47(S1), 15-25.
- Latour, B. (2007). Reassembling the social. *An Introduction to Actor-Network-Theory*, 138.
- Latour, B. (2012). *We have never been modern*: Harvard University Press.
- Lave, J., & Wenger, E. (1999). Learning and pedagogy in communities of practice. *Learners and pedagogy*, 21-33.
- Law, J., & Singleton, V. (2000). Performing technology's stories: On social constructivism, performance, and performativity. *Technology and Culture*, 41(4), 765-775.
- Lea, S. J., Stephenson, D., & Troy, J. (2003). Higher education students' attitudes to student-centred learning: beyond 'educational bulimia'? *Studies in Higher Education*, 28(3), 321-334.
- Lee, M.-H., & Tsai, C.-C. (2010). Exploring teachers' perceived self efficacy and technological pedagogical content knowledge with respect to educational use of the World Wide Web. *Instructional Science*, 38(1), 1-21.

- Lewis, P., Thornhill, A., & Saunders, M. (2007). *Research methods for business students*: Pearson Education UK.
- Lyons, J. P., Hannon, J., & Macken, C. (2014). Sustainable practice in embedding learning technologies: Curriculum renewal through course design intensives *Curriculum Models for the 21st Century* (pp. 423-442): Springer.
- Martin, H. E., & Ellis, E. B. (1930). Biopsy by needle puncture and aspiration. *Annals of surgery*, 92(2), 169.
- Maygarden, S. J., & Novotny, D. B. (1998). Teaching cytopathology in the undergraduate medical school curriculum: the experience at the University of North Carolina. *Modern pathology: an official journal of the United States and Canadian Academy of Pathology, Inc*, 11(8), 795-797.
- Means, M., Pantanowitz, L., & Sheldon, D. (2014). If You Build It Who Will Come? The Cytology Education Learning Lab (CELL) Website. *Journal of the American Society of Cytopathology*, 3(5), S7.
- Merriam, S. B. (1998). *Qualitative Research and Case Study Applications in Education. Revised and Expanded from "Case Study Research in Education."*: ERIC.
- Mills, P. C., Bradley, A. P., Woodall, P. F., & Wildermoth, M. (2007). Teaching histology to first-year veterinary science students using virtual microscopy and traditional microscopy: a comparison of student responses. *Journal of veterinary medical education*, 34(2), 177-182.
- Moate, J., & Sullivan, P. (2015). The moral journey of learning a pedagogy: a qualitative exploration of student-teachers' formal and informal writing of dialogic pedagogy. *Pedagogy, Culture & Society*, 23, (3, 2015), pages 411-433. doi: DOI:10.1080/14681366.2014.994666b
- pages 411-433
- Morgan, P. B. (1992). I Reference, Literary History and Bibliography. *The Year's Work in English Studies*, 70(1), 1-24.
- Naylor, B. (2000). The century for cytopathology. *Acta cytologica*, 44(5), 709-725.
- Naylor, B. (2011). The century for cytopathology. *Acta cytologica*, 44(5), 709-725.
- Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: what can be done? *Assessment & Evaluation in Higher Education*, 33(3), 301-314.
- Papanicolaou, G. N. (1942). A new procedure for staining vaginal smears. *Science*, 95(2469), 438-439.
- Papanicolaou, G. N., & Traut, H. F. (1943). Diagnosis of uterine cancer by the vaginal smear. *New York*, 46.
- Pickel, H., Reich, O., Winter, R., & Young, R. H. (2009). Hermann Lebert (1813–1878): a pioneer of diagnostic pathology. *Virchows Archiv*, 455(3), 301-305.
- Pink, D. H. (2005). *A Whole New Mind: Moving from the Information Age to the Conceptual Age*: AUDIO CD: Riverhead Books.
- Pink, D. H. (2006). *A whole new mind: Why right-brainers will rule the future*: Penguin.
- Pink, D. H. (2007). Revenge of the right brain. *PUBLIC MANAGEMENT-LAWRENCE THEN WASHINGTON-*, 89(6), 10.
- Pink, D. H. (2010). *The surprising truth about what motivates us*: Soundview Executive Book Summaries.

- Posel, N., McGee, J. B., & Fleiszer, D. M. (2014). Twelve tips to support the development of clinical reasoning skills using virtual patient cases. *Medical teacher*(0), 1-6.
- Pouliakis, A., Archondakis, S., Karakitsou, E., & Karakitsos, P. (2014). Cloud Computing for Cytopathologists. *Cloud Computing Applications for Quality Health Care Delivery*, 250.
- Roemen, G. M., zur Hausen, A., & Speel, E. J. M. (2015). Adequate tissue for adequate diagnosis: what do we really need? *Lung Cancer*, 68, 119.
- Saunders, M. N., Saunders, M., Lewis, P., & Thornhill, A. (2011). *Research methods for business students*, 5/e: Pearson Education India.
- Scardamalia, M., & Bereiter, C. (2015). Education in an open informational world. *Emerging Trends in the Social and Behavioral Sciences: An Interdisciplinary, Searchable, and Linkable Resource*.
- Schlegel, A., Alexander, P., Fogelson, S. V., Li, X., Lu, Z., Kohler, P. J., . . . Meng, M. (2015). The artist emerges: Visual art learning alters neural structure and function. *NeuroImage*, 105, 440-451.
- Schmitt, F. (2011). Cytology education in the 21st century: living in the past or crossing the Rubicon? *Acta cytologica*, 54(4), 654-656.
- Shambayati, B. (2014). *Extending the boundaries of cytology: a personal and professional journey*. Middlesex University.
- Shaw, J. (2006). Some Quotable Quotes for Statistics.
- Shield, P., Cosier, J., Ellerby, G., Gartrell, M., & Papadimos, D. (2014). Rapid on-site evaluation of fine needle aspiration specimens by cytology scientists: a review of 3032 specimens. *Cytopathology*.
- Shor, I., & Freire, P. (1987). What is the "dialogical method" of teaching? *Journal of education*, 11-31.
- Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International journal of instructional technology and distance learning*, 2(1), 3-10.
- Siemens, G. (2014). Connectivism: A learning theory for the digital age.
- Sims, M. H., Mendis-Handagama, C., & Moore, R. N. (2007). Virtual microscopy in a veterinary curriculum. *Journal of veterinary medical education*, 34(4), 416-422.
- Somekh, B., & Lewin, C. (2011). *Theory and methods in social research*: Sage.
- Spriggs, A., & Boddington, M. M. (1989). *Atlas of serous fluid cytopathology* (Vol. 14): Springer.
- Stergiou, N., Georgoulakis, G., Margari, N., Aninos, D., Stamataki, M., Stergiou, E., . . . Karakitsos, P. (2009). Using a web-based system for the continuous distance education in cytopathology. *International journal of medical informatics*, 78(12), 827-838.
- Stoler, M. H. (2000). Advances in cervical screening technology. *Modern pathology*, 13(3), 275-284.
- Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*: Sage Publications Inc.
- Trochim, W. M., & Donnelly, J. P. (2001). Research methods knowledge base.
- Verhoef, V. M., Bosgraaf, R. P., van Kemenade, F. J., Rozendaal, L., Heideman, D. A., Hesselink, A. T., . . . Melchers, W. J. (2014). Triage by methylation-marker testing versus cytology in women who test HPV-positive on self-collected cervicovaginal specimens (PROHTECT-3): a randomised controlled non-inferiority trial. *The lancet oncology*, 15(3), 315-322.
- Virchow, R., & Chance, F. (1860). *Cellular Pathology as based upon physiological and pathological histology. Twenty lectures delivered in... 1858. Translated from the second edition of the original by F. Chance. With notes and numerous emendations principally from MS. notes of the author, and illustrated by... engravings on wood*.

- Von Glasersfeld, E. (1989). Cognition, construction of knowledge, and teaching. *Synthese*, 80(1), 121-140.
- Wall, S. (2008). An autoethnography on learning about autoethnography. *International journal of qualitative methods*, 5(2), 146-160.
- Waltz, S. B. (2004). Giving artifacts a voice? Bringing into account technology in educational analysis. *Educational Theory*, 54(2), 157-172.
- Wang, C.-Y. (2015). Scaffolding Middle School Students' Construction of Scientific Explanations: Comparing a cognitive versus a metacognitive evaluation approach. *International Journal of Science Education*, 37(2), 237-271.
- Willingham, D. T. (2008). Critical thinking: Why is it so hard to teach? *Arts Education Policy Review*, 109(4), 21-32.
- Xin, K., Wu, P., Li, R., Wei, J., Sha, H., Zhang, Y., . . . Liu, B. (2015). Facile preparation of a novel mulberry silk fibroin scaffold for three-dimensional tumor cell culture. *Materials Letters*, 143, 8-11.
- Yong, S. (2014). Pedagogy: An Immature Science on the basis of System Science. *Procedia-Social and Behavioral Sciences*, 122, 525-528.
- Yun, G. W., & Trumbo, C. W. (2000). Comparative Response to a Survey Executed by Post, E-mail, & Web Form. *Journal of Computer-Mediated Communication*, 6(1), 0-0. doi: DOI: 10.1111/j.1083-6101.2000.tb00112.x
- Zeppa, P., Barra, E., Napolitano, V., Cozzolino, I., Troncone, G., Picardi, M., . . . Palombini, L. (2011). Impact of endoscopic ultrasound-guided fine needle aspiration (EUS-FNA) in lymph nodal and mediastinal lesions: A multicenter experience. *Diagnostic cytopathology*, 39(10), 723-729.

8 APPENDIX

8.1 Appendix-A: Ethics Application: 15/24



A U T E C
S E C R E T A R I A T

10 February 2015

Dear Ailsa

Re Ethics Application: 15/24

What is the student experience in the use of the online platform www.cytologystuff.com when learning Introductory Cytology?

Thank you for providing evidence as requested. Your ethics application has been approved for three years until 10 February 2018. As part of the ethics approval process, you are required to submit the following to AUTEK:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 10 February 2018;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>. This report is to be submitted either when the approval expires on 10 February 2018 or on completion of the project.
- It is a condition of approval that AUTEK is notified of any adverse events or if the research does not commence. AUTEK approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTEK grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,



Kate O'Connor

Executive Secretary

Auckland University of Technology Ethics Committee

8.2 Appendix-B: Participant Information Sheet



Date Information Sheet Produced:

Feb/2015

Project Title

Exploring the user experience of the online platform, www.cytologystuff.com when learning cytology.

An Invitation:

Hello, I am Ghada Alnajar, a Master student at Auckland University of Technology.

I would like to invite you into a research project looking at your experiences in using online website www.cytologystuff.com. This research is undertaken for the qualification of the Master of Medical Laboratory Science and your participation is completely voluntary.

What is the purpose of this research?

This research is undertaken as part of the requirements for gaining the qualification of a Masters in Medical Laboratory Science. My interest is finding out if the use of free virtual resources, can be useful tools in the learning of Cytology.

I am using a written survey to find out about your experience making use of the www.cytologystuff.com website platform. All data collected is anonymous.

The findings of this study will be published as a thesis and may also be presented in other academic publications or presentations, such as a peer reviewed journals or conference presentations.

How was I identified and why am I being invited to participate in this research?

You have been invited to participate because you are a cytotechnologist working for the Auckland District Health Board.

What will happen in this research?

Dr. Fabrice Merien is inviting you to participate in the survey in behave of the research team. The written survey will ask you questions about your experience of the

www.cytologystuff.com website. The survey will take about 15 minutes to complete and your involvement will be both anonymous and optional. After you finish the survey, please post your anonymous paper survey into the survey box provided at your work sit (Screening Room). This will be collected after five working days of the survey has been distributed.

What are the discomforts and risks?

It is not expected that you will experience any discomfort or risk by participating in this research.

What are the benefits?

You will not benefit from undertaking the survey, however your participation will be useful for guiding the development of teaching and learning resources in Cytology education. The finding of this research may help educators developing their curriculum and potentially Cytology education.

How will my privacy be protected?

All information collected in this study is anonymous.

The researchers will not know who has participated in the study. Any material paraphrased or quoted will only be identified with a label such as "Participant 1".

What are the costs of participating in this research?

The only expected cost to you in being involved in this survey is approximately 15 minutes of your time.

What opportunity do I have to consider this invitation?

Five working days.

How do I agree to participate in this research?

No consent form is required. Completion of the optional survey signifies your agreement to participate in this research.

Will I receive feedback on the results of this research?

A summary of the findings of this research will be placed on the AUTOnline platform for the paper Histology and Cytology (775511) as well as on the School of Applied Sciences website. The information will be also provided to the cytology department at the ADHB at Lab Plus.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Primary Supervisor, Dr Ailsa Haxell, ailsa.haxell@aut.ac.nz, work phone +64 9219999 ext. 7105

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTECH, Kate O'Connor, ethics@aut.ac.nz, 921 9999 ext. 6038.

Whom do I contact for further information about this research?

Ghada Alnajar.

Dr. Ailsa Haxell.

Dr. Fabrice Merien.

Researcher Contact Details:

ghada.alnajar@yahoo.com

Project Supervisor Contact Details:

Dr Ailsa Haxell, ailsa.haxell@aut.ac.nz, work phone +64 9 9219999 ext. 7105

Dr Fabrice Merien, fabric.merien@aut.ac.nz work phone +64 9 9219999 ext. 8055

8.3 Appendix-C: Cytotechnologists survey questionnaire



CYTOTECHNOLOGISTS SURVEY QUESTIONNAIRE

PROJECT TITLE:

Exploring the user experience of the online platform, www.cytologystuff.com when learning cytology.

Participants are invited to complete three demographic information, eleven closed questions and six open-ended questions.

The survey will elicit participants' experiences of using the cytology website platform www.cytologystuff.com.

If you like to participate in this research, no consent form is required. Completion of the optional survey signifies your agreement to participate in this research. After you finish the survey, can you please post your anonymous paper survey into a box provided at you work sit. This will be collected 5 working days after the survey has been distributed.

Thank you for your time and participations.

Demographic information:

What is your gender?

Female

Male

What is your age group?

20 – 30

30 – 40

40 – 50

50 – 60

Over 60

How long is your professional experience in cytology practice?

Under 5 years

5 – 10 years

10 - 15 years

15 - 20 years

20 – 25 years

25 – 30 years

Over 30 years

Closed end questions:

Do you use the Virtual Cytology educational material of the free platform website; www.cytologystuff.com?

- ☐ Yes definitely.
- ☐ Yes partially.
- ☐ Not really.
- ☐ Definitely not.
- ☐ Don't know.

Is it easy to use the Virtual Cytology resources of the website platforms;
www.cytologystuff.com?

- ☐ Yes definitely.
- ☐ Yes partially.
- ☐ Not really.
- ☐ Definitely not.
- ☐ Don't know.

Do you use the Virtual Cytology resources of the website platform;
www.cytologystuff.com to support your ongoing Cytology learning?

- ☐ Yes definitely.
- ☐ Yes partially.
- ☐ Not really.
- ☐ Definitely not.
- ☐ Don't know.

Do you use the Virtual Cytology resources of the website platform;
www.cytologystuff.com. In problem-based Cytology Learning.

- ☐ Yes definitely.
- ☐ Yes partially.
- ☐ Not really.
- ☐ Definitely not.
- ☐ Don't know.

Do you use the Virtual Cytology resources of the website platform;
www.cytologystuff.com to improve your skills in Diagnostic Cytology?

- ☐ Yes definitely.
- ☐ Yes partially.
- ☐ Not really.

☐ Definitely not.

☐ Don't know.

Do you use the Virtual Cytology resources of the website platform; www.cytologystuff.com in your ongoing professional development?

☐ Yes definitely.

☐ Yes partially.

☐ Not really.

☐ Definitely not.

☐ Don't know.

Do you feel more confident in daily work after your learning experience using Virtual Cytology of the website platform; www.cytologystuff.com ?

☐ Yes definitely.

☐ Yes partially.

☐ Not really.

☐ Definitely not.

☐ Don't know.

Do you believe that you have improved your professional skills by using the free Virtual Cytology resources of the website platform; www.cytologystuff.com ?

☐ Yes definitely.

☐ Yes partially.

☐ Not really.

☐ Definitely not.

☐ Don't know.

Do you find the Virtual Cytology educational material of the platform website; www.cytologystuff.com compatible with the tradition material used in teaching Cytology?

☐ Yes definitely.

☐ Yes partially.

☐ Not really.

☐ Definitely not.

☐ Don't know.

Would you recommend the use of Virtual Cytology resources of the website platform; www.cytologystuff.com as a learning strategy for students?

- ☐ Yes definitely.
- ☐ Yes partially.
- ☐ Not really.
- ☐ Definitely not.
- ☐ Don't know.

Would you recommend the use of Virtual Cytology resources of the website platform; www.cytologystuff.com in teaching Non-gynaecology cytology.

- ☐ Yes definitely.
- ☐ Yes partially.
- ☐ Not really.
- ☐ Definitely not.
- ☐ Don't know.

Open end questions:

In what ways did the Virtual Cytology resources of the website platform; www.cytologystuff.com, support YOUR learning?

In what ways the Virtual Cytology resources of the website platform; www.cytologystuff.com, did NOT support YOUR learning?

In what ways the Virtual Cytology resources of the website platform; www.cytologystuff.com, can support the STUDENT learning?

In what ways the Virtual Cytology resources of the website platform; www.cytologystuff.com, can NOT support the STUDENT learning?

What might be done differently for the student, when using Virtual Cytology resources of the website platform; www.cytologystuff.com?

Would you like to give further comments, about the use of the Virtual Cytology resources of the website platform; www.cytologystuff.com?



8.4 Appendix-A: Reminder:

REMINDER;

Project title

Exploring the user experience of the online platform, www.cytologystuff.com when learning cytology.

Hello;

Last week you were invited to participate in a research project regarding your use of the free website www.cytologystuff.com. If you have filled out the survey, thank you!

If you have not had a chance to take the survey yet, I would appreciate you reading the message below. I am using a written survey to find out about your experience making use of the www.cytologystuff.com. If you are willing to participate, please use one of the survey copy that available in the envelope beside the survey box provided at your work sit (screening room).

If you have questions about this research, please contact the Primary Supervisor, Dr Ailsa Haxell, ailsa.haxell@aut.ac.nz, work phone +64 9219999 ext. 7105 .

Thank you for your time and participations.

Ghada Alnajar