Evaluation of a Self-Directed E-Learning Resource: Integrating Hauora Māori and Clinical Content for Undergraduate Medical Students

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A thesis submitted for the degree of Master of Health Sciences
At the University of Otago, Christchurch, New Zealand
September 2014
Abstract

Despite e-learning becoming more established in medical education, there remains a lack of e-learning resources teaching indigenous health at the undergraduate level. There is markedly less evidence to support cultural competency e-learning resources that integrate clinical and cultural (specifically indigenous) teaching content in one package, and no published evaluation of such resources at the undergraduate or postgraduate level.

This study utilised a Kaupapa Maori Research (KMR) methodology to incorporate Māori beliefs, values and experiences and was conceived, planned and implemented with the intention to support Māori health gains. An e-learning resource designed to integrate Hauora Māori and clinical content (specifically schizophrenia) was developed and evaluated by fifth year medical students at the University of Otago, Christchurch (UOC) and Wellington (UOW) Schools of Medicine, and Rural Medical Immersion Programme (RMIP). The evaluation method consisted of a pre- and post-test of student knowledge, a student feedback questionnaire, a student course component comparison questionnaire, and a teaching staff review questionnaire.

The findings of this study suggest that an e-learning resource integrating indigenous health and clinical content could provide an innovative and useful means of adding teaching value to an indigenous health and clinical curriculum and be equally as effective across a number of demographic groups of undergraduate medical students. It appears that the benefits of developing such a resource outweigh any costs that may be incurred, and this type of integrated resource can serve as an effective means of delivering cultural competency training to future health practitioners, helping to decrease the burden of health inequality in indigenous populations.
Acknowledgements

With thanks to my beautiful family, Maria-Elisa, Rico and Amaya, for your love and support, and for keeping me happily distracted from the stresses of my studies;

To my supervisors, Dr Cameron Lacey, Tania Huria and Dr Phil Blyth for their time, expertise and contributions;

To Carole Aitcheson for invaluable advice on academic writing and Dr Jonathan Williman for helping me make sense of the results of my study;

To Dr Suzanne Pitama for encouraging me to pursue further study, and providing me with an opportunity to create and innovate during the development of this e-learning resource;

Finally, to the Educating for Equity (E4E) project team, the Ministry of Health Hauora Māori scholarship committee and Waikato Raupatu Trust for providing scholarship aid for this masters project.
Declaration

This is to certify that:

(i) The thesis comprises only my original work towards the Masters of Health Science except where indicated in the Preface,

(ii) Due acknowledgement has been made in the text to all other material used,

(iii) The thesis is fewer than 40,000 words in length, exclusive of tables, references and appendices.
Preface

This thesis includes the use of the Hui Process and Meihana Model, which was developed by teaching staff at the Māori and Indigenous Health Institute (MIHI), University of Otago, Christchurch School of Medicine prior to the commencement of this thesis and had already been a part of a Hauora Māori course teaching. It also includes the use of schizophrenia teaching material which was developed by the fifth year Psychological Medicine teaching team. The original work utilising the teaching material above for this thesis included the design, development, implementation and evaluation of an e-learning resource integrating clinical (schizophrenia) and cultural (Hauora Māori) teaching content. The remainder of the thesis, which comprises presentation and discussion of findings, is original work.
# Table of Contents

Abstract ........................................................................................................................................... i
Acknowledgements .......................................................................................................................... ii
Declaration ......................................................................................................................................... iii
Preface ................................................................................................................................................ iv
Table of Contents ............................................................................................................................ v
List of Tables ....................................................................................................................................... viii
List of Figures .................................................................................................................................... ix
Glossary of Terms and Abbreviations ............................................................................................ x
Glossary of Selected Māori Terms ................................................................................................. xi
Introduction ......................................................................................................................................... 1

Chapter 1: Background ......................................................................................................................... 4
  1.1 Introduction .................................................................................................................................. 4
  1.2 Indigenous Health Inequalities .................................................................................................. 4
  1.3 Cultural Competency to Address Health Inequalities .............................................................. 7
  1.4 The Role of Medical Education in Reducing Indigenous Health Inequalities ......................... 8
    1.4.1 Medical education and indigenous health teaching methods ............................................. 9
    1.4.2 Evaluation of an indigenous curriculum within medical education ............................... 13
  1.5 Mainstream Medical Education Pedagogies ............................................................................ 13
  1.6 Uses for E-Learning Resources .............................................................................................. 15

Chapter 2: Literature Review ............................................................................................................... 17
  2.1 Introduction .................................................................................................................................. 17
  2.2 E-learning and Medical Education ............................................................................................ 17
  2.3 Design of E-Learning Resources .............................................................................................. 20
  2.4 Implementation of E-Learning Resources ................................................................................ 21
  2.5 Evaluation of E-Learning Resources ...................................................................................... 23
  2.6 E-Learning and an Indigenous Curriculum Within Medical Education .............................. 26
  2.7 Overview ..................................................................................................................................... 27
  2.8 Thesis Aim and Objectives ....................................................................................................... 27

Chapter 3: Methodology ...................................................................................................................... 28
  3.1 Introduction .................................................................................................................................. 28
  3.2 Development of Content for the E-Learning Resource ............................................................ 28
  3.3 Development of the Design and Presentation Style of the E-Learning Resource .................. 28
  3.4 Development of an Evaluation Method for the E-Learning Resource .................................... 29
  3.4.1 Evaluation Components ....................................................................................................... 30
  3.4.2 Student knowledge evaluation .............................................................................................. 31
Appendix Two: Participant Information Sheet

Appendix Three: Multiple Choice Test Questions

Hauora Māori pre- and post-test multiple choice questions

Schizophrenia pre- and post-test questions
List of Tables

Table 1: Ethnicity of study participants ................................................................. 42
Table 2: Home country of study participants ......................................................... 43
Table 3: Provincial region of study participants .................................................... 44
Table 4: High school decile rating of study participants ........................................ 45
Table 5: Participant subgroups for analysis ........................................................... 46
Table 6: Subgroups pre- and post-test performance .............................................. 49
Table 7: Test score comparisons between subgroups ............................................ 50
Table 8: Performance comparison between Schizophrenia and Hauora Māori content ................................................................. 52
Table 9: Comparison of performance of schizophrenia multiple choice questions ................................................................. 53
Table 10: Comparison of performance of Hauora Māori multiple choice questions ................................................................. 54
Table 11: Student evaluation questionnaire: Knowledge scores ................................ 55
Table 12: Student evaluation questionnaire: Integration scores ................................ 56
Table 13: Student evaluation questionnaire: User experience scores ..................... 56
Table 12: Hauora Māori course component comparison results ............................ 58
Table 13: Psychological Medicine and Hauora Māori teaching staff review feedback on integration .............................. 60
Table 14: Psychological Medicine and Hauora Māori teaching staff review feedback on course difficulty .... 61
Table 15: Psychological Medicine and Hauora Māori teaching staff review responses the critical thinking question ................................................................. 61
List of Figures

Figure 1: Selection process for inclusion of study participants ................................................................. 40
Figure 2: Age range of study participants .................................................................................................. 41
Figure 3: Boxplot of overall pre- and post-test scores .............................................................................. 47
Figure 4: Distribution of change of scores from pre to post-test ............................................................... 48
Figure 5: Boxplot of percentage change in student knowledge evaluation scores for Hauora Māori and schizophrenia .................................................................................................................. 51
Figure 6: Distribution of overall student evaluation questionnaire responses ............................................ 57
Figure 7: Distribution of overall Hauora Māori course component comparison responses ..................... 59
### Glossary of Terms and Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALM</td>
<td>Advanced Learning in Medicine</td>
</tr>
<tr>
<td>AMC</td>
<td>Australian Medical Council</td>
</tr>
<tr>
<td>Blended Learning</td>
<td>A teaching method delivered partly face to face, and partly in an online environment</td>
</tr>
<tr>
<td>CBL</td>
<td>Case Based Learning</td>
</tr>
<tr>
<td>CDAMS</td>
<td>Committee of Deans of Australian Medical Schools</td>
</tr>
<tr>
<td>CICM</td>
<td>College of Intensive Care Medicine</td>
</tr>
<tr>
<td>CME</td>
<td>Continuing Medical Education</td>
</tr>
<tr>
<td>Distance Learning</td>
<td>The delivery of an educational programme extramurally, which may or may not include the use of e-learning</td>
</tr>
<tr>
<td>DSM</td>
<td>Dunedin School of Medicine</td>
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<tr>
<td>E-Learning</td>
<td>The use of electronic media and technology in education</td>
</tr>
<tr>
<td>E4E</td>
<td>Educating For Equity</td>
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<tr>
<td>ELM</td>
<td>Early Learning in Medicine</td>
</tr>
<tr>
<td>EMQ</td>
<td>Extended matching questions</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>LMS</td>
<td>Learning Management System</td>
</tr>
<tr>
<td>KMR</td>
<td>Kaupapa Māori Research</td>
</tr>
<tr>
<td>MCQ</td>
<td>Multiple Choice Question</td>
</tr>
<tr>
<td>MDANZ</td>
<td>Medical Deans of Australia and New Zealand</td>
</tr>
<tr>
<td>MERSQI</td>
<td>Medical Education Research Study Quality Instrument</td>
</tr>
<tr>
<td>MIHI</td>
<td>Māori and Indigenous Health Institute</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>MOOC</td>
<td>Massive Open Online Course</td>
</tr>
<tr>
<td>Moodle</td>
<td>An open source learning management system</td>
</tr>
<tr>
<td>OSCE</td>
<td>Objective Structured Clinical Examination</td>
</tr>
<tr>
<td>PBL</td>
<td>Problem Based Learning</td>
</tr>
<tr>
<td>Prezi</td>
<td>Cloud-based presentation software</td>
</tr>
<tr>
<td>RMIP</td>
<td>Rural Medical Immersion Programme</td>
</tr>
<tr>
<td>UOC</td>
<td>University of Otago, Christchurch</td>
</tr>
<tr>
<td>UOW</td>
<td>University of Otago, Wellington</td>
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</tbody>
</table>
Glossary of Selected Māori Terms

Ako to learn/to teach
Aotearoa the original Māori name for New Zealand
Hui meeting; conference
Hauora Māori the health/wellbeing of Māori people
Kāinga house; home
Kaupapa topic(s); policy/policies; matter(s); theme(s)
Kia piki ake to appreciate
Māori the indigenous people of Aotearoa/New Zealand
Manaaki to look after; provide hospitality
Manaaki mai to provide support for the person speaking
Marae a place where local Māori customs and protocols prevail, usually consisting of a wharenui (meeting house) and wharekai (dining room)
Mātauranga education
Mauri ora healthy individuals
Noho marae staying/sleeping at a marae
Pae ora healthy futures
Pākehā to be of New Zealand European descent
Poroporoaki to farewell
Raruraru problem; trouble
Te Tiriti o Waitangi The Treaty of Waitangi
Tino rangatiratanga Self-determination; autonomy
Taonga tuku iho cultural aspiration, importance and validation of things Māori
Te reo Māori the Māori language
Tikanga Māori Māori customs and protocols
Whakawhanaungatanga process of building relationships
Whānau family
Whānau ora healthy families
Wai ora healthy environments
Wairua spirit; spiritual
Introduction

This thesis presents the first time an e-learning resource integrating clinical and indigenous health content has been evaluated in undergraduate medical education. Given the current state of health inequality in indigenous, and more specifically Māori populations, this study aims to make a positive contribution to Māori health and reducing disparities. It utilises a Kaupapa Māori Research (KMR) approach by ensuring the validation of Māori beliefs, values and experiences, including concepts consistent with Te Ao Māori (a Māori world view), and it was decided at the outset that the intention of this study was to support Māori health gains. It is intended that the findings of this study fill a gap in the indigenous health medical education literature and serve as an e-learning template for those who are considering adding such a resource to indigenous health programmes. The components of the thesis are summarised below:

Chapter One – Background - This chapter is divided into five main sections.
Section one reviews the current state of indigenous health inequalities to provide the broader context within which this study is based. It explores current Māori health status, Māori health rights and governmental obligations to address Māori health inequality. Factors which may contribute to the current Māori health status are also presented.

Section two focuses on cultural competency training as a means of addressing health inequalities. It begins by presenting a definition of cultural competency as it relates to this study and explores issues that should be considered in an indigenous health cultural competency training package. Current use of cultural competency training at postgraduate and undergraduate levels is also discussed in this section.

Section three reviews the role of medical education in providing cultural competency training to reduce health inequalities. It discusses current indigenous health teaching methods in undergraduate medical education, and the value of adding an e-learning resource to an existing indigenous health curriculum to enhance cultural competency.
Section four discusses mainstream medical education pedagogies and reviews the use of e-learning resources in medical education.

Section five describes the uses of e-learning technologies in general education and presents a rationale for including an e-learning resource to an indigenous medical curriculum.

Chapter Two - Literature Review – This chapter presents a literature review of e-learning in the field of medical education, in particular its popularity, strengths and weaknesses, and key design, implementation and evaluation principles. The chapter also reviews current e-learning practice in undergraduate and continuing medical education (CME) and ways that e-learning is currently being used to teach indigenous health. It explores the extent to which the literature supports the use of a blended e-learning resource to teach indigenous health within medical education.

Chapter Three – Methodology - This chapter outlines the content and design of this study’s e-learning resource which was designed to integrate Hauora Māori and clinical content. The rationale for the design of this e-learning resource is explained, followed by a description of the sampling and evaluation components. The chapter reviews Kaupapa Māori Research (KMR) methodology and its application to this study, and describes procedures around data collection, management and analysis.

Chapter Four – Results - This chapter is divided into four main sections. Section one presents the results of the student knowledge evaluation and the demographic characteristics of the participants. Section two, three and four present the findings of the students’ evaluation of a blended e-learning resource; the Hauora Māori course component comparison and the teaching staff review, respectively.

Chapter Five – Discussion - This chapter brings together the main findings of this study and discusses its implications and significance in the current landscape of medical education literature. It is divided into eight main sections. Sections one and two discuss the integration of clinical and cultural content in the e-learning environment and whether this
approach works well for teaching both bodies of content. Sections three, four and five discuss the design, implementation and evaluation considerations of this study. Sections six, seven and eight discuss incidental findings, and this study’s weaknesses and strengths respectively.

*Chapter Six – Recommendations and conclusion –* This thesis concludes by proposing recommendations for future developers of e-learning resources.
Chapter 1: Background

1.1 Introduction

The purpose of this thesis is to evaluate an e-learning resource that integrates clinical and cultural content, and its potential value when added to an existing medical curriculum that teaches indigenous health. This chapter reviews the role of medical education in providing cultural competency training to reduce health inequalities. It discusses, in particular, current indigenous health teaching methods in undergraduate medical education, and the potential value of adding an e-learning resource to an existing indigenous health curriculum to enhance cultural competency. The chapter also highlights the current state of indigenous health, factors contributing to health inequalities, and the potential for cultural competency training specifically for addressing indigenous health issues.

1.2 Indigenous Health Inequalities

The impact of colonisation as a contributing factor to health inequalities in indigenous populations is well documented (Anderson et al., 2006; Gracey & King, 2009). There is strong evidence from New Zealand (Davis et al., 2006; Robson & Harris, 2007; Westbrooke, Baxter, & Hogan, 2001) and internationally (Bramley, Hebert, Jackson, & Chassin, 2004; Gracey & King, 2009; King, Smith, & Gracey, 2009; Kressin & Petersen, 2001; LaVeist, Nuru-Jeter, & Jones, 2003) that indigenous and minority populations experience a poorer state of health, when compared to non-indigenous communities (Davis et al., 2006; Robson & Harris, 2007; Smedley, Stith, & Nelson, 2003; Westbrooke et al., 2001). The Treaty of Waitangi 1840 is the founding document between the British Crown and Māori, the indigenous people of New Zealand, and under the terms of the Treaty the British Crown agreed to allow Māori continued access to resources and well-being, enjoying all the rights and privileges of English settlers (Durie, 1998; Reid, Robson, & Jones, 2000).

The New Zealand government has demonstrated an acknowledgement of the need to address health inequalities through health policy. The Māori health strategy document He Korowai Oranga was published by the Ministry of Health (MOH) originally in 2002 (Ministry of Health, 2002a), and updated in 2014 (Ministry of Health, 2014a) and outlines three key themes in relation to Māori health and health outcomes. Theme one,
Rangatiratanga, refers to the New Zealand Government’s acknowledgement of Māori having a say in the decision-making process on issues of development within communities and institutions (Ministry of Health, 2002a). Theme two, Building on the gains, refers to acknowledgement of “Māori and Whānau ora outcomes, service uptake and Māori participation in and throughout the health and disability sector” (Ministry of Health, 2002a, p. 7) and the responsibility to maintain and build on gains to date. Theme Three, Reducing inequalities, acknowledges existing health inequities and access issues to health services for Māori. The updated strategy has included an overarching aim in Pae ora (healthy futures) which is made of up three elements: Mauri ora (healthy individuals), Whānau ora (healthy families) and Wai ora (healthy environments) (Ministry of Health, 2014a). This thesis will contribute to theme three of He Korowai Oranga 2002, reducing inequalities, and the broader aim of the updated He Korowai Oranga document, Pae ora (healthy futures).

The action plan documents published by the Ministry of Health that accompany He Korowai Oranga are Whakatātaka: Māori Health Action Plan 2002-2005 (Ministry of Health, 2002b) and Whakatātaka Tuarua: Māori Health Action Plan 2006-2011 (Ministry of Health, 2006). The Whakatātaka documents state objectives for Māori health over the said time period as they apply to the strategies of He Korowai Oranga (Ministry of Health, 2002b, 2006). The He Korowai Oranga themes above are echoed throughout the broader New Zealand Health Strategy document originally published by the Ministry of Health in 2000 (Ministry of Health, 2000). An annual New Zealand Health Strategy Implementation report documents progress in the priority areas highlighted in the original strategy document. The most recent report was released in December 2013 (Ministry of Health, 2013). Despite the release of all these reports, indigenous health disparities between Māori and non-Māori continue to be recorded (Ajwani, Blakely, Robson, Tobias, & Bonne, 2003; Blakely, Fawcett, Hunt, & Wilson, 2006; Robson & Harris, 2007).

Action 3.3.1 in Whakatātaka: Māori Health Action Plan 2002-2005 makes reference to development of clinical and cultural best practice guidelines in delivery of services to Māori (Ministry of Health, 2002b). Cultural competency training that is inclusive of evolving best practice guidelines can be one tool that contributes to meeting the third
theme of *He Korowai Oranga* (Ministry of Health, 2002a) in reducing Māori health inequalities (Durie, 2001; Jansen, 2011; Jones et al., 2010). Internationally it has been suggested that sociocultural barriers to health care, amongst other concerns, need to be first identified before any change can be expected in ethnic health inequality (Betancourt, Green, Carrillo, & Ananeh-Firempong, 2003; Betancourt, Green, Carrillo, & Park, 2005; Medical Council of New Zealand, 2006). Cultural competency training that acknowledges these barriers is one way of addressing health disparities (Brach & Fraser, 2000).

Factors which have been identified as contributing to Māori health inequalities include access to health care (Cormack, Robson, Purdie, Ratima, & Brown, 2005; Crengle, 2007; Davis et al., 2006), differential rate of referral (Bramley, Hebert, Tuzzio, & Chassin, 2005; Cormack et al., 2005; Westbrooke et al., 2001), differential rate of diagnosis (Cormack et al., 2005; Reid & Robson, 2006), differential intervention rates (Bramley, Riddell, et al., 2004; Crengle, 2007; Kressin & Petersen, 2001; Westbrooke et al., 2001), socioeconomic status (Ajwani et al., 2003; Blakely et al., 2006), racism (Harris, 2006; Nairn, Pega, McCreanor, Rankine, & Barnes, 2006), health system barriers (Bramley, Riddell, et al., 2004; Cormack et al., 2005; Davis et al., 2006; Nairn et al., 2006; Reid & Robson, 2006; Robson & Harris, 2007) and cultural competency of clinicians (Betancourt et al., 2003; Reid & Robson, 2007; Van Ryn & Fu, 2003). Despite its inclusion in *Whakatātaka: Māori Health Action Plan 2002-2005* (Ministry of Health, 2002b), cultural competency was not mentioned specifically in *Whakatātaka Tuarua: Māori Health Action Plan 2006-2011* (Ministry of Health, 2006) and there are still no universally accepted best clinical practice guidelines in cultural competency with Māori.

Indigenous health professionals are underrepresented worldwide, particularly in the field of medicine (Curtis, Wikaire, Stokes, & Reid, 2012; Ratima et al., 2007). Medical education has a role to play in training physicians to be more effective in meeting the health needs of indigenous peoples (Jones et al., 2010; Phillips, 2004; Pitama, 2012). Development of a medical school curriculum that specifically reflects the needs of a population is emphasised by Burdick et al as being key to building capacity and long term improved health outcomes (Burdick, Morahan, & Norcini, 2007). Such a curriculum should acknowledge the health needs of indigenous populations, and ensure there is a place for
indigenous health teaching in medical school education. This thesis intends to contribute to existing indigenous medical education literature by investigating the value of an e-learning resource as a method of delivering a component of an indigenous medical curriculum.

1.3 Cultural Competency to Address Health Inequalities

In 2003 Betancourt et al defined cultural competence in a health care setting as “understanding the importance of social and cultural influences on patients’ health beliefs and behaviors; considering how these factors interact at multiple levels of the health care delivery system and, finally, devising interventions that take these issues into account to assure quality health care delivery to diverse patient populations” (Betancourt et al., 2003, p. 297). Cultural competency training that addresses these issues may be an avenue for improvement of poor health outcomes for indigenous populations (Brach & Fraser, 2000).

Cultural competency training has traditionally had a broad focus, grouping ethnic minorities and indigenous populations. Despite the existence of indigenous-specific models for engagement (Bennett, 2009; Carrese & Rhodes, 2000; Lacey, Huria, Beckert, Gilles, & Pitama, 2011; Mauri Ora Associates), there are no universally accepted guidelines for engaging with individual indigenous populations (Brach & Fraser, 2000). The ongoing impacts of colonisation have created issues that acutely face indigenous peoples, many of which may not apply to other ethnicities (Pitama, 2012; Pitama et al., 2007). Racism, dehumanisation, marginalisation, loss of economic resource, a disproportionate shortened life expectancy, loss of land and identity are some of the issues that contribute to inequitable health outcomes for indigenous peoples (Reid & Cram, 2005; Reid & Robson, 2007). Cultural competence training should acknowledge the issues listed above while promoting engagement that is inclusive of specific indigenous cultural norms and processes (Lacey, Huria, et al., 2011; Pitama et al., 2007). This thesis will add to the body of cultural competence literature by evaluating a Hauora Māori e-learning resource for undergraduate medical students that is inclusive of the above elements.

Much has been published in the field of cultural competency focusing on postgraduate professional development of practising health professionals (Durie, 2001; Hawthorne,
Cultural competence training at postgraduate and undergraduate levels has a role in reducing health inequalities (Brach & Fraser, 2000; Jones et al., 2010). An undergraduate indigenous health curriculum or continuing medical education (CME) intervention that uses principles from the wider field of cultural competence and combines them with established cultural practices and protocols should provide a tailored training package specific to indigenous populations (Jones et al., 2010; Jones, Reid, O'Connor, & Poole, 2009). Within the field of medical education there are few Hauora Māori cultural competency training packages available at postgraduate (Durie, 2001; Jansen, 2011; Mauri Ora Associates) and undergraduate levels (Jones et al., 2010; Lacey, Huria, et al., 2011; Pitama, 2012; Pitama et al., 2007), the teaching content varies widely and no accepted best practice exists (Durie, 2001; Jansen, 2011).

### 1.4 The Role of Medical Education in Reducing Indigenous Health Inequalities

Acknowledgement of the need for a separate indigenous health curriculum within undergraduate medical education has been highlighted by the Medical Deans of Australia and New Zealand’s (MDANZ – previously known as Committee of Deans of Australian Medical Schools (CDAMS)) recommendations in 2002 to the Australian Medical Council (AMC) (Phillips, 2004). The AMC is the accreditation body for all medical school programmes in Australia and New Zealand. MDANZ undertook to seek accreditation of an indigenous curriculum framework by the AMC, and in 2006, specific indigenous health standards were introduced, thereby requiring all medical schools in Australia and New Zealand to adhere to new standards (Medical School Accreditation Committee, 2010).
Two strategies have been proposed to improve health services to indigenous populations. One is to increase the indigenous health workforce (Durie, 1998; Ring & Brown, 2003). In New Zealand and internationally, the indigenous health workforce is small in comparison to population based needs (Durie, 2003; Ring & Brown, 2003). One response to the shortage may be to promote active policies in institutions training health professionals, to strategically increase indigenous health practitioner numbers (Curtis et al., 2012). Another way is to train the existing health workforce to be competent in delivering health services to an indigenous population (Jones et al., 2010). There are two medical schools in New Zealand, one at the University of Otago, and the other at the University of Auckland, and as members of MDANZ both are obliged to follow MDANZ recommendations regarding an indigenous curriculum framework with accompanying indigenous health standards.

1.4.1 Medical education and indigenous health teaching methods

There are varied teaching methods across the New Zealand and Australian medical schools to deliver an indigenous health curriculum (Jones et al., 2010; Pitama, 2012). The approach to teaching Hauora Māori (Māori health) in the two undergraduate medical programmes in New Zealand is different. Both programmes use immersed, integrated and independent teaching methods, described in greater detail below. An overview of health teaching strategies, both indigenous and mainstream, is discussed to help clarify where e-learning may be best positioned amongst other teaching methods in a medical curriculum teaching indigenous health.

**Immersed**

Immersed learning refers to sessions solely dedicated to teaching Hauora Māori. Immersed learning sessions are introduced to the students early on and involve initiatives such as a single “Introduction to Hauora Māori” teaching session for second year medical students, or hosting a “Māori health week”, which brings together second year medical, nursing and pharmacy students for a week, and exposes them to concepts of Hauora Māori in different teaching settings. In both situations students participate in activities promoting Hauora Māori and health inequalities on a marae, providing a cultural environment where Māori protocols and customs prevail. Marae are traditional meeting places where tangihanga
(funeral), wānanga (learning sessions) and hui (meetings) are common events (Pitama, 2012). The marae provides an ideal immersed learning environment to learn a mixture of Māori language (Te reo Māori), cultural practices and protocols (Tikanga Māori) and concepts of Hauora Māori. In one programme, fourth year medical students are taken on a “Noho marae” (marae stay over), which involves learning sessions where students stay overnight on a marae, and share meals and sleeping quarters as is consistent with tikanga Māori (Jones et al., 2010). This type of learning environment fits well with Māori pedagogies and is consistently rated highly by students (Huria, Beckert, Lacey, & Pitama, 2013; Pitama, 2012).

**Integrated**

Integrated learning as utilised by the two New Zealand medical programmes involves teaching sessions and self-directed tasks in Hauora Māori frameworks and concepts, whilst being engaged in clinical block modules (Jones et al., 2010). Teaching sessions have included lecture and tutorial style sessions taught alongside clinical attachments. One study noted that this style of teaching was seen as useful by students as long as lecture material was applied to clinical practice. Exposure to positive examples through video media in lectures or self-directed activities were noted especially as enhancing lecture and tutorial based sessions (Pitama, 2012).

Small group work has also been used as an integrated learning method. The Māori phrase “Manaaki mai” literally translated means support me. Manaaki Mai teaching sessions involve group interviewing scenarios where students take turns participating as a spokesperson in a simulated interview with a Māori patient. The larger group is responsible for directing the line of inquiry, and group feedback is relayed to the Māori patient by the student designated the spokesperson. These scenarios are facilitated by teaching staff to ensure the interview remains consistent with prior teaching material (Pitama, 2012).

Clinical interaction with Māori patients outside of simulated teaching environments is another way students can receive integrated teaching. Student-led mini-clinics set up for members of a Māori community in a Māori environment (e.g. marae or kura kaupapa
(Māori language school)) provide an opportunity for students to utilise practical frameworks in Hauora Māori taught in previous teaching sessions. These clinics are run by students in their clinical years and supervised by clinical and Hauora Māori teaching staff. This type of teaching initiative increases contact time for students with Māori patients and allows students to apply clinical and Hauora Māori skills in a real life clinical setting (Jones et al., 2010).

**Independent**

Independent learning initiatives include summative assessment of a student who has interviewed a Māori patient during a clinical run. Conducting a clinical interview and writing up the findings of the interview are required of all students to complete this self-directed task. This allows students to engage independently with a Māori patient and whānau in a clinical environment, and practise the principles that have been taught previously.

The teaching methods described above are utilised to ensure graduates meet specific learning outcomes. Both New Zealand medical schools have outlined graduate learning outcomes to define the scope and content of Hauora Māori curricula, and these are quoted below (Jones et al., 2010; Jones et al., 2009; Phillips, 2004; University of Otago, 2014).

**University of Auckland**

Graduates of the University of Auckland Medical School programme “will be able to:

- Engage appropriately in interactions with Māori individuals, whānau and communities.
- Explain the historic, demographic, socioeconomic, and policy influences on health status.
- Explain how ethnic inequalities in health are created and maintained and how they may be reduced and eliminated.
- Identify approaches to reducing and eliminating inequalities including actively challenging racism.
- Explain the influence of one’s own culture and that of the health system on patient and population health outcomes.
• Engage in a continuous process of reflection on one’s practice and actively participate in self-audit in respect of the Treaty of Waitangi.

• Identify and address professional development needs as a basis for life-long learning about Māori health” (Jones et al., 2010, p. 3)

**University of Otago**

Similarly, graduates of the University of Otago Medical School programme “will be able to:

• Describe the determinants of health disparities between Māori and non-Māori and describe approaches to addressing disparities.

• Demonstrate the principles of cultural safety, competency and literacy within the health environment.

• Demonstrate appropriate engagement in communication skills with Māori patients, whānau and community.

• Describe Māori health status and the health disparities that exist for Māori—both within a national and international context.

• Identify the principles of Māori Beliefs, Values and Experiences (MBVEs) and their application to Hauora Māori.

• Identify and apply a Hauora Māori model to clinical cases.

• Identify evidence based skills when undertaking critical appraisal of epidemiology, clinical research and qualitative research in Māori Health” (Jones et al., 2010, p. 3)

The desirable attributes of both universities’ graduate profiles laid out above share common themes of critical analysis of health inequality data, practical tools to help reduce health inequity, appropriate engagement practices with Māori, and practices that acknowledge principles of cultural safety. Differences between the above profiles can be attributed more to emphasis on certain areas rather than misalignment of goals (Jones et al., 2010). Both programmes have broad goals for graduates and a range of teaching methods that is inclusive of e-learning may be required to reach these goals.
1.4.2 Evaluation of an indigenous curriculum within medical education

Challenges exist in medical education when looking at evaluation of an undergraduate or postgraduate intervention, and tracking its influence on clinical practice and patient outcomes. Initial changes in knowledge, skills and attitudes can be measured with relative ease by using current assessment tools, but measuring change in long-term behaviour of clinicians in clinical practice is difficult (Epstein, 2007; Nestel et al., 2011). Tracking a shift in patient outcome or health disparity data back to a particular historical intervention is more challenging (Ewen, Paul, & Bloom, 2012).

In 2013 the Māori and Indigenous Health Institute (MIHI), based at the University of Otago, Christchurch School of Medicine carried out an evaluation of immersed methods of indigenous health teaching within the University of Otago. They reported that initiatives such as “noho marae” were a highly useful introduction to students in their clinical years of medicine (Huria et al., 2013). Despite this, independent and integrated teaching methods appear more popular within an indigenous health curriculum; this may be due to relevance of these methods to clinical practice, and a comparatively small level of staffing resources available to indigenous health teaching programmes (Pitama, 2012). A University of Otago study looking at student-led mini clinics as an integrated learning initiative reported the experiences of students, clinical supervisors and indigenous participants as being rated highly (Lacey, Yee, Huria, & Pitama, 2011). Independent initiatives such as the long-case assessment have been included in indigenous health teaching as a means of assessing clinical competencies (Ponnamperuma, Karunathilake, McAleer, & Davis, 2009).

1.5 Mainstream Medical Education Pedagogies

In order to understand the place of e-learning in medical education, one needs to consider existing teaching methods which include traditional didactic lecture based learning, case-based learning (CBL), problem-based learning (PBL), large and/or small group teaching sessions, simulation and/or role playing activities and online teaching modules (Krueger et al., 2004; Ruiz, Mintzer, & Leipzig, 2006). Mainstream medical education teaching and assessment methods mirror those of an indigenous health curriculum (Epstein, 2007; Jones et al., 2010; Pitama, 2012). For many conveners, teaching and assessment methods have
been selected for their ability to fulfil the stated learning objectives, emphasising a level of understanding rather than topics in the curriculum to be covered. The most common teaching method in an indigenous curriculum was that of didactic lecture based teaching, delivered to whole classes. This was often the only teaching method available to indigenous curriculum conveners due to time allocation in the medical curriculum (Pitama, 2012).

Best practice of Hauora Māori teaching uses all of the teaching methods, immersed, integrated and independent (Jones et al., 2010; Pitama, 2012). One form of independent learning used within medical education that may have potential for increased usefulness in an indigenous curriculum is that of e-learning resources. It is argued that this form of teaching allows the learner to have more control over learning sequence and pace of learning to deliver a more tailored experience to the student (Ruiz et al., 2006).

In the literature there is a consistent problem with the discussion of e-learning, that is that the terms distance learning and e-learning are commonly used as synonyms (Moore, Dickson-Deane, & Galyen, 2011). While distance learning programmes do utilise e-learning, e-learning is more often used in non-distance learning programmes, so to use the terms as synonyms creates confusion (Guri-Rosenblit, 2005; Moore et al., 2011). In this thesis e-learning will be defined as the use of electronic media and technology in education. The literature divides e-learning tools into four broad categories: completely online, asynchronous, synchronous and hybrid or blended (Chen, 2008; Welsh, Wanberg, Brown, & Simmering, 2003).

Completely online and asynchronous tools are self-directed and allow the learner to progress through the content at their own pace. The difference between the two is that asynchronous e-learning tools will have some online interaction between students and teachers in the form of discussion boards or online forums; an e-learning tool based completely online will not. In an asynchronous tool, responses are posted by the students and teachers at their leisure and are not typically done in real time (Chen, 2008; Ellaway & Masters, 2008).
Synchronous e-learning tools involve live communication between the teacher and student in a web environment such as a chat room or using video conferencing software, allowing real time interaction between student and teacher. The literature supports the view that this e-learning method encourages students to develop ideas, promote problem solving and enhance critical thinking (Taran, 2006; Welsh et al., 2003).

Hybrid and blended learning tools involve a mixture of face-to-face teaching sessions and e-learning. This approach usually involves a portion of course content being presented online and the remainder of content presented using classroom style teaching methods. Online material may be in the form of tutorials, mock tests, presentations, video or audio clips or relevant text documents (Mitchell & Honore, 2007; Ruiz et al., 2006).

Blended or hybrid e-learning tools are becoming a more popular teaching medium, especially where face to face learning sessions are already in existence. A blended approach allows the benefits of live feedback to the learner in the classroom, with an added bonus of review or solidifying of learning from complementary learning material online. An alternative teaching method is increasingly being used where learning material is presented initially in an e-learning tool, and then applied practically in a classroom based role play or discussion session (Welsh et al., 2003). Arguably the type of e-learning, that best fits the established teaching approach to indigenous health within medical education is blended learning.

1.6 Uses for E-Learning Resources

There is huge variation in what is included under the umbrella of e-learning, but most e-learning tools follow an asynchronous method of teaching (Welsh et al., 2003). As outlined in the four different types of e-learning tools above, e-learning has been utilised to teach an entire course online, yet also has been used to teach part of a course as in the case of blended learning (Chen, 2008). The emergence of Massive Open Online Courses (MOOCs) has seen e-learning become a platform for tertiary institutions to deliver entire courses that are freely accessible to a worldwide audience (Waldrop, 2013). These MOOCs utilise a range of content delivery tools in the form of podcasts of recorded lectures, peer-marking and review of student assignments, interaction of ideas between students and instructor
via discussion forums, completion of quizzes and peer-feedback of results, and downloadable course readings for future reference (Kellogg, 2013). Outside of MOOCs and within general education, what constitutes e-learning is equally as variable. Content delivery can be as little as text on a web page, downloadable word processing documents or Microsoft PowerPoint files, or more sophisticated online tools such as virtual hospital or patient simulation software that require user interaction to progress through each learning point (Welsh et al., 2003). All of these examples fall under the umbrella of e-learning, so this makes it challenging to not only compare e-learning resources, but also identify the relevance of evaluation data to this particular study.

Key themes emerge in the literature when looking at design and implementation of an e-learning module. Firstly with regard to design, Keller and Suzuki wrote of the need to identify the motivational requirements of learners (Keller & Suzuki, 2004). This is echoed by others, all highlighting the importance of understanding the needs of the learner audience (Govindasamy, 2001; Keller & Suzuki, 2004; Meng Tham & Werner, 2005). Another key design principle is that of defining learning objectives and selecting activities and multimedia tools that match learning objectives (Govindasamy, 2001). Activities and multimedia tools that provide only aesthetic value without adding teaching value to the material should be avoided so that the focus remains on learning objectives rather than attractive visual effects (Bradley & Boyle, 2004).

E-learning may provide a way to meet the changing needs of Hauora Māori or indigenous health course conveners and teachers within their institutions. E-learning can be especially useful for providing resources for students on rural placements or based at distant teaching sites. Currently, e-learning is not featured strongly in Hauora Māori and indigenous health curricula worldwide (Pitama, 2012). This thesis aims to evaluate the addition of a blended Hauora Māori e-learning module to a Hauora Māori vertical module and a Psychological Medicine block module to see if its inclusion improves undergraduate medical students’ ability to integrate Hauora Māori and clinical content.
Chapter 2: Literature Review

2.1 Introduction

The focus of this literature review is e-learning in the field of medical education, in particular its popularity, strengths and weaknesses, as well as key design, implementation and evaluation principles. This chapter also reviews current e-learning practice in undergraduate and continuing medical education (CME) and ways that e-learning is currently being used to teach indigenous health. It explores the extent to which the literature supports the use of a blended e-learning module to teach indigenous health within medical education. Where existing literature on e-learning in medical education is inadequate, research from other areas of education which examines important aspects of e-learning has been included.

2.2 E-learning and Medical Education

Within a short period of time e-learning has become part of mainstream medical education, with its popularity continuing to increase (Kim, 2006). Medical education follows the popular trend of integrating mainly asynchronous or blended e-learning tools into medical curricula. In medical education, synchronous or all online e-learning tools exist, but are less favored than the other two e-learning teaching methods (Ellaway & Masters, 2008).

E-learning within continuing medical education (CME) is heavily used for its ability to limit common barriers to CME access such as family commitments, organisation of locum coverage, and travel and course costs (Ellaway & Masters, 2008). Asynchronous CME modules focused on specific topics are favored over an entire distance learning course (Kim, 2006). The use of e-learning at an undergraduate medical student level is also increasing (Cook, Garside, Levinson, Dupras, & Montori, 2010; Ellaway & Masters, 2008; Kim, 2006; Ruiz et al., 2006). Whether students are in urban hospital based placements or rural and remote practices, the literature confirms that faculty, administrators and students find e-learning modules to be a convenient mode of learning, favoring blended or hybrid e-learning modules (Choules, 2007; Ruiz et al., 2006).
The strengths of well-designed e-learning resources within medical education are many, the most obvious being their ability to provide teaching to students across a raft of different locations (Choules, 2007; Cook, Dupras, Thompson, & Pankratz, 2005; Oz, 2005). Scheduling teaching also becomes more flexible as students can access e-learning resources in their own time (Choules, 2007; Cook & Dupras, 2004b).

With this flexibility of delivery come potential economies of scale, as class size is limited only by institutional server capabilities and student access to a computer (Cook, 2007; Fall et al., 2005). Economies of scale can be less of a factor when discussion forums are part of an e-learning tool as ongoing faculty input to such forums increase the cost burden of the resource (Cook, 2007).

Another benefit of e-learning is that it allows a consistent message to be conveyed in the case of varied or limited faculty expertise in distant locations (Cook & Dupras, 2004b), and this message can easily and inexpensively be perpetually updated after initial setup (Choules, 2007; Cook, 2007; Tyler, Rowlands, & Spasoff, 2009). E-learning offers the further advantages of instructional methods that are less feasible or impossible to recreate using traditional teaching methods, such as the use of virtual patient simulators (Cook, Erwin, & Triola, 2010; Cook & Triola, 2009), interactive multimedia activities (Ruiz, Cook, & Levinson, 2009) and using the internet to search on and around a topic from multiple sources (Cook, 2007). Automated record keeping of tracking and assessment data within e-learning resources allows for customised feedback to the student as well as automatic updating of assessment records (Cook, 2007; Tyler et al., 2009).

Many of the weaknesses of e-learning relate directly to the strengths stated above and can be adjusted for in a well-designed resource. For instance, while a benefit may be that students can complete an e-learning module by themselves, working in this way often leaves the student socially isolated and unable to seek immediate answers to questions from peers or teaching staff (Cook, 2007). A well utilised discussion forum can moderate this weakness by allowing both peer and teacher response in a timely fashion (Sandars, 2006).
Initial setup costs of a well-designed e-learning resource are generally high, but perpetual use of the resource and a long term view of cost analysis would make it a cost effective exercise for adding to teaching resources (Fall et al., 2005). Poor instructional design can be an issue of both e-learning and traditional methods of teaching, though the use of good instructional design principles in the design phase of resource creation can moderate this issue (Cook & Dupras, 2004a; Ruiz et al., 2006). Technical problems that limit or prevent student access are always going to be a weakness of any e-learning resource, and despite technically inclined teaching staff or a designated technical team doing their best to offer technical support, technical problems will always remain a challenge in e-learning (Childs, Blenkinsopp, Hall, & Walton, 2005).

There is some debate in the literature around individualised learning in an e-learning environment. Web based learning or e-learning holds a promise of offering students the benefit of an individualised learning experience by allowing students to select learning activities, repeat if necessary and progress through the resource at their own pace (Clark, 2002). While these benefits can be factored into the design of a resource, Cook argued in 2007 that an e-learning resource needed to monitor, recognise and respond to individual learning needs to qualify as individualised learning, and at that time, only a small minority of resources did this, and most were outside of medical education (Cook, 2007). There was no further evidence within the scope of this review to suggest that this has changed more recently.

E-learning both inside and outside of medical education is hugely variable in terms of design, implementation and evaluation, although some general themes emerge in the literature (Cook, Garside, et al., 2010). No best practice exists, either inside or outside of medical education literature (Cook, 2006, 2009; Triola, Huwendiek, Levinson, & Cook, 2012). Cook (2006) suggested that the questions of how and when to use e-learning needed to be addressed in the medical education literature to give institutions and teaching staff a set of tools to create effective e-learning resources. He proposed that the question of how to do this is best answered by considering key instructional design features that are specific to learning objectives, rather than having one module design that fits all medical education needs (Cook et al., 2013). The question of when to use e-
learning, Cook (2006) thought could be answered by looking at studies that explore how to integrate or implement an e-learning resource into existing methods of instruction, or the appropriateness of using e-learning to achieve predetermined learning objectives.

### 2.3 Design of E-Learning Resources

An important design principle of e-learning across medical education literature is the adherence of teaching content of an e-learning resource to predetermined learning objectives (Cook, 2007; Cook & Dupras, 2004a; Cook & McDonald, 2008; Ruiz et al., 2006; Zehry, Halder, & Theodosiou, 2011). In a systematic review of the variability of web based teaching resources, Cook et al. (2010) identified that the majority of e-learning in medical education used a combination of written text and multimedia as tools to present learning material. Cook et al. also found that less commonly, tools such as e-mail communication, discussion forums, chat rooms and videoconferencing were utilised.

In a 2013 systematic review and meta-analysis of the literature Cook et al identified a list of key design features in technology enhanced simulation-based medical education. They defined technology enhanced simulation-based medical education as “an educational tool or device with which the learner physically interacts to mimic an aspect of clinical care for the purpose of teaching or assessment” (Cook et al., 2013, p. e867). Range of difficulty is self-explanatory and seeks to ensure that there is variation in difficulty level or complexity of learning tasks. Repetitive practice makes sure that there is an opportunity for the learner to have multiple attempts at learning tasks to improve performance. Distributed practice relates to spreading training over a period of time. Cognitive interactivity encompasses learning strategies such as multiple repetitions, feedback, task variation, interactive multimedia activities or intentional task sequencing to maximise learning outcomes. Multiple learning strategies refers to allowing for more than one instructional strategy, for example, case based learning worked or not worked, discussion boards, feedback, intentional sequencing, or task variation. Individualised learning promotes training that is responsive to individual learner needs and can be adapted based on performance. Mastery learning is a training model where learners must achieve a predetermined standard before advancing to the next task. Feedback can be from instructors, peers or the computer (in the form of predetermined performance based feedback) and
can be completed either during or after a learning task. An increased amount of time to complete learning activities, ensuring teaching material reflects learning objectives, and clinical variation by way of use of multiple patient scenarios rounded off this comprehensive list of design features identified in the review (Cook et al., 2013).

The most common instructional method identified by the Cook et al. (2013) review was teaching by way of patient cases. A guided problem-based learning approach (a combination of patient case information and programmed instruction) in an e-learning environment was shown to be more effective than lecture and text, or lecture and video presentations of the same case study (Kamin, O’Sullivan, Deterding, & Younger, 2003). This is in opposition to Basu Roy and McMahon’s findings that reported the use of video based cases in problem-based learning to be disruptive to deep critical thinking, despite video rather than text being preferred by students and tutors (Basu Roy & McMahon, 2012).

The findings of Basu Roy and McMahon’s study may not apply to teaching methods utilising e-learning as their study only compared video patient cases to text cases, using problem based learning in a small group setting, rather than an e-learning environment. Other less common methods identified as improving the outcome of an e-learning resource include: providing constructive, personalised feedback to student performance throughout the period of the e-learning resource; teaching by repetition, where teaching content, often in the form of case based questions, was cycled in multiple times over a teaching period; and finally, an innovative approach that asked students to evaluate and contrast cases, then submit a case summary of the findings (Cook, Garside, et al., 2010). The tools available to developers of e-learning resources are many, and some appear more suited to specific learning objectives than others; best practice is discussed below. There is no clear direction in the literature that answers the two main questions of what tools and methods to use, and how to use them effectively.

2.4 Implementation of E-Learning Resources
The next step after design of an e-learning resource is implementation. Cook and Dupras (2004) outlined barriers to implementation which included resistance to web based learning, lack of computer proficiency, insufficient time for placement of an e-learning
resource into the curriculum, or perception that the curriculum is a low priority. Greenhalgh (2001) suggested using staff development as a means to engage teaching staff with e-learning projects, offering reward in the form of recognition or promotion, for engaging with content experts, educators, and technical specialists. They argue that identification of these barriers early on in the design and development phase will allow developers an opportunity to address the previously mentioned barriers.

Cook and Dupras (2004) and Chan and Robbins (2006) encouraged piloting an e-learning resource in its entirety prior to full implementation. The “gold standard” as advocated by Cook and Dupras involves formal testing in a lab setting by a sample similar to that of the targeted learners. If the pilot in a lab is not feasible, informal testing having access over a more flexible time period is the next best option for feedback (Cook & Dupras, 2004a). Information on navigation, timing, adherence to learning objectives performance and appropriateness of multimedia activities and overall impression of the resource can be extremely useful in addressing issues before the tool is made live to the intended target audience (Chan & Robbins, 2006; Cook & Dupras, 2004a). Developing a response plan for potential technical issues, with clear instructions to users of key contacts and protocol, should also be included in any implementation plan (Chan & Robbins, 2006).

Integration and implementation of e-learning tools into medical curricula is made easier when a needs assessment of a course results in the decision to add an e-learning resource (Ruiz et al., 2006). Ellaway and Masters (2008) emphasise acknowledgement of the roles of learner, teacher and institution in being key to implementation. The role of the learner is participation on predetermined activities as well as self-initiated extra learning. The role of the teacher is not just of development then absence, but to have continued engagement with the students of their e-learning resource. The role of the institution is to provide support to teachers less inclined or able to develop e-learning resources, and extending the traditional list of performance indicators for promotion to include e-learning endeavors (Ellaway & Masters, 2008).
2.5 Evaluation of E-Learning Resources

E-learning as a teaching method has often been compared to traditional methods of teaching or no intervention at all (i.e. a control group or preintervention assessment) to evaluate its effectiveness (Cook, 2009; Cook et al., 2011; Cook et al., 2008; Schilling, Wiecha, Polineni, & Khalil, 2006). In medical education, when compared to no intervention at all, e-learning is associated with large positive effects in learning (Cook et al., 2008). Despite the reporting of e-learning as a superior instructional method in earlier literature (Clark, 2002; Cook & McDonald, 2008), it has been argued that research involving comparisons between an e-learning intervention group and traditional teaching methods are difficult to interpret meaningfully because of the lack of valid comparison groups (Cook, 2005).

In a meta-analysis of the literature, Cook et al. (2008) concluded that when compared to traditional methods of teaching, e-learning is currently thought to be just as effective where similar instructional methods are used (Cook et al., 2008). Simulation based training may be an exception, as Cook et al. (2012) reported in a systematic review that technology-enhanced simulation in an e-learning environment was more effective than non-simulation instructional methods. Nonetheless, this finding is qualified, applying only when teaching material is aligned to learning objectives, and simulation design follows principles of simulation research (Cook et al., 2012). Cook (2009) argues that rather than looking at e-learning either as inferior or superior to traditional teaching methods, both should be acknowledged as different and complementary.

Only a few frameworks for evaluation of e-learning resources have emerged in the literature. Attwell (2006) identified five broad categories of variables that need to be considered: individual learning variables, learning environment variables, contextual variables, technology variables and pedagogic variables. Individual variables refer to physical attributes such as age and sex, previous experiences with learning, attitude to learning, motivation to learn and exposure to technology. Learning environment variables include the physical learning space the e-learning will take place in, the environment of the institution or organisation and the subject environment. Contextual variables refer to socioeconomic factors, political factors such as the funding body of the e-learning tool, and
cultural factors such as perceived value of e-learning and geographic location. Technology variables include consideration around essential hardware, software, connectivity, media and the delivery mode. Finally pedagogic variables refer to learner support systems, accessibility, methodology, flexibility, learner autonomy, selection and recruitment, assessment and evaluation, and accreditation and certification (Attwell, 2006).

This comprehensive approach to evaluation allows institutions and organisations to answer important questions about their e-learning modules such as: In which context does a particular tool work? What learner group will benefit most from it? How will different style learners respond to the tool? Do different information and communication technology (ICT) platforms make a difference? Are socioeconomic factors contributing to differences? and ultimately, is a particular e-learning tool effective in accomplishing learning objectives? Attwell’s comprehensive and very useful guide was produced as a collaborative European project, but since its publication in 2006 appears to have been largely ignored in the literature.

In order to identify best practice with design and implementation, there is need for effective evaluation to identify areas that require change. A piloting phase is highly recommended to iron out issues with design, implementation and evaluation prior to going live (Cook & Dupras, 2004a). There is a lack of consistency in the literature regarding evaluation methods for e-learning resources, but the most common method is ethnographic measures in the form of learner questionnaires (Attwell, 2006; Meng Tham & Werner, 2005). Atwell found in 2006 that within learner feedback questionnaires for e-learning resources, there is an over-reliance on questions around the use of technology as a teaching medium rather than the content of and engagement with the e-learning resource (Attwell, 2006).

A feedback questionnaire should consider questions touching on a range of aspects relating to e-learning such as course expectations (Meng Tham & Werner, 2005), course structure and content (Govindasamy, 2001; Meng Tham & Werner, 2005), assessment tasks, appropriate timing, learning pace, navigation, appropriate use of multimedia, level of interactivity, visual design and overall impression of the tool (Bradley & Boyle, 2004).
While all of these aspects may not be relevant to each individual e-learning project, consideration of each should occur at the design stage of the tool.

A peer review evaluation questionnaire on e-learning resources is another way of assessing value in a curriculum, but there appears to be little literature in the area currently. A problem with peer review of e-learning resources is that few reviewers are likely to have expertise in both the content and technological aspects of e-learning. Ruiz, Candler and Teasdale (2007) highlight that ideally, a peer review of e-learning tools should include key aspects such as teaching pedagogy, learning format, ease of navigation, level of interactivity, issues around delivery, ability to update material with relative ease, and distribution and access to the tool (Ruiz, Candler, & Teasdale, 2007). In contrast, McKenzie and Parker (2011) place a greater value on a critique of module content, rather than technical aspects of an e-learning resource. The following are highlighted as being important areas to cover in a peer review according to McKenzie and Parker: clear learning objectives, up to date course material and teaching methods, alignment of teaching and assessment tools to learning objectives, Interface interactivity sufficient to engage students to learn, student outcomes that match intended course outcomes, and an ongoing process of reflection and review.

E-assessment (assessment activities in an e-learning environment) also has a mixed review in the literature (Ellaway & Masters, 2008; Ripley, Harding, Redif, Ridgway, & Tafler, 2009). The benefits of conducting flexible assessment activities may be outweighed by the potential for abuse by fraudulently allowing a third party to complete an assessment without detection (Ripley et al., 2009). This potential risk can be minimised by using formative instead of summative assessments (Ellaway & Masters, 2008; Ripley et al., 2009).

E-assessment in the form of tracking formative and/or summative assessment results has consistently been used as an evaluation method of e-learning resources (Govindasamy, 2001; Graff, 2003). Formative assessments can be defined as ongoing assessments throughout a course. They are used to help students and teachers identify gaps in teaching and learning. Examples of formative assessment in e-learning include multiple choice
questions (MCQ) (K. Wang, Wang, Wang, & Huang, 2006), and discussion forums that aim to promote ideas and feedback from learners on a particular topic or subject (Ardito et al., 2006). When used as a formative assessment, MCQs or short or long answer questions can be attempted multiple times until a standard of learning has been met; the quiz result generally does not contribute to the overall grade of a course (T. Wang, 2007). Summative assessments are usually completed at the end of a course and signal whether or not a required level of learning has been achieved, before moving to the next level. Summative assessments in e-learning most commonly include MCQs (Govindasamy, 2001).

Govindasamy (2001) argues that carefully designed MCQs that assess learning on all six levels of Bloom’s Taxonomy of Educational Objectives (knowledge, comprehension, application, analysis, synthesis and evaluation), whether for the purposes of formative or summative assessment, can be used effectively in teaching and testing at a level greater than just memorisation (Govindasamy, 2001). Allowing learners to access MCQ question banks on specific subjects, while permitting the ability to perform module content or internet searches on the subject, will allow learners to repeat questions and search content until mastery of the subject is achieved (Govindasamy, 2001). Tham and Werner (2005) comment that assessment scores such as MCQs used in isolation do not measure all of the aspects of e-learning. The literature therefore supports well designed MCQs being used as a part of e-learning evaluation, but not as the only means of evaluation. Nonetheless the literature lacks evidence based research.

2.6 E-Learning and an Indigenous Curriculum Within Medical Education

There are a number of e-learning tools available as part of CME or postgraduate courses in the field of indigenous health. However, there is not the same volume available at the undergraduate level and whilst indigenous e-learning tools may exist, they have not been reported in undergraduate medical education literature. Postgraduate e-learning examples in Australia and New Zealand include indigenous health modules available through the Royal Australasian College of Surgeons (Royal Australasian College of Surgeons), Royal Australasian College of Physicians (Royal Australasian College of Physicians), Royal
Australasian College of Medical Administration (Royal Australasian College of Medical Administration), Australian College of Dermatologists (Australasian College of Dermatologists) and Mauri Ora Associates (Mauri Ora Associates). Whilst evaluations of these e-learning resources may have been completed, results are not publically and easily available.

There is almost no literature available on the use of e-learning for teaching a Hauora Māori curriculum. Pitama (2012) argues after surveying a number of indigenous health experts across multiple medical schools in New Zealand, Australia, Hawaii and Canada that the addition of e-learning resources to indigenous health programmes would be one way for course conveners and lecturers to cope with increasing competition for teaching time, which continues to be an issue in undergraduate medical programs.

2.7 Overview
It is clear from the literature that there is a lack of evidence based research on best practice for design, implementation and evaluation of e-learning in medical education. Cook et al. (2013) provide the best evidence for design considerations by highlighting range of difficulty, repetitive practice, distributed practice, cognitive interactivity, multiple learning strategies, individualized learning, mastery learning, feedback, longer time, and clinical variation. Potential issues of implementation should be considered at the outset of e-learning tool development and can be moderated by preparing key stakeholders for the addition of the resource to the curriculum. Evaluation of an e-learning resource should be a multi-pronged approach including formative assessment in the form of MCQ’s, learner feedback questionnaires and teaching staff review. Although recent research has indicated a demand exists in medical education for e-learning resources, there is still a gap in the literature in the area of indigenous health in medical education.

2.8 Thesis Aim and Objectives
Given the lack of research in the area of using e-learning to teach indigenous health, this thesis aims to evaluate the addition of a blended Hauora Māori e-learning module to a Hauora Māori vertical module and a Psychological Medicine block module to see if its inclusion improves undergraduate medical students’ ability to integrate Hauora Māori and clinical content.
Chapter 3: Methodology

3.1 Introduction
This chapter outlines the content and design of an e-learning module designed to integrate Hauora Māori and clinical content, and its application to a Kaupapa Māori Research (KMR) methodology. The rationale for the use of questionnaires and pre- and post-testing in the study design is outlined in this chapter, followed by a description of the sampling and questionnaire design. Procedures around data collection, management and analysis are also covered in this chapter. The research question for this study was aligned with the objectives of the Educating for Equity (E4E) research project which is a collaborative research project between New Zealand, Canada and Australia that is investigating the role of medical education in decreasing indigenous health disparities and chronic disease.

3.2 Development of Content for the E-Learning Resource
The E4E research team planned to develop online learning modules in Hauora Māori and chronic disease as one component of the E4E project. The module on Schizophrenia and its impact on Māori was developed due to high health disparities for Māori communities with this chronic condition. The content of this module was provided by the convenor of both the Hauora Māori and Psychological Medicine programs at the University of Otago, Christchurch School of Medicine (UOC). The Psychological Medicine content was integrated with Hauora Māori content by using the Hui process (Lacey, Huria, et al., 2011) and Meihana Model (Pitama et al., 2007) as a clinical framework. Teaching content was presented as a guided problem based learning exercise utilising a case study of a Māori patient diagnosed with schizophrenia, as part of the Psychological Medicine block module for UOC and University of Otago, Wellington (UOW) students, and the Hauora Māori vertical module for Rural Medical Immersion Program (RMIP) students.

3.3 Development of the Design and Presentation Style of the E-Learning Resource
The opportunity arose to evaluate one of these modules as a Masters project. The schizophrenia module was selected due to the willingness of the conveners of the Psychological Medicine programmes at UOC, UOW and RMIP to be involved in its
evaluation. The choice of design, format and presentation of this module was tasked to the researcher of this study. Teaching content was presented in the form of a ‘Prezi’ presentation and embedded into a webpage on the University of Otago’s Learning Management System (LMS) Moodle. The content included the use of text, images, tables, graphs, a video vignette of a Māori patient diagnosed with schizophrenia (sourced by the researcher from Faultline films in association with Māori Television) and video media relating to student experiences with Māori and schizophrenia. The Prezi presentation format was chosen due to its ability to allow users to repeat and master learning points throughout the module, increase cognitive interactivity, provide flexibility in navigation and for its visual appeal. These elements were identified in the literature review as being important to e-learning design considerations. Moodle as a web based platform was used to align with the University of Otago web based learning practices. The e-learning module was hosted securely on the University’s servers which required students to logon with a username and password in order to gain access. The blended learning module was supervised by an administrator in a computer lab over a two hour period. Ten minutes was allocated for the pre-test, post-test and evaluation questionnaire with the balance of the time available to complete the schizophrenia and Māori presentation. The average completion time of the schizophrenia and Māori presentation was sixty minutes.

3.4 Development of an Evaluation Method for the E-Learning Resource

A range of methods of evaluation was considered for this study including focus group interviews, tracking of student summative performance, tracking of e-learning tool usage statistics, one-off testing, objective structured clinical examination (OSCE) and use of self-assessment questionnaires. The literature review in Chapter Two explored evaluation methods for an e-learning tool. The main findings encouraged a multi-pronged approach to e-learning evaluation consisting of tracking of e-assessment activities, learner questionnaires, and a teaching staff review or questionnaire. This study utilised pre- and post-module multiple choice questionnaires (MCQs) to evaluate changes in students’ knowledge. Twenty Hauora Māori questions were developed and moderated by Hauora Māori teaching staff at UOC, and twenty schizophrenia questions were developed and
moderated by teaching staff from the University of Otago’s Wellington and Christchurch Psychological Medicine departments.

Learner questionnaires were utilised with two different student questionnaires, one which was completed immediately after the final module activity and the other in the final UOC Hauora Māori teaching session of the 2013 academic year. The questionnaire conducted in this last teaching session asked students to rate all aspects of the Hauora Māori course, of which the Schizophrenia and Māori e-learning resource was one. The aim of this questionnaire was to gauge the students’ overall impression of the e-learning tool in comparison to the other learning activities completed in the Hauora Māori curriculum. A teaching staff review of the e-learning resource was completed by both Hauora Māori and Psychological Medicine teaching staff.

The evaluation components selected for this study are outlined below.

- Student knowledge evaluation
- Students’ evaluation of the blended e-learning resource
- Hauora Māori course component comparison
- Teaching staff review

### 3.4 Evaluation Components

#### 3.4.1 Sample population

A total of 179 students were invited to participate in this study. They consisted of fifth year medical students from UOC, UOW and RMIP. The University of Otago medical programme is a six year full time programme divided into Early Learning in Medicine (ELM) consisting of years one to three, and Advanced Learning in Medicine (ALM) consisting of years four to six. Fifth year medical students were selected because of their increased exposure to and experience in clinical medicine. Fifth year medical students from the University of Otago, Dunedin School of Medicine (DSM) were not selected as the structure of the ALM teaching at the DSM meant that the psychological medicine block module (in which schizophrenia is taught) was completed by the students in the fourth year of medical studies. Additional demographic data on study participants was provided by the University of Otago’s E-vision (enrolment) department. This data was collected by the university at the time of student
enrolment and included age, gender, school of medicine enrolled in, home country, home region if a New Zealand address was provided, previous high school and ethnicity. There were a range of different ethnicity options available to study participants which are pre-defined by the University of Otago and its enrolment processes, from which the data was collected.

3.4.2 Student knowledge evaluation
UOC, UOW and RMIP conveners of Hauora Māori and Psychological Medicine agreed to have all fifth year medical students in their respective programmes complete this e-learning module as part of course requirements. The e-learning intervention took place at UOC and UOW. Each rotation of students was expected to complete each aspect of the module (pre-test, presentation on schizophrenia and Māori, post-test and evaluation questionnaire) as part of formative assessment requirements.

Convenors of the Hauora Māori and Psychological medicine programs of UOC and UOW combined resources to provide a database of multiple choice questions to be used for the purposes of pre- and post-testing of this module. The pre- and post-module tests consisted of ten randomised multiple choice questions taken from a pool of 40 questions (20 Hauora Māori and 20 clinical) and were completed before and after the Schizophrenia and Māori presentation. Questions were randomised using the Moodle question randomisation tool to prevent sharing of answers between students in close proximity to one another, thereby minimising contamination of results. Test data was stored securely on the University of Otago servers accessible only to those involved in development and administration of the e-learning module.

3.4.3 Students’ evaluation of the blended e-learning resource
Students were required to fill out an evaluation questionnaire immediately following the post-test part of the e-learning module. The evaluation consisted of 10 subjective questions using a five point Likert scale. The questionnaire covered three aspects; knowledge, integration and design-user experience. The knowledge questions (questions 1-3) related to perceived knowledge improvement, improved understanding of Hauora Māori concepts and an appropriate level of teaching content. The integration questions
(questions four to six) related to the resource’s ability to integrate the content of both Hauora Māori and psychological medicine, and whether the module complemented both the Hauora Māori and Psychological Medicine programmes individually. The design and user experience questions (questions seven to ten) related to navigation and student impression of design elements used in the module. These questionnaire components were identified as being important parts of a learner questionnaire in the literature review above.

**3.4.4 Hauora Māori course component comparison**

All fifth year medical students from UOC were invited to reflect on the perceived value of each Hauora Māori teaching session individually, allowing a comparison of the e-learning resource to existing methods of Hauora Māori teaching. The time between completing the e-learning resource and completing the course component comparison questionnaire varied for the students involved. Some were assigned to the Psychological Medicine block module in the first week of the academic year and completed the e-learning resource then, while others completed it at different stages throughout the year right up to those who had recently completed their Psychological Medicine block module in the weeks leading up to the final Hauora Māori teaching session. The questionnaire consisted of nine subjective questions using a five point Likert scale. The Hauora Māori curriculum was organised into eight teaching sessions, with the Schizophrenia and Māori e-learning module a new addition to the curriculum.

**3.4.5 Teaching staff review**

An invitation to complete the teaching staff review questionnaire for the schizophrenia and Māori e-learning module was extended to all those involved in teaching on the Hauora Māori at the Christchurch, Wellington and Dunedin Schools of Medicine, and Psychological Medicine programmes at the Christchurch and Wellington Schools of Medicine. This included 27 individuals. The questionnaire consisted of nine subjective questions using a five point Likert scale and two open text questions asking for feedback on what was enjoyed most and least with regard to the e-learning resource. The questionnaire covered three aspects; course difficulty, integration and critical thinking. The course difficulty questions (questions two to five) related to the level of teaching material and test
questions. The integration questions (questions one, six, eight and nine) related to the perceived ability to integrate the cultural and clinical content and also whether the reviewers felt that the module complemented the current teaching for both Hauora Māori and Psychological Medicine. Question seven was related to the resource’s ability to promote critical thinking. This questionnaire was designed at the early stage of this study, and subsequent categorisation into these three areas occurred after completion of literature review.

3.5 Data Analysis

The proposed method of analysis was developed in consultation with UOC biostatistician, Dr Jonathan Williman. Preliminary sample power calculations appear favourable. The assumption that a standard deviation of the difference in scores between the post-test and pre-test data would be 2 marks, a sample size of 170 people, would give 90% power at a significance level of 5% to detect an average increase in scoring of 0.5 mark. The pre- and post-testing data was analysed using paired and independent t-tests to evaluate the change in student knowledge. Sub analysis of student knowledge evaluation data was carried out on the following subgroups: age, gender, ethnicity, University of Otago School of Medicine, home country, home region and decile rating of previous high school attended. Data is presented in tables, graphs and box and whisker plots. The inner fences or whisker markers of the box and whisker plot represent 1.5 times the height of the box or the maximum data point; the upper and lower borders of the box represent the interquartile ranges, with the midline of the box indicating the median score, and the small circles the outliers.

3.6 Kaupapa Māori Research Methodology

This study Kaupapa Māori Research (KMR) methodology to provide a theoretical framework that ensured the validation of Māori beliefs, values and experiences. This was acknowledged by inclusion of concepts consistent with Te Ao Māori (a Māori world view), and deciding at the outset that the intention of this study was to support Māori health gains (Moewaka-Barnes, 2000; G. Smith, 2004; L. Smith, 2012). This section will outline a
brief history and key principles of KMR and then consider how this study utilises these principles.

Western scientific research methods have historically served the purposes of the dominant culture, and this same paradigm for research has been used as a means of promoting a particular agenda that further disadvantages indigenous and minority populations (Pihama, Cram, & Walker, 2002; L. Smith, 2012; S. Walker, Eketone, & Gibbs, 2006). Suppression of an indigenous voice in western scientific research has produced research that portrays an indigenous world view as inferior and void of scientific rigour (Moewaka-Barnes, 2000; S. Walker et al., 2006). In New Zealand this type of research has been used as a means of progressing political agendas, justifying actions such as confiscation of land, acquisition of precious resources and stealing of intellectual property rights (R. Bishop, 2011; Gibbs, 2001; L. Smith, 2012; R. Walker, 2004). Kaupapa Māori research methodology evolved out of dissatisfaction with western scientific methods by the Māori academic community, and the tendency to interpret research conducted on Māori through western eyes. The inability of western scientific methods to meet Māori needs provided an environment for Māori researchers to develop new ways of understanding Māori research (Keefe et al., 1999; L. Smith, 2012).

Kaupapa Māori research methodology does not have one all-encompassing definition, though essential elements of Kaupapa Māori research have been outlined by key authors and these are described below:

- **Tino Rangatiratanga** relates to self-determination and autonomy, the ability to be in control of culture, aspirations and the future.
- **Taonga Tuku Iho** refers to cultural aspiration and the importance and validation of the Māori language (Te Reo Māori), customs and protocols (Tikanga Māori) and education (Matauranga Māori).
- **Ako Māori** is the freedom to use culturally appropriate pedagogies, teaching and learning practices that are either traditional or preferred by Māori.
- **Kia piki ake i ngā raruraru o te kainga** relates to the awareness of socio-economic issues known to Māori, and the need to create ways of rising above these problems. It
calls for the Kaupapa Māori research to be a positive vehicle of change to Māori communities. It also acknowledges the relevance and success that Māori derived initiatives have as intervention systems for addressing socio-economic issues that currently exist.

• Whānau as it relates to Kaupapa Māori research refers to commonly accepted relationships within Māoridom, both interpersonal and those with the surrounding environment. Whakawhanaungatanga or the building or maintenance of relationships is a key element of Kaupapa Māori Research that unites the researcher with the research participants to produce research outcomes that are beneficial to Māori (G. Smith, 2004; L. Smith, 2012).

• The principle of Kaupapa relates to the vision and desires of Māori communities, with a view that any research topic or intervention should reflect the “kaupapa” of the community involved (G. Smith, 2004; L. Smith, 2012).

• Te Tiriti o Waitangi or the Treaty of Waitangi 1840 outlines the relationship and responsibilities of the Crown to Māori. This element of Kaupapa Māori research promotes an ability to critically analyse research relationships and continue to affirm the rights of Māori as they relate to the Treaty (Pihama, 2001).

• The principle of Ata was introduced to the Kaupapa Māori research framework by Pohatu in 2005 and is about relationships and establishing appropriate boundaries to ensure that research is conducted in a culturally safe manner (Pohatu, 2005).

The Kaupapa Māori Research framework is not prescriptive in nature but rather a research approach that validates a Māori world view by acknowledging elements that are important to Māori (Mahuika, 2008). Linda Tuhiwai Smith stated that “By asserting the validity of Māori knowledge, Māori people have regained greater control over the research being carried out in the Māori field” thus allowing the progression of an indigenous agenda through research (L. Smith, 2012, p. 177). She encourages a series of questions that researchers can ask of their research and themselves in a cross-cultural environment. These are listed below (L. Smith, 2012):

1. Who defined the research question?
2. For whom is this study worthy and relevant and who said so?
3. What knowledge will the community gain from this study?

4. What will the researcher gain?

5. What are some of the likely positive outcomes?

These questions are designed to protect participants and researchers from repeating mistakes of the past and to provide a beneficial outcome for all parties including Māori communities (L. Smith, 2012). The Kaupapa Māori Research framework is present in education (R. Bishop, Berryman, Cavanagh, & Teddy, 2009; Kana & Tamatea, 2006) and health literature (Cunningham, 2000; Kerr, Penney, Moewaka-Barnes, & McCleanor, 2010; Pitama et al., 2011).

According to Linda Tuhiwai Smith, within a university structure Kaupapa Māori Research can be applied two different ways. One way is by using research methods that involve and are put into practice by indigenous communities, and the other is by universities allocating space in the form of indigenous research centres and study programmes (Henry & Pene, 2001; L. Smith, 2012; S. Walker et al., 2006). An undergraduate medical programme with an indigenous curriculum that uses a Kaupapa Māori framework has an opportunity to validate a Māori point of view within an institution with predominantly western philosophies, and increase their ability to be more responsive to indigenous health (Pitama, 2012; L. Smith, 2012).

Linda Tuhiwai Smith observed that the curriculum of a university influences the way knowledge is reproduced within education and more broadly in society, making academics leaders in society in the field of knowledge (L. Smith, 2012). Increasing the contribution from intellectuals in the field of medical education using a Kaupapa Māori methodology may increase the weight of indigenous health in a medical curriculum (Pitama, 2012). Pitama noted that this methodology has the potential to shape the medical curriculum of an institution, thereby influencing future graduates’ perspective of indigenous health and benefiting Māori communities (Pitama, 2012).

The presence of an e-learning intervention utilising a Kaupapa Māori framework in a medical education setting is scarce. E-learning tools for teaching indigenous health are in
existence at both undergraduate (Rose & Devonshire, 2004) and postgraduate levels (Australasian College of Dermatologists; Mauri Ora Associates; Royal Australasian College of Medical Administration; Royal Australasian College of Physicians; Royal Australasian College of Surgeons), but no evaluation of such tools has been published to date. Evaluation of e-learning tools using a Kaupapa Māori methodology has taken place in the broader field of education (Tiakiwai & Tiakiwai, 2010), but is yet to be published in the field of medical education.

In relation to this study, experts in Hauora Māori and medical education were consulted to define this study’s research question. This study is relevant to those tasked with teaching Hauora Māori within medical schools and also medical school conveners who are required to include principles of Hauora Māori into clinical medicine teaching. The knowledge gained from this study will provide additional evidence for alternative methods of teaching cultural competence principles to clinicians and potentially provide a more culturally competent health workforce for Māori communities. The researcher of this study will gain additional insight into integrating cultural competency in Hauora Māori and clinical content into an e-learning environment, and the likely positive outcomes of this study are a more culturally competent medical workforce.

3.6 Ethics

This study followed University of Otago research protocols by consulting the UOC research office and gaining approval to proceed with the proposed research. Consent forms (appendix one) and information sheets (appendix two) were given to all participants prior to engaging in research activities, with contact details of the primary supervisor and principal investigator supplied if further questions arose from the participants. Information sheets were explained and an opportunity given to all participants to ask questions regarding the purpose of the research and intended use of the data. All student participants were required to complete the entire Schizophrenia and Māori e-learning resource as part of formative assessment requirements, though the opportunity to opt out of individual data being used in this study was extended to all student participants. Participants were informed that electronic data would be stored securely on the University
of Otago’s servers, and physical data would be locked in a filing cabinet for a period of 10 years at which time it would be destroyed.

This Masters of Health Science thesis is a component of a broader research project, Educating for equity: Exploring how health professional education can reduce disparities in chronic disease care and improve outcomes for indigenous populations project (E4E). The E4E project has ethics approval through the University of Auckland Human Participants ethics committee reference number: 2010 / 339. Ethical approval was also granted by the University of Otago Human Ethics Committee.
Chapter 4: Results

4.1 Introduction

This chapter presents the demographic characteristics of the participants, results of the student knowledge evaluation and student evaluation questionnaire, and curriculum comparison data. Feedback from teaching staff of both Psychological Medicine and Hauora Māori who reviewed the Schizophrenia and Māori e-learning module is also presented.

4.2 Student Knowledge Evaluation

This section presents student recruitment and response rates, participant characteristics, subgroups for further analysis and the results of the student knowledge evaluation. Change in student knowledge was measured by comparing pre- and post module test scores.

4.2.1 Participant characteristics

Recruitment and response

All University of Otago, Christchurch (UOC), Wellington (UOW) and Rural Medical Immersion Programme (RMIP) fifth year medical students completed the e-learning module (179 of 179), and 97.2% (174 of 179) of students consented to the use of their pre- and post-test data. An overview of the recruitment and response of students is presented in Figure 1. Consent to the use of both demographic data held by the University of Otago and student knowledge evaluation data for this study was given by 83.2% of students (149 of 179). The demographic details of these participants are presented in the following sections and a summary of the main characteristics is presented in Table 5.
**Age**

The distribution of student’s ages is presented in Figure 2. The age range was 21 - 46 years although most students were in their early twenties. For the purposes of this study, the participants were split into two subgroups for further analysis: 21-26 years and 27+ years (see Table 5). These subgroups reflect the alternate entry pathways to medical studies. Those in the 21-26 years of age subgroup generally entered medical school immediately or shortly after leaving high school, whereas those in the 27+ years of age subgroup would have entered medical school as mature students.
Figure 2: Age range of study participants

Gender
There were similar numbers of male and female participants (see Table 5).

Ethnicity
Participants were able to identify up to three different ethnicity groups on enrolment as previously discussed in the methods chapter. The majority of study participants identified as New Zealand European/Pākehā, with eight students identifying as New Zealand Māori and the rest of the student cohort identifying from a range of different ethnicities (see Table 1).

For the purposes of this study, participants were grouped into three ethnicity categories for further analysis: New Zealand Māori, New Zealand European/Pākehā and Other. New Zealand Māori were participants who identified as Māori in any one of the three ethnicity options. New Zealand European/Pākehā were participants who identified as New Zealand European in any one of the three ethnicity options, as long as Māori was not also identified. Other ethnicity were participants who did not identify as either New Zealand Māori or New Zealand European/Pākehā in any ethnicity option (see Table 5).
<table>
<thead>
<tr>
<th></th>
<th>Ethnicity 1</th>
<th>Ethnicity 2</th>
<th>Ethnicity 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand Māori</td>
<td>2</td>
<td>6</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>New Zealand European/Pākehā</td>
<td>98</td>
<td>2</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Other European</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Middle Eastern</td>
<td>5</td>
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<td>-</td>
<td>5</td>
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<td>Chinese</td>
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<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Other Asian</td>
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<td>-</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Other Southeast Asian</td>
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<td>-</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Niuean</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Indian</td>
<td>4</td>
<td>1</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>British/Irish</td>
<td>5</td>
<td>5</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Sri Lankan</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Japanese</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Korean</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Australian</td>
<td>1</td>
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<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Italian</td>
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<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Fijian</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Filipino</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Polish</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>149</td>
<td>21</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Table totals add to more than 149 as participants were able to select multiple ethnic groups

School of medicine

There were participants from three of the University of Otago Schools of Medicine being the Christchurch and Wellington Schools, and the Rural Medical Immersion program (RMIP). There were a similar number of participants from the Christchurch and Wellington Schools of Medicine with a minority of participants from the RMIP (see Table 5).

Home country

The majority of students listed New Zealand as their home country, with a small number of students listing various countries around the world as home. This is shown in Table 2 below. For the purposes of this study, the participants were divided into two subgroups for further analysis: Domestic and International. The Domestic subgroup were participants with a New Zealand regional area recorded as their home area. The International
subgroup were participants with an area outside of New Zealand recorded as their home area (see Table 5).

Table 2: Home country of study participants

<table>
<thead>
<tr>
<th>Home country</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
<td>128</td>
</tr>
<tr>
<td>Malaysia</td>
<td>9</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>3</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1</td>
</tr>
<tr>
<td>Australia</td>
<td>3</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>2</td>
</tr>
<tr>
<td>Singapore</td>
<td>1</td>
</tr>
<tr>
<td>Canada</td>
<td>1</td>
</tr>
<tr>
<td>Niue</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>149</td>
</tr>
</tbody>
</table>

**New Zealand provincial region**

For those students that identified New Zealand as their home country at the time of study enrolment, provincial region was also recorded. Christchurch and Auckland had the largest regional groups (see Table 3). For the purposes of this study, the participants were divided into two subgroups for further analysis: North Island and South Island. The North Island subgroup were participants with a home address located in the North Island of New Zealand at the time of enrolment, and the South Island subgroup were participants with a home address located in the South Island of New Zealand at the time of enrolment. The rationale for these subgroups is related to the number of Māori located in the North versus the South Islands of New Zealand. According to the 2006 New Zealand census, 87% of Māori lived in the North Island, with 13% living in the South Island (Statistics New Zealand, 2014). These subgroups are reported in Table 5.
<table>
<thead>
<tr>
<th>Region</th>
<th>% Total</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland (City)</td>
<td>13.3%</td>
<td>17</td>
</tr>
<tr>
<td>Auckland (North)</td>
<td>7.0%</td>
<td>9</td>
</tr>
<tr>
<td>Auckland (South)</td>
<td>2.3%</td>
<td>3</td>
</tr>
<tr>
<td>Bay of Plenty</td>
<td>0.8%</td>
<td>1</td>
</tr>
<tr>
<td>Canterbury (Mid)</td>
<td>0.8%</td>
<td>1</td>
</tr>
<tr>
<td>Canterbury (North)</td>
<td>0.8%</td>
<td>1</td>
</tr>
<tr>
<td>Central North Island</td>
<td>0.8%</td>
<td>1</td>
</tr>
<tr>
<td>Christchurch</td>
<td>20.3%</td>
<td>26</td>
</tr>
<tr>
<td>Coromandel</td>
<td>2.3%</td>
<td>3</td>
</tr>
<tr>
<td>Dunedin</td>
<td>4.7%</td>
<td>6</td>
</tr>
<tr>
<td>Gisborne</td>
<td>0.8%</td>
<td>1</td>
</tr>
<tr>
<td>Hamilton/Waikato</td>
<td>3.9%</td>
<td>5</td>
</tr>
<tr>
<td>Hastings</td>
<td>0.8%</td>
<td>1</td>
</tr>
<tr>
<td>Hutt (Upper &amp; Lower)</td>
<td>2.3%</td>
<td>3</td>
</tr>
<tr>
<td>Marlborough</td>
<td>0.8%</td>
<td>1</td>
</tr>
<tr>
<td>Napier</td>
<td>2.3%</td>
<td>3</td>
</tr>
<tr>
<td>Nelson (City)</td>
<td>3.9%</td>
<td>5</td>
</tr>
<tr>
<td>Nelson (Provincial)</td>
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<tr>
<td>New Plymouth</td>
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<td>1</td>
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<tr>
<td>Otago</td>
<td>2.3%</td>
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<tr>
<td>Palmerston North</td>
<td>3.9%</td>
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</tr>
<tr>
<td>Rotorua</td>
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<tr>
<td>Southland</td>
<td>3.9%</td>
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<tr>
<td>Tauranga</td>
<td>3.1%</td>
<td>4</td>
</tr>
<tr>
<td>Wanganui</td>
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<tr>
<td>Wellington (City)</td>
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</tr>
<tr>
<td>Wellington (Provincial)</td>
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</tr>
<tr>
<td>Westland</td>
<td>0.8%</td>
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</tr>
<tr>
<td>Whangarei</td>
<td>1.6%</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0%</strong></td>
<td><strong>128</strong></td>
</tr>
</tbody>
</table>
**School decile rating**

For students who reported a home area in New Zealand at the time of enrolment, previous high school data for this study was collected and matched to New Zealand High School decile data (as at 15 May 2014) (Education Counts, 2014). This data is in Table 4 below. Decile rating is a 10% grouping which indicates the socioeconomic spread of a school’s student population (Ministry of Education, 2014). This information is relevant to this study as Māori are overrepresented in lower socioeconomic communities (Ministry of Health, 2014b). The mean decile was 7.8, and for the purposes of this study, the participants were split into two subgroups for further analysis: New Zealand High school deciles 2-7 and 8-10. These subgroups are reported in Table 5.

<table>
<thead>
<tr>
<th>High School decile rating</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>9</td>
<td>24</td>
</tr>
<tr>
<td>10</td>
<td>36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>126</strong></td>
</tr>
</tbody>
</table>
Table 5: Participant subgroups for analysis

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-26</td>
<td>139</td>
<td>93%</td>
</tr>
<tr>
<td>27+</td>
<td>10</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>149</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>69</td>
<td>46%</td>
</tr>
<tr>
<td>Female</td>
<td>80</td>
<td>54%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>149</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand Māori</td>
<td>8</td>
<td>5%</td>
</tr>
<tr>
<td>New Zealand European/Pākehā</td>
<td>94</td>
<td>63%</td>
</tr>
<tr>
<td>Other</td>
<td>47</td>
<td>32%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>149</td>
<td>100%</td>
</tr>
<tr>
<td><strong>School of Medicine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UOC</td>
<td>67</td>
<td>45%</td>
</tr>
<tr>
<td>UOW</td>
<td>66</td>
<td>44%</td>
</tr>
<tr>
<td>RMIP</td>
<td>16</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>149</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Home country</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>128</td>
<td>87%</td>
</tr>
<tr>
<td>Foreign country</td>
<td>21</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>149</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Home region</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Island</td>
<td>78</td>
<td>60%</td>
</tr>
<tr>
<td>South Island</td>
<td>50</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>128</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Decile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-7</td>
<td>48</td>
<td>38%</td>
</tr>
<tr>
<td>8-10</td>
<td>78</td>
<td>62%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>126</td>
<td>100%</td>
</tr>
</tbody>
</table>

UOC = University of Otago, Christchurch School of Medicine
UOW = University of Otago, Wellington School of Medicine
RMIP = University of Otago, Rural Medical Immersion Program
4.2.2 Student knowledge evaluation results

Overall student scores on pre- and post-tests are represented in Figure 3 below. The mean score of all student participants increased from 60.5% in the pre-test MCQ, to 78.7% in the post-test. This difference was significant (t = -10.8, df=148, p<0.001).

Figure 3: Boxplot of overall pre- and post-test scores

Upper inner fence = Highest values that are not outliers or extreme values
Lower inner fence = Lowest values that are not outliers or extreme values
Outliers = Values that are between 1.5 and 3 times the interquartile range
Extreme values = Values that are more than 3 times the interquartile range
The majority of changes in individual student knowledge evaluation scores increased from pre to post-testing, with a minority number of participants showing a decrease (see Figure 4).

Figure 4: Distribution of change of scores from pre to post-test

The majority of study participants across all subgroups showed an increase of approximately 20% in mean student knowledge evaluation scores from pre to post-testing (see Table 6). This indicates there was a consistent increase in performance across all participant subgroups. Individual subgroup performance on the student knowledge evaluation is shown in Table 6 below.
### Table 6: Subgroups pre- and post-test performance

<table>
<thead>
<tr>
<th></th>
<th>Pre-test score mean (SD)</th>
<th>Post-test score mean (SD)</th>
<th>Mean change (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-26</td>
<td>61 (17.71)</td>
<td>79 (13.58)</td>
<td>18 (20.94)</td>
</tr>
<tr>
<td>27+</td>
<td>60 (18.33)</td>
<td>77 (11.64)</td>
<td>17 (17.87)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>61 (18.60)</td>
<td>78 (14.72)</td>
<td>16 (22.99)</td>
</tr>
<tr>
<td>Female</td>
<td>60 (16.95)</td>
<td>80 (12.23)</td>
<td>20 (18.48)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand Māori</td>
<td>58 (20.94)</td>
<td>77 (10.58)</td>
<td>19 (26.75)</td>
</tr>
<tr>
<td>New Zealand European/Pākehā</td>
<td>63 (16.82)</td>
<td>80 (12.81)</td>
<td>17 (19.88)</td>
</tr>
<tr>
<td>Other</td>
<td>57 (18.50)</td>
<td>77 (15.06)</td>
<td>21 (21.49)</td>
</tr>
<tr>
<td><strong>School of Medicine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UOC</td>
<td>63 (16.99)</td>
<td>81 (13.54)</td>
<td>18 (21.36)</td>
</tr>
<tr>
<td>UOW</td>
<td>56 (17.76)</td>
<td>77 (12.78)</td>
<td>21 (20.20)</td>
</tr>
<tr>
<td>RMIP</td>
<td>68 (15.95)</td>
<td>76 (14.53)</td>
<td>8 (17.29)</td>
</tr>
<tr>
<td><strong>Home Country</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>61 (18.06)</td>
<td>80 (12.59)</td>
<td>19 (20.52)</td>
</tr>
<tr>
<td>Foreign country</td>
<td>57 (14.93)</td>
<td>71 (16.19)</td>
<td>14 (21.97)</td>
</tr>
<tr>
<td><strong>Home Region</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Island</td>
<td>62 (18.19)</td>
<td>81 (13.11)</td>
<td>19 (21.25)</td>
</tr>
<tr>
<td>South Island</td>
<td>59 (17.83)</td>
<td>78 (11.56)</td>
<td>19 (19.72)</td>
</tr>
<tr>
<td><strong>Decile</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-7</td>
<td>60 (16.76)</td>
<td>82 (12.64)</td>
<td>21 (17.44)</td>
</tr>
<tr>
<td>8-10</td>
<td>62 (18.56)</td>
<td>79 (12.78)</td>
<td>17 (22.15)</td>
</tr>
</tbody>
</table>

**UOC** = University of Otago, Christchurch School of Medicine  
**UOW** = University of Otago, Wellington School of Medicine  
**RMIP** = University of Otago, Rural Medical Immersion Program  
**SD** = standard deviation  
**Mean change** = Post-test score mean – pre-test score mean
The difference between subgroup mean change was calculated by determining the difference between the mean change of the first subgroup and the mean change of the second subgroup. There were no significant differences across all subgroup comparisons (see Table 7).

Table 7: Test score comparisons between subgroups

<table>
<thead>
<tr>
<th></th>
<th>Difference between subgroup mean change</th>
<th>Confidence interval (95%CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-26 vs 27+</td>
<td>0.96</td>
<td>-12.47</td>
<td>14.40</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male vs Female</td>
<td>-3.64</td>
<td>-10.35</td>
<td>3.08</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NZ Euro vs NZ Māori</td>
<td>1.52</td>
<td>-13.41</td>
<td>16.45</td>
</tr>
<tr>
<td>NZ Euro vs Other</td>
<td>-3.58</td>
<td>-10.80</td>
<td>3.63</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UOC vs UOW</td>
<td>-3.16</td>
<td>-10.31</td>
<td>3.96</td>
</tr>
<tr>
<td>UOC vs RMIP</td>
<td>10.10</td>
<td>-1.35</td>
<td>21.54</td>
</tr>
<tr>
<td>Home Country</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand vs Foreign</td>
<td>4.50</td>
<td>-5.33</td>
<td>14.34</td>
</tr>
<tr>
<td>Home Region</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North vs South Island</td>
<td>0.13</td>
<td>-7.21</td>
<td>7.47</td>
</tr>
<tr>
<td>Decile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-7 vs 8-10</td>
<td>3.54</td>
<td>-3.90</td>
<td>10.98</td>
</tr>
</tbody>
</table>

NB: The difference between subgroup mean change was calculated by performing an independent-samples t-test
NZ Māori = New Zealand Māori
NZ Euro = New Zealand European/Pākehā
UOC = University of Otago, Christchurch School of Medicine
UOW = University of Otago, Wellington School of Medicine
RMIP = University of Otago, Rural Medical Immersion Program
Student knowledge evaluation scores for both Hauora Māori and Schizophrenia multiple choice questions increased individually from pre to post-testing. Overall changes in student knowledge evaluation scores for Hauora Māori and schizophrenia are represented in Figure 5 below. The mean pre module test score for the schizophrenia questions was 60% with a mean post module test score increasing to 76%. The mean pre module test score for the Hauora Māori questions was 54% with a mean post module test score increasing to 76%. There was no significant difference in mean change in scores between schizophrenia and Hauora Māori across all subgroups (see Table 8).

**Figure 5: Boxplot of percentage change in student knowledge evaluation scores for Hauora Māori and schizophrenia**

Upper inner fence = Highest values that are not outliers or extreme values  
Lower inner fence = Lowest values that are not outliers or extreme values  
Outliers = Values that are between 1.5 and 3 times the interquartile range  
Extreme values = Values that are more than 3 times the interquartile range
Table 8: Performance comparison between Schizophrenia and Hauora Māori content

<table>
<thead>
<tr>
<th></th>
<th>Mean change in knowledge score (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SCHIZOPHRENIA</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>16 (11 to 22)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>21-26</td>
<td>16 (10 to 22)</td>
</tr>
<tr>
<td>27+</td>
<td>21 (14 to 40)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>13 (4 to 22)</td>
</tr>
<tr>
<td>Female</td>
<td>19 (12 to 26)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>New Zealand Māori</td>
<td>23 (-24 to 71)</td>
</tr>
<tr>
<td>New Zealand European/Pākehā</td>
<td>14 (8 to 20)</td>
</tr>
<tr>
<td>Other</td>
<td>16 (8 to 24)</td>
</tr>
<tr>
<td><strong>School of Medicine</strong></td>
<td></td>
</tr>
<tr>
<td>UOC</td>
<td>16 (8 to 24)</td>
</tr>
<tr>
<td>UOW</td>
<td>19 (10 to 29)</td>
</tr>
<tr>
<td>RMIP</td>
<td>6 (-8 to 20)</td>
</tr>
<tr>
<td><strong>Home Country</strong></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>17 (11 to 23)</td>
</tr>
<tr>
<td>Foreign country</td>
<td>10 (-8 to 28)</td>
</tr>
<tr>
<td><strong>Home Region</strong></td>
<td></td>
</tr>
<tr>
<td>North Island</td>
<td>16 (8 to 24)</td>
</tr>
<tr>
<td>South Island</td>
<td>19 (10 to 29)</td>
</tr>
<tr>
<td><strong>Decile</strong></td>
<td></td>
</tr>
<tr>
<td>2-7</td>
<td>18 (8 to 28)</td>
</tr>
<tr>
<td>8-10</td>
<td>16 (7 to 24)</td>
</tr>
</tbody>
</table>

A summary of the performance on each individual multiple choice question is presented in Table 9: Comparison of performance of schizophrenia and Table 10: Comparison of performance of Hauora Māori below. There was varied performance on both Schizophrenia and Hauora Māori questions within their respective categories. This may reflect the difference in difficulty of some questions, and also highlight key areas where learning had improved in others. This identifies questions that performed worse in post-testing vs pre-testing in Schizophrenia and Hauora Māori. The facility index is calculated as the average score for any given question expressed as a percentage.
Table 9: Comparison of performance of schizophrenia multiple choice questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre-test facility index</th>
<th>Post-test facility index</th>
<th>Change in facility index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which of the following is least likely to be involved in the aetiology of schizophrenia</td>
<td>45.16%</td>
<td>86.21%</td>
<td>41.05%</td>
</tr>
<tr>
<td>The typical age of onset of schizophrenia is:</td>
<td>56.45%</td>
<td>92.98%</td>
<td>36.53%</td>
</tr>
<tr>
<td>Which of the following is least likely to be a reason to consider use of the mental health act for patients with schizophrenia:</td>
<td>37.04%</td>
<td>67.86%</td>
<td>30.82%</td>
</tr>
<tr>
<td>Which of the following psychosocial interventions is least likely to be helpful in the treatment of schizophrenia</td>
<td>16.67%</td>
<td>42.42%</td>
<td>25.75%</td>
</tr>
<tr>
<td>A person with schizophrenia TYPICALLY has:</td>
<td>69.09%</td>
<td>93.02%</td>
<td>23.93%</td>
</tr>
<tr>
<td>A person with schizophrenia TYPICALLY has:</td>
<td>52.54%</td>
<td>75.51%</td>
<td>22.97%</td>
</tr>
<tr>
<td>Which one of the following is true about schizophrenia:</td>
<td>73.21%</td>
<td>96.00%</td>
<td>22.79%</td>
</tr>
<tr>
<td>The following are DSM criteria for schizophrenia:</td>
<td>75.49%</td>
<td>96.43%</td>
<td>20.94%</td>
</tr>
<tr>
<td>Which of the following is least likely to be correct?</td>
<td>8.82%</td>
<td>25.71%</td>
<td>16.89%</td>
</tr>
<tr>
<td>Which of the following are true about schizophrenia:</td>
<td>80.77%</td>
<td>93.52%</td>
<td>12.75%</td>
</tr>
<tr>
<td>An increased risk of developing schizophrenia is NOT associated with:</td>
<td>60.53%</td>
<td>71.11%</td>
<td>10.58%</td>
</tr>
<tr>
<td>Negative symptoms of schizophrenia include all of the following EXCEPT:</td>
<td>82.86%</td>
<td>92.86%</td>
<td>10.00%</td>
</tr>
<tr>
<td>Which of the following is NOT an important principle in the treatment of schizophrenia?</td>
<td>87.10%</td>
<td>96.15%</td>
<td>9.05%</td>
</tr>
<tr>
<td>Positive features of schizophrenia include:</td>
<td>81.63%</td>
<td>84.21%</td>
<td>2.58%</td>
</tr>
<tr>
<td>A man presenting on examination is poorly kept talks very quietly, is expressionless and answers with very brief sentences. The most likely diagnosis other than schizophrenia include:</td>
<td>82.61%</td>
<td>84.09%</td>
<td>1.48%</td>
</tr>
<tr>
<td>With regard to the genetic basis of schizophrenia:</td>
<td>84.00%</td>
<td>85.45%</td>
<td>1.45%</td>
</tr>
<tr>
<td>Regarding auditory hallucinations which of the following statement/s are true regarding schizophrenia</td>
<td>87.76%</td>
<td>85.71%</td>
<td>-2.05%</td>
</tr>
<tr>
<td>Which of the following regarding the dopamine hypothesis is incorrect</td>
<td>80.00%</td>
<td>77.78%</td>
<td>-2.22%</td>
</tr>
<tr>
<td>Believing that other people can hear your thoughts is best described as:</td>
<td>96.97%</td>
<td>94.44%</td>
<td>-2.53%</td>
</tr>
<tr>
<td>Which of the following neurotransmitters is least likely to be involved in schizophrenia</td>
<td>87.50%</td>
<td>62.16%</td>
<td>-25.34%</td>
</tr>
</tbody>
</table>

See appendix three for entire question text
Table 10: Comparison of performance of Hauora Māori multiple choice questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre-test facility index</th>
<th>Post-test facility index</th>
<th>Change in facility index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which statement best describes the purpose of a karakia?*</td>
<td>32.56%</td>
<td>93.75%</td>
<td>61.19%</td>
</tr>
<tr>
<td>What is mate Māori?</td>
<td>21.88%</td>
<td>79.59%</td>
<td>57.71%</td>
</tr>
<tr>
<td>Which statement best describes a risk factor for schizophrenia in Māori that can be associated with colonisation?</td>
<td>32.00%</td>
<td>85.45%</td>
<td>53.45%</td>
</tr>
<tr>
<td>Which statement best describes what does matekite mean?</td>
<td>30.36%</td>
<td>83.33%</td>
<td>52.97%</td>
</tr>
<tr>
<td>Which of the following is least likely to contribute to higher readmission rates for Māori with schizophrenia compared to non-Māori?</td>
<td>15.38%</td>
<td>64.00%</td>
<td>48.62%</td>
</tr>
<tr>
<td>What does porangi mean?</td>
<td>45.28%</td>
<td>88.89%</td>
<td>43.61%</td>
</tr>
<tr>
<td>Which of the following is least likely to contribute to possible differences in the studies investigating the prevalence of schizophrenia among Māori:</td>
<td>53.85%</td>
<td>85.37%</td>
<td>31.52%</td>
</tr>
<tr>
<td>Which of the following is least likely to be important when beginning an assessment of a Māori patient with schizophrenia</td>
<td>57.50%</td>
<td>88.89%</td>
<td>31.39%</td>
</tr>
<tr>
<td>“medication is the answer – but [Māori] just don’t take their pills – if cannabis was prescribed, I’d bet they’d bloody take that.” This is best considered as an example of:</td>
<td>31.43%</td>
<td>59.38%</td>
<td>27.95%</td>
</tr>
<tr>
<td>Which of the following components is not part of the Iwi Katoa dimension of the Meihana model?</td>
<td>23.81%</td>
<td>50.86%</td>
<td>27.05%</td>
</tr>
<tr>
<td>Which of the following statements regarding the influence of Māori culture on expression of positive symptoms is most likely to be true:</td>
<td>66.67%</td>
<td>92.86%</td>
<td>26.19%</td>
</tr>
<tr>
<td>Which of the following statements regarding the significance of Māori beliefs values and experiences for Māori experiencing schizophrenia is least likely to be correct:</td>
<td>53.33%</td>
<td>69.70%</td>
<td>16.37%</td>
</tr>
<tr>
<td>Which of the following is least likely to be appropriate to discuss with the patient’s whānau in a clinical interview?</td>
<td>89.58%</td>
<td>97.62%</td>
<td>8.04%</td>
</tr>
<tr>
<td>Which of the following would you not normally ask about during the mihimihi stage with a Māori patient with schizophrenia</td>
<td>94.34%</td>
<td>94.44%</td>
<td>0.10%</td>
</tr>
<tr>
<td>Which of the following questions might best help you explore the wairua dimension of schizophrenia in a clinical interview?</td>
<td>37.04%</td>
<td>35.48%</td>
<td>-1.56%</td>
</tr>
<tr>
<td>What is makutu?</td>
<td>70.69%</td>
<td>65.45%</td>
<td>-5.24%</td>
</tr>
<tr>
<td>Which of the following options would be less likely to engage the patient?</td>
<td>72.58%</td>
<td>67.21%</td>
<td>-5.37%</td>
</tr>
<tr>
<td>Which of the following options related to community health services and Māori is not correct?</td>
<td>100.00%</td>
<td>93.33%</td>
<td>-6.67%</td>
</tr>
<tr>
<td>Which of the following is least likely to be appropriate when attempting whakawhanunatanga with a Māori patient with schizophrenia</td>
<td>86.05%</td>
<td>73.81%</td>
<td>-12.24%</td>
</tr>
<tr>
<td>Which of the following is least likely to be important when working with the Māori whānau of someone with schizophrenia</td>
<td>72.22%</td>
<td>57.58%</td>
<td>-14.64%</td>
</tr>
</tbody>
</table>

*See appendix three for entire question text
4.3 Students’ Evaluation of the Blended E-Learning Resource

As is outlined in the student knowledge evaluation section above, the same participant cohort from the Christchurch and Wellington Schools of Medicine, and RMIP were invited to complete the post module student evaluation questionnaire immediately following the post-test part of the Schizophrenia and Māori e-learning module. While 97.2% of study participants (173 of 178) consented to the use of their student evaluation questionnaire data in this study, only 91.6% of participants (163 of 178) responded to the post module student evaluation questionnaire. Tracking data of the participants who consented to data use, but did not complete the questionnaire, were unable to be obtained from the study database. The student evaluation questionnaire was made anonymous, preventing further subgroup analysis of questionnaire data.

The majority of student participants indicated that knowledge had improved generally, and specifically in Hauora Māori, and also that content difficulty of the module seemed to be at the right level (see Table 11).

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes, definitely</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>No, not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overall knowledge improvement</td>
<td>36%</td>
<td>47%</td>
<td>10%</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>2. Improved understanding of Hui process and Meihana model</td>
<td>27%</td>
<td>48%</td>
<td>17%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>3. Content level appropriate</td>
<td>40%</td>
<td>45%</td>
<td>9%</td>
<td>5%</td>
<td>1%</td>
</tr>
</tbody>
</table>

The group of questions related to integration of clinical and cultural content was also rated highly by the majority of student participants who reported that the module complemented both Hauora Māori and Psychological Medicine teaching (see Table 12).
Table 12: Student evaluation questionnaire: Integration scores

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes, definitely</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>No, not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Module Integrated Hauora Māori and Psychological medicine well</td>
<td>46%</td>
<td>41%</td>
<td>9%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>5. Module complemented Hauora Māori course</td>
<td>54%</td>
<td>37%</td>
<td>6%</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>6. Module complemented Psychological medicine course</td>
<td>31%</td>
<td>44%</td>
<td>20%</td>
<td>2%</td>
<td>3%</td>
</tr>
</tbody>
</table>

The design and user experience group of questions yielded a much broader range of feedback. (see Table 13). Overall the students rated the e-learning resource experience highly.

Table 13: Student evaluation questionnaire: User experience scores

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes, definitely</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>No, not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Video media assisted understanding</td>
<td>40%</td>
<td>30%</td>
<td>18%</td>
<td>9%</td>
<td>2%</td>
</tr>
<tr>
<td>8. Presentation medium increased interactivity</td>
<td>26%</td>
<td>27%</td>
<td>24%</td>
<td>13%</td>
<td>10%</td>
</tr>
<tr>
<td>9. Student experience video assisted understanding</td>
<td>16%</td>
<td>33%</td>
<td>25%</td>
<td>20%</td>
<td>6%</td>
</tr>
<tr>
<td>10. Navigation with relative ease</td>
<td>42%</td>
<td>33%</td>
<td>18%</td>
<td>6%</td>
<td>1%</td>
</tr>
</tbody>
</table>

When calculated as a total score, student evaluation questionnaire results appear to follow a normal distribution, with the majority of students rating the e-learning module highly. There appears to be 8.6% (14/163) of the total group of students who completed the questionnaire with a total score of 30 or above (see Figure 6). This minority group represents students who consistently scored the e-learning experience low, indicating that all aspects of the module for this small group held little or no value. No additional details are available to identify further characteristics of this group.
4.4 Hauora Māori Course Component Comparison

The Hauora Māori course component comparison was conducted on the 18th and 19th of September, and was completed only by students from UOC. These two dates coincided with the final Hauora Māori teaching sessions for the 2013 academic year, and the final time all fifth year UOC students would be together to conduct a survey. The purpose of the final Hauora Māori teaching session, amongst other things, is to get feedback from the departing students regarding their experiences and impressions of the Hauora Māori course as a whole, and its individual teaching components.

There was an 86% response rate (67 of 78) to the curriculum comparison questionnaire. Two UOC students, who originally had not consented to the use of pre- and post-test data, and student evaluation questionnaire data, completed the curriculum comparison and consented to its use. Ten students had not completed the curriculum comparison as they had not yet had an opportunity to access and complete the Schizophrenia and Māori e-learning resource at the time the curriculum comparison was conducted.
This group of study participants is a sample from the student cohort in the sections above, but as the comparison questionnaire was anonymised, no descriptive demographic data of the students was able to be used for further analysis. The curriculum comparison questionnaire was anonymous so no further subgroup analysis was able to be performed on this Hauora Māori course component comparison data.

Overall the e-learning resource rated highly. In comparison to other components of the Hauora Māori course, the Schizophrenia and Māori e-learning resource ranked similarly to teaching components that emphasised contextual theory and application of practical frameworks (components one, two and four). The resource rated higher than the Hauora Māori long case assessment (component seven), and lower than teaching components that allowed students to engage in practical application of Hauora Māori learning and frameworks (components three, five and six).

Table 12: Hauora Māori course component comparison results

<table>
<thead>
<tr>
<th>Hauora Māori learning module</th>
<th>Extremely valuable</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Not valuable at all</th>
<th>No response</th>
<th>Mean response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Using an Indigenous Health Framework - lecture</td>
<td>28%</td>
<td>55%</td>
<td>10%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>1.94</td>
</tr>
<tr>
<td>and workshops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Te Reo Māori (Māori language) - lecture</td>
<td>22%</td>
<td>52%</td>
<td>21%</td>
<td>3%</td>
<td>2%</td>
<td>0%</td>
<td>2.09</td>
</tr>
<tr>
<td>and workshops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Simulated Māori adolescent patient(s) session</td>
<td>52%</td>
<td>39%</td>
<td>6%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>1.60</td>
</tr>
<tr>
<td>4. Tutorial and group exercises using and</td>
<td>27%</td>
<td>52%</td>
<td>13%</td>
<td>6%</td>
<td>2%</td>
<td>0%</td>
<td>2.03</td>
</tr>
<tr>
<td>indigenous health framework</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Māori Health Day: Student led public day</td>
<td>46%</td>
<td>40%</td>
<td>5%</td>
<td>6%</td>
<td>2%</td>
<td>2%</td>
<td>1.74</td>
</tr>
<tr>
<td>clinic available to Māori community</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Summative assessment: Hauora Māori OSCE</td>
<td>34%</td>
<td>42%</td>
<td>16%</td>
<td>3%</td>
<td>5%</td>
<td>0%</td>
<td>2.01</td>
</tr>
<tr>
<td>7. Assessment: Hauora Māori case presentations</td>
<td>9%</td>
<td>42%</td>
<td>36%</td>
<td>10%</td>
<td>3%</td>
<td>0%</td>
<td>2.57</td>
</tr>
<tr>
<td>(HMCP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Poroporoaki: Final face to face debrief</td>
<td>24%</td>
<td>46%</td>
<td>19%</td>
<td>9%</td>
<td>2%</td>
<td>0%</td>
<td>2.18</td>
</tr>
<tr>
<td>session</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Schizophrenia and Māori e-learning module</td>
<td>21%</td>
<td>43%</td>
<td>25%</td>
<td>5%</td>
<td>6%</td>
<td>0%</td>
<td>2.31</td>
</tr>
</tbody>
</table>

When calculated as a total score, Hauora Māori course component comparison results appear to follow a normal distribution, with the majority of students rating the Hauora Māori course components highly. There appeared to be a minority of 4% (3/67) of the total group of students with a total score of 30 or above (see Figure 7). This minority group
represents students who consistently scored the Hauora Māori course components low, indicating that all aspects of the Hauora Māori course for this small group held little or no value.

Figure 7: Distribution of overall Hauora Māori course component comparison responses

4.5 Teaching Staff Review

The response rate of the teaching staff review questionnaire was 63%, with 17 of the 27 reviewers completing the questionnaire. Of those who completed the questionnaire 47% were Hauora Māori teaching experts (8 of 17) and 53% were Psychological Medicine teaching experts (9 of 17). All of those who completed the questionnaire consented to the use of their data for this study. Of the questionnaires received, 76% (13 of 17) were incomplete. This was due to the multidisciplinary pool of reviewers, with very few having expertise in both Hauora Māori and Psychological medicine. Participants were encouraged to answer only questions they felt reflected their area of expertise.

For the purposes of this study, the participants will be split into two subgroups for further analysis: Hauora Māori and Psychological Medicine staff. The results for these two
subgroups are reported in Tables 13-15 below. No additional demographic data was gathered for this group of participants.

Overall the e-learning resource was rated highly by Psychological Medicine and Hauora Māori teaching staff reviewers. Specifically, the e-learning resource’s ability to integrate clinical and cultural content was rated highly by the majority of Psychological Medicine and Hauora Māori reviewers (see Table 13).

Table 13: Psychological Medicine and Hauora Māori teaching staff review feedback on integration

<table>
<thead>
<tr>
<th>Question</th>
<th>PM (9)</th>
<th>PM (8)</th>
<th>HM (9)</th>
<th>HM (8)</th>
<th>No, not at all</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. E-learning can effectively integrate Hauora Māori and Clinical content</td>
<td>Yes, definitely</td>
<td>56%</td>
<td>22%</td>
<td>22%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The module achieves the goal of integrating Hauora Māori and clinical content</td>
<td>PM (9)</td>
<td>44%</td>
<td>44%</td>
<td>11%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>HM (7)</td>
<td>38%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>8. The module complements current Hauora Māori curriculum</td>
<td>PM (5)</td>
<td>12%</td>
<td>22%</td>
<td>22%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>HM (8)</td>
<td>75%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>9. The module complements current Psychological medicine curriculum</td>
<td>PM (7)</td>
<td>33%</td>
<td>33%</td>
<td>12%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>HM (7)</td>
<td>75%</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

PM = Psychological Medicine teaching staff responses (number of respondents)
HM = Hauora Māori teaching staff responses (number of respondents)

The majority of Psychological Medicine and Hauora Māori reviewers rated the difficulty level of the e-learning resource at an appropriate level, and a broad range of feedback was reported when asked about Hauora Māori test question levels (see Table 14).
Table 14: Psychological Medicine and Hauora Māori teaching staff review feedback on course difficulty

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes, definitely</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>No, not at all</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The schizophrenia test questions are an appropriate level</td>
<td>PM (8)</td>
<td>0%</td>
<td>56%</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>HM (8)</td>
<td>50%</td>
<td>38%</td>
<td>12%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>3. The Hauora Māori test questions are an appropriate level</td>
<td>PM (7)</td>
<td>11%</td>
<td>44%</td>
<td>22%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>HM (8)</td>
<td>63%</td>
<td>12%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>4. The schizophrenia teaching material is an appropriate level</td>
<td>PM (9)</td>
<td>11%</td>
<td>89%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>HM (8)</td>
<td>63%</td>
<td>25%</td>
<td>12%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>5. The Hauora Māori teaching material is an appropriate level</td>
<td>PM (8)</td>
<td>22%</td>
<td>67%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>HM (7)</td>
<td>50%</td>
<td>25%</td>
<td>12%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

PM = Psychological Medicine teaching staff responses (number of respondents)
HM = Hauora Māori teaching staff responses (number of respondents)

Overall the e-learning resource’s ability to promote critical thinking was rated highly by the majority of Psychological Medicine teaching staff, and all Hauora Māori respondents. There was a mixed response from Psychological Medicine reviewers as a substantial number rated the e-learning resource’s promotion of critical thinking as mid to low range.

Table 15: Psychological Medicine and Hauora Māori teaching staff review responses the critical thinking question

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes, definitely</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>No, not at all</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. The module engages students to promote critical thinking</td>
<td>PM (9)</td>
<td>33%</td>
<td>33%</td>
<td>22%</td>
<td>11%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>HM (8)</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

PM = Psychological Medicine teaching staff responses (number of respondents)
HM = Hauora Māori teaching staff responses (number of respondents)
4.5.1 Qualitative feedback

The following quotations are a selection of feedback from teaching staff reviewers regarding things they enjoyed about the e-learning resource and things they feel could be improved. A sample of comments is listed below (HM and PM have been used to highlight comments from Hauora Māori and Psychological Medicine teaching staff respectively):

**Design comments:**

“I would have enjoyed a voice over alongside key points to walk me through the learning”  
(HM)

“I thought the overall visual impact of the tutorial was impressive but I didn't think the moving around/zooming in and out gave me a structure that I could retain or use to aid learning”  
(PM)

“The jumping around of prezi can be a bit much, but I could see how it made the meihana model more interactive”  
(HM)

“The use of media supports this module well”  
(HM)

“Easy pathway to learning”  
(HM)

**Evaluation comments:**

“The pre/post-test could be improved to require more application of the critical thought promoted through the module”  
(PM)

**Teaching content comments:**

“Given the detail provided in the module and the way it can be practically tested could just alert students. The point is to understand and critique key concepts rather rote learn all the detail”  
(HM)

“Some of the statements re: mental health and maori need to be referenced for supporting literature”  
(PM)
“Provide a clinical role model (video clip of how to apply hui process especially whakawhanaungatanga in a clinical setting). video clips could be longer” (HM)

“Really enjoyed the hauora maori components, as these were least familiar to me” (PM)

“I believe this is one of the best psychological medicine teaching resources that I have seen. It is certainly consistent with the material that I teach - recovery from a service user perspective. I find the centrality and regard for the service user perspective through the module particularly impressive. One of the things that I find difficult is that other aspects of the program are so far removed (or even incompatible) that students have difficulty integrating it all. Hence I advocate for a more fundamental and extensive re-orientation across all our teaching, learning materials, attachments, supervision and assessment” (PM)

“Liked the wairua & poroporoaki section. Liked clips of whanau discussing whanau support. Liked the clinical information and integration of maori patients. Overall an excellent e-learning tool and a great way to integrate hauora maori into psychological medicine, we would definitely use it” (PM)

4.6 Summary of Key Results

4.6.1 Student Knowledge Evaluation
Student knowledge evaluation scores increased on average by around 20% with no significant differences between subgroups. Increases in students’ knowledge of both Hauora Māori and Schizophrenia were shown. Hauora Māori knowledge scores increased 6% more than schizophrenia knowledge scores, but this was not statistically significant.

4.6.2 Students’ evaluation of the blended e-learning resource
Overall the students rated the e-learning experience highly. The majority of students reported that their knowledge had improved, and that the Hauora Māori and schizophrenia teaching content was well integrated. The design aspects of the resource had a varied response.
4.6.3 Hauora Māori course component comparison
The e-learning resource rated highly amongst the UOC students who were able to complete it. The mean rating for the blended e-learning resource for this cohort of students was 2.31 on 5 point Likert scale. This was within the range of the other components of the Hauora Māori curriculum (1.60-2.57). A minority group of students consistently scored the Hauora Māori course components low.

4.6.4 Teaching staff review
The majority of Hauora Māori and Psychological Medicine reviewers rated course difficulty and integration highly. The resource’s ability to promote critical thinking was rated highly by Hauora Māori reviewers but had a mixed response by Psychological Medicine reviewers. Overall the resource was rated highly by Hauora Māori and Psychological Medicine teaching staff reviewers.
Chapter 5: Discussion

5.1 Introduction

The focus of this chapter is to discuss the findings of this study and their context in the current landscape of medical education literature. This study evaluated an e-learning resource designed to integrate indigenous health and clinical content for fifth year medical students, specifically on the subject of schizophrenia and its impact on Māori. This chapter will discuss the main findings of this study and their relevance to indigenous health and medical education.

5.2 Integration of Indigenous and Clinical Content in an E-Learning Environment

There is an abundance of literature in the field of e-learning and also much published regarding indigenous health in medical education. However, a gap in the literature exists in integrating the two bodies of content, particularly when e-learning is used as a teaching method in undergraduate medical education. This study represents the first time a blended e-learning resource integrating indigenous health and clinical content has been evaluated in the undergraduate medical education literature.

The integrated approach to teaching content used in the Schizophrenia and Māori e-learning resource utilised the Hui process (Lacey, Huria, et al., 2011) and Meihana Model (Lacey, Huria, et al., 2011; Pitama et al., 2007) as a practical framework to apply to the clinical condition of schizophrenia (outlined in Chapter Three). This approach is consistent with current Hauora Māori curriculum delivery described in Chapter One, where teaching and assessment of Hauora Māori practical frameworks are taught and assessed in the context of a clinical condition. The results of this study showed that teaching staff and students agreed that the Schizophrenia and Māori e-learning resource achieved the goal of integrating the two bodies of teaching content.

As there is a lack of literature in the field of e-learning and indigenous health within medical education, the findings of this study will be compared and contrasted to similar resources and studies within the broader medical education field. Other e-learning
resources may exist, but their restricted access places them outside the scope of this study.

At undergraduate level other integrated teaching methods combining clinical and indigenous health, as discussed in Chapter One, include lectures and tutorials taught alongside clinical attachments where teaching material is applied to clinical practice; Manaaki mai (support me) teaching sessions involving a simulated interview with a Māori patient; and student led mini clinics for members of indigenous communities. The literature is sparse in this area of indigenous health teaching methods, although Pitama (2012) found that exposure to positive role modelling via clinical interactions with an indigenous patient, through video media during lectures or self-directed activities, enhanced learning. This was confirmed by students in the same study who indicated that they felt the videos helped “demonstrate the implementation of the indigenous health framework within a clinical interview” (Pitama, 2012, p. 178). Pitama’s finding indicates that this type of video media would make a good addition to an e-learning resource integrating clinical and indigenous health content.

Despite the lack of known resources at the undergraduate level, a number of indigenous health e-learning resources are in existence internationally within continuing medical education (CME). In New Zealand, it appears that Mauri Ora Associates is the only organisation to have developed a publically accessible e-learning resource in cultural competency and healthcare for health professionals that engages with Māori communities. These resources have been developed for all health professionals across a broad range of disciplines, not specifically for use in medical education, and there does not appear to be any published evaluation of indigenous health e-learning. Furthermore, the emphasis for CME e-learning resources is on cultural competency, rather than integrated clinical and cultural learning. The design aspects of CME e-learning are discussed in section 5.4 of this chapter.
5.3 The Value of an Integrated E-Learning Module in a Medical Curriculum

At the design and development stage, it was agreed by the developer, and conveners of both the Hauora Māori and Psychological Medicine courses, that the Schizophrenia and Māori e-learning resource would run out of the Psychological Medicine block module teaching time rather than the Hauora Māori vertical module. Hauora Māori teaching takes place at different times throughout the academic year, meaning that only the small group of students who were on the Psychological Medicine block module rotation would be learning Schizophrenia in its native block module, and in the context of other Psychological Medicine conditions. It was made clear to the student participants in the consent form (appendix one) and information sheet (appendix two) that the Schizophrenia and Māori e-learning resource was a collaborative teaching initiative by the two teaching departments. The findings of this study indicated that the majority of both student participants and teaching staff reviewers rated highly the e-learning resource’s ability to complement the Hauora Māori and Psychological medicine courses, and student participants rated the e-learning resource equal to other contextual theory and practical frameworks teaching sessions in the Hauora Māori curriculum.

These findings indicate that the students approved of the inclusion of the e-learning resource in the Hauora Māori curriculum, and enjoyed engaging in e-learning as a teaching method for learning indigenous health and schizophrenia. The positive response from the study participants is consistent with the findings of Cook et al.’s (2012) systematic review and meta-analysis of e-learning in medical education. Cook et al. (2012) found that the use of e-learning technology in patient simulation training was associated with higher outcomes than other teaching methods, which supports the findings of this study, indicating high value in adding a simulated e-learning resource to an existing medical curriculum. Further research is required to provide additional evidence on supporting the addition of a blended e-learning resource that integrates clinical and cultural content to a medical curriculum.
5.3.1 Self-directed learning and teaching time in a medical curriculum

Having the Schizophrenia and Māori e-learning resource run out of the clinical block module instead of the Vertical Hauora Māori module had added value for both Hauora Māori and Psychological Medicine departments. The Department of Psychological Medicine in Christchurch replaced its entire traditional schizophrenia lecture with the Schizophrenia and Māori e-learning resource, and conveners of both the Hauora Māori and Psychological Medicine programmes agreed to make completion of the e-learning resource part of formative assessment requirements. This formally made it part of both curricula despite the resource being run in Psychological Medicine block teaching time. This was done to signal to the students buy in of both departments. This structure also allowed scheduled face to face Psychological Medicine teaching time to be freed up for other areas, and redirected the schizophrenia content to self-directed learning time in the Psychological Medicine curriculum. From a Hauora Māori perspective, having the e-learning resource run in Psychological Medicine’s clinical block module meant that additional Hauora Māori teaching was occurring outside of allocated Hauora Māori teaching time. The findings of this study confirm that the Schizophrenia and Māori e-learning resource complemented both programmes and was well placed in the Hauora Māori curriculum.

In a 2009 survey of conveners and facilitators of indigenous health programmes within five medical schools, from Aotearoa/New Zealand, the United States, Canada, and Australia, four of the five medical schools perceived the limited teaching time dedicated to teaching indigenous health in a medical curriculum as inadequate to meet the requirement for graduate learning outcomes (Pitama, 2012). Inclusion of integrated clinical and indigenous health e-learning modules that run in clinical block module time may provide a mutually beneficial solution to a common challenge of finding additional teaching time in an already time limited medical curriculum. Clinical conditions that highlight an overrepresentation of indigenous peoples may be the best starting point for developers interested in developing such resources. Participants of the Pitama study suggested developing distance learning initiatives, such as e-learning resources, to meet changing teaching and institutional needs around content delivery to students in rural placement or distant areas (Pitama, 2012).
5.3.2 Ability of an e-learning resource to promote critical thinking

One objective of the Schizophrenia and Māori e-learning resource was to stimulate critical thinking in learners. This was done by combining elements of clinical content (schizophrenia) and guided problem based learning (Māori schizophrenic patient), and framing these two elements in a Hauora Māori framework for clinical engagement (Hui process and Meihana Model). This allowed students to be reminded of key engagement concepts taught in the Hauora Māori course, see and hear the experiences of a Māori schizophrenic patient, and synthesise in their minds which specific questions could appropriately be asked of the patient if they were required to conduct a clinical interview. Students were able to progress to each point of learning at their own pace, evaluating each piece of content in the context of the Māori schizophrenic patient. The results of this study showed the majority of both Hauora Māori and Psychological Medicine teaching staff rated highly the e-learning resource’s ability to promote critical thinking. This finding is consistent with Kamin et al’s (2003) study which found that students who were presented with a problem based learning exercise involving a patient case study showed enhanced levels of critical thinking in an e-learning environment, when compared to those receiving the same case study in a lecture format (Kamin et al., 2003). Further research is required on the design elements needed to enhance critical learning in an e-learning environment, and teaching staff input is recommended early in the development stages to ensure staff expectations of critical learning are reflected in the e-learning resource.

5.4 Design Considerations for an Integrated E-Learning Resource

The Schizophrenia and Māori e-learning resource evaluated in this study used a number of design elements identified as current best practice in the literature review in Chapter Two. Interactive multimedia was one such element. A ‘Prezi’ presentation was chosen as the tool to display the teaching content in the Schizophrenia and Māori e-learning resource due to its perceived ability by the developer to portray teaching content and multimedia in an interactive manner. Although the majority of students highly rated the use of ‘Prezi’ as the presentation medium and its ability to increase interactivity, a substantial number of respondents varied from a midrange to low rating. This study’s presentation style differs from existing publically accessible indigenous health e-learning resources offered at the CME level by a number of organisations, which use a range of presentation methods to
present teaching material, such as audio podcasts (Australian and New Zealand College of Anaethetists), video presentations/case studies (Australasian College of Emergency Medicine; College of Intensive Care Medicine (CICM); Mauri Ora Associates) and slide presentations (Royal Australasian College of Physicians; Royal Australasian College of Physicians; Royal Australasian College of Physicians).

In a similar study of a clinical e-learning resource teaching leukaemia, Morgulis et al. (2012) used Adobe captivate v 5.5 software to display teaching content. The authors selected Adobe Captivate for its “balance of design options and ease of use” and the ability to have the e-learning resource be compatible with any web browser (Morgulis, Kumar, Lindeman, & Velan, 2012, p. 2). The ‘Prezi’ presentation tool has similar flexibility and allows the developer to use all, or a combination of the above, to package teaching content into one resource. During the piloting phase of the Schizophrenia and Māori resource, prior to the collection of data for this study, feedback from reviewers indicated that the panning and zooming effect utilised in the pilot resource could have a dizzying effect on the user; as a result, in this study, panning and zooming were minimised to reduce the dizzying effect for participants. Modifications have since been made to the resource to further address this issue, and anecdotal feedback from stakeholders is positive.

Interactive multimedia, cognitive interactivity, repetitive practice, multiple learning strategies, individual learning and clinical variation were other key design elements identified in the literature review above. Multimedia in the form of a video of a Māori patient diagnosed with schizophrenia, and a video of a positive student clinical experience with a different Māori schizophrenic patient, were used in this study’s e-learning resource to help address one of the recommended design elements above. Learners were able to repeat video clips as often as required, have video introduced in a sequence that built on previous material, engage with principles of both case based and problem based learning, progress through learning material at their own pace and were exposed to two different Māori schizophrenic patient scenarios. The results of this study showed that the majority of student participants indicated that the case study videos of the Māori schizophrenic patient assisted understanding of teaching material. Only 49% of participants rated the
student clinical experience video’s ability to assist understanding highly, with the remainder rating the video’s ability as mid-range or low. This use of multimedia is consistent with Govindasamy’s (2001) recommendations of using multimedia tools that match learning objectives, and also follows Bradley and Boyle’s (2004) advice of excluding multimedia that only provides aesthetic value.

The use of video media in CME indigenous health tools has varied from practitioner experiences with indigenous communities (Australasian College of Emergency Medicine; College of Intensive Care Medicine (CICM)) to entire video presentations with navigation characters highlighting teaching content (Mauri Ora Associates). The lack of use of video media in the form of a patient case or patient experiences within indigenous health e-learning tools likely reflects the focus generally on patient communication and cultural competency, rather than an integration of clinical and cultural content. Utilising video by way of role modelling a clinical interview scenario, with an indigenous patient presenting with a clinical condition, may be an effective tool to use in future e-learning resources integrating clinical and indigenous health content. This view is supported by one teaching staff reviewer’s comments, who mentioned that a video clip of a clinical role model might effectively demonstrate application of the Hauora Māori frameworks for clinical interaction taught in the Hauora Māori curriculum. Further research is needed into development of best practice guidelines regarding the use of video media in e-learning resources.

The choice was made by the developer of this Schizophrenia and Māori e-learning resource to allow a semi-structured method for navigation through the teaching material. This involved having a predetermined sequence of events that could be progressed through from beginning to end using the forward and backward buttons, with the added ability to easily return or progress to a certain learning point using a timeline bar that revealed a mini screenshot of the section of the presentation for easy identification. This approach helped provide a structure to learn the teaching material, while also providing freedom for learners to navigate to areas of content that needed revision. Ease of navigation was identified in the literature review above as one of the key elements to get right at the piloting phase to ensure implementation of the e-learning resource was
smooth (Chan & Robbins, 2006; Cook & Dupras, 2004a). This mode of navigation was rated highly by the majority of student participants of this study. Further research is required into the key principles of navigation in e-learning resources.

Distributed practice as a design element, allowing learners to access the resource over a period of time, was not utilised in this study. This design element is utilised in all CME indigenous health e-learning resources mentioned above as well as the clinical e-learning modules on leukaemia (two week open access period) (Morgulis et al., 2012) and haemorrhoids (24 hour open access period) (Bhatti et al., 2011) which were evaluated using undergraduate medical students. The decision to allow learners to complete this Schizophrenia and Māori e-learning resource in one supervised two hour period, as mentioned in the methodology section above, was made to avoid contamination of the testing results. Currently and in the future, the Schizophrenia and Māori blended learning module will be available to students over a period of weeks in keeping with current practices and principles of distributed practice. Design elements of mastery learning and ongoing feedback throughout the e-learning resource are elements that should be considered in future updates of the Schizophrenia and Māori blended learning module.

5.4.1 Level appropriateness of the resource

The level of teaching content for the Schizophrenia and Māori e-learning module was determined by liaising with conveners and teaching staff of both the Hauora Māori and the Psychological Medicine departments as outlined in the methodology section of this study. This was done to ensure that McKenzie and Parker’s (2011) recommendations outlined in Chapter Two were followed, to have teaching methods and assessment activities aligned to learning objectives for both Hauora Māori and Psychological Medicine courses. The results of this study showed that the majority of student participants, and Hauora Māori and Psychological Medicine teaching staff reviewers, rated the Schizophrenia and Māori e-learning resource at an appropriate teaching and assessment level. A few of the indigenous health resources mentioned previously (Australasian College of Emergency Medicine; College of Intensive Care Medicine (CICM); Mauri Ora Associates) have published clearly defined learning objectives for learners to understand the purpose of the correlating resource. As no evaluation of these tools has been published to date,
adherence of the teaching material to learning objectives is unable to be determined in each case.

5.5 Implementation Considerations for an Integrated E-Learning Resource

The inclusion of conveners of both the Hauora Māori and Psychological Medicine programmes at the early design phase of the Schizophrenia and Māori e-learning module’s development made implementation of the resource into existing curricula a seamless process with little resistance from all the parties involved. This experience differs from the common barriers to implementation that Cook and Dupras found in 2004. This perhaps reflects the shift in attitude towards e-learning within medical education over the ten years since Cook and Dupree’s (2004) study.

5.6 Evaluation/Assessment Considerations for an Integrated E-Learning Resource

5.6.1 Knowledge uptake evaluation

A multiple choice questionnaire was used as a method for knowledge evaluation in response to the findings of the literature review in Chapter Two above. The results of the student knowledge evaluation showed test scores improved by approximately 20% from pre to post-testing. This result corresponded well with the results of the students’ evaluation of the blended e-learning module, which found that the majority of student participants reported feeling that their overall knowledge and understanding of Hauora Māori teaching models had improved after completion of the Schizophrenia and Māori e-learning resource. These two results compare well to a study of similar sample size by Bhatti et al. (2011), which also used a multiple choice questionnaire (as well as extended matching questions (EMQ)) and feedback questionnaire (using a seven point Likert scale) as an evaluation method (Bhatti et al., 2011). Bhatti et al. compared didactic teaching to an e-learning intervention specifically on the clinical condition of haemorrhoids (clinical content only), and reported a 15% increase in knowledge from pre to post-testing in the e-learning group.
An evaluation of performance of the multiple choice questions (MCQ) used in the Student Knowledge assessment was also reported in the results chapter above. This showed varied performance across both Hauora Māori and schizophrenia questions, indicating a difference in the range of difficulty of questions. Future updates of this e-learning resource might benefit from a review of the current pool of MCQs, to ensure Govindasamy’s (2001) recommendations for designing MCQs (Govindasamy, 2001) are followed, whilst still allowing for varied MCQ difficulty.

5.6.2 Consistent increase in performance across all subgroups

The results of the student knowledge evaluation in this study showed relative consistency in increasing test scores from pre to post across the majority of subgroups analysed. The findings of this study suggest that this integrated approach is an effective way of improving the knowledge of indigenous health and clinical content across diverse demographic groups.

5.7 Incidental Study Findings

5.7.1 Group of students who scored low across Hauora Māori

An incidental finding in the results of this study showed a group of students who consistently scored all aspects of the Hauora Māori course low in the Hauora Māori course component comparison. No identifying information was recorded in this study cohort. Future research may help clarify reasons for this minority group indicating that for them, the Hauora Māori course held little or no value.

5.8 Study Limitations

One key limitation to this study is the specificity of the e-learning resource, being on Schizophrenia and Māori. The results of this study cannot be generalised across all areas of e-learning within medical education without the addition of other studies of a similar nature. Another limitation of this study was the absence of a control group in its design with which to compare results. This also limits the generalisability of the findings and future studies should look to include a control group in its design where possible.
The short term (up to one year) nature of this study’s evaluation is a limitation as results cannot be generalised to determine if this e-learning resource achieves the intermediate and longer term goals of building a health workforce with indigenous cultural competencies and reducing health inequality for indigenous peoples.

Other limiting factors included technical difficulties and a reported dizzying effect of the presentation medium experienced by some students and teaching staff reviewers. This may have influenced the student’s ability to learn, and the teaching staff’s ability to review the e-learning resource effectively. Also the time limit of two hours allocated to completing the e-learning resource, without an opportunity to consolidate and review teaching content at a later time may have limited the learning of some students.

The response rate of 63% by Psychological Medicine and Hauora Māori teaching staff reviewers and exclusion of University of Otago, Dunedin School of Medicine Psychological Medicine teaching staff from having the opportunity to complete the teaching staff review limited the generalisability of the findings of this study’s teaching staff review.

5.9 Study Strengths

This study provides original research in a developing area of medical education. The design quality of this study presents a number of strengths and are best measured against the Medical Education Research Study Quality Instrument (MERSQI) criteria (Reed et al., 2008). This study used three non-randomised groups in its study design, sampling was done across two different schools of medicine, and a rural placement programme with a response rate greater than 75% (in the case of student participants). The study data collected included both participant assessment and objective review data. Also appropriate descriptive analysis and outcomes that measured perception and knowledge add to the level of quality of this study according to the MERSQI criteria.

This study represents the first time an e-learning resource that integrates clinical and indigenous health content has been evaluated in an undergraduate medical curriculum, providing a valuable template for other future developers of similar resources.
Furthermore, the design of this study identified a way to free up face to face teaching time by shifting appropriate clinical content into self-directed learning time, and allowing face to face teaching to focus on other key course objectives.

The evaluation method of this study included student participants and teaching staff reviewers and showed positive increases in knowledge and feedback from both groups. The feedback questionnaires for both students and teaching staff focused on content and engagement with teaching material, rather than an over-reliance on technical aspects of the e-learning resource. This evaluation method may also serve as a template for future studies.
Chapter 6: Conclusion and Recommendations

6.1 Conclusion

The findings of this chapter suggest that an e-learning resource integrating indigenous health and clinical content could provide an innovative and useful means of adding teaching value to an indigenous health and clinical curriculum. Currently, there is very little literature on e-learning and indigenous health, or on e-learning resources that integrate clinical and cultural content using a practical framework in postgraduate or undergraduate medical education. This study helps to fill a gap in the indigenous health medical education literature and can also serve as a template for those who are considering adding such an e-learning resource to their teaching programmes.

This study has shown that integrated clinical and cultural teaching in an e-learning environment can be achieved successfully, and is equally as effective across a number of demographic groups. The findings also show that the benefits of this approach are not just for indigenous health teaching, but also clinical block programmes. This same integrated teaching approach can be applied in postgraduate education, and also more broadly in clinical health science programmes outside of medicine.

The blended e-learning approach used in this study has been shown to be effective in improving knowledge and critical thinking in both clinical and cultural content, and in integrating both bodies of teaching content. The Schizophrenia and Māori e-learning resource evaluated in this study was rated highly by both students and teaching staff, and offers an encouraging precedent for those considering adding such a resource to their teaching programme. The resistance to implementation of e-learning resources that was once evident in the medical education literature may no longer be an issue using this integrated learning approach. Blended learning appears to complement existing indigenous health teaching methods, specifically in areas focusing on contextual theory and practical frameworks. Further, this e-learning resource appears to complement traditional teaching methods in indigenous medical education, and may serve as an effective tool for preparing students for real-life clinical interaction with indigenous patients.
A few small modifications to the design, implementation and evaluation of this Schizophrenia and Māori e-learning resource are likely to improve the already positive feedback in future evaluations. Future research should be directed at identifying design elements that may enhance critical learning and navigation, and on increasing the volume of literature on e-learning and indigenous health.

It appears from the findings of this study that the benefits of including an integrated e-learning resource in an indigenous and clinical curriculum in undergraduate medical education outweigh any costs that may be incurred by the development of such a resource. A final significant advantage of integrated e-learning resources is that they can serve as an effective means of delivering cultural competency training to practitioners, helping to decrease the burden of health inequality in indigenous populations.

6.2 Recommendations

• That cultural competency e-learning resources integrate clinical content with cultural frameworks to increase clinical relevance

• That a blended e-learning resource in undergraduate medical education, designed to integrate clinical and cultural content, exist as part of a clinical block module, and indigenous health course formative assessment

• That a blended e-learning resource in undergraduate medical education, designed to integrate clinical and cultural content, be placed as self-directed learning in clinical block teaching time

• That developers of an e-learning resource integrating clinical and cultural content consult with key stakeholders from both clinical and cultural teaching programmes early in the design and development stage, ensuring learning objectives of both teaching programmes are reflected in the end product of the resource, that implementation is supported, and teaching level is appropriate

• That an e-learning resource include positive role modelling videos that demonstrate implementation of the principles taught within a clinical interview
• That an e-learning resource integrating clinical content and indigenous health should use clinical conditions overrepresented in indigenous populations to increase clinical relevance

• That the design of an e-learning resource should use a presentation option that enhances interactivity, while maintaining flexibility and ease of navigation

• That the design of an e-learning resource should consider as many of the following elements as possible: range of difficulty, repetitive practice, distributed practice, Interactive multimedia, cognitive interactivity, multiple learning strategies, individualised learning, mastery learning, teaching staff feedback, clinical variation, and ensuring teaching material adheres to learning objectives

• That the design of multiple choice questions should carefully consider all aspects of Bloom’s Taxonomy of Education Objectives, being: knowledge, comprehension, application, analysis, synthesis and evaluation

• That where possible, researchers track students beyond the e-learning intervention to determine ongoing application of learning
References


Medical Council of New Zealand. (2014). *Statement on cultural competence: Medical Council of New Zealand*.


Pitama, S. (2012). “As natural as learning pathology” The design, implementation and impact of indigenous health curricula within medical schools. (Doctor of Philosophy PhD), University of Otago, Christchurch.


Tiakiwai, S., & Tiakiwai, H. (2010). A Literature Review focused on Virtual Learning Environments (VLEs) and e-Learning in the Context of Te Reo Māori and Kaupapa Māori Education. Wellington: Ministry of Education.


Appendices

Appendix One: Participant consent form

The Integration Of Clinical And Hauora Maori Content: An e-learning case study

Consent Form

I have read and I understand the associated information sheet and understand what it is about. All my questions have been answered to my satisfaction.

I understand that:

1. My participation in the research project is entirely voluntary.
2. I have had time to consider whether to take part.
3. I am free to withdraw from the project at any time without any disadvantage.
4. I may decline to answer any particular question(s).
5. I understand that my participation in this study is confidential and that no material that could identify me will be used in any reports on this study.
6. I know who to contact if I have any questions about the study.
7. I agree to the investigators accessing my demographic data held by the university.
8. I wish to receive a copy of the results. YES/NO

I __________________ (full name) hereby consent to take part in this study.

Date: __________________ Signature: __________________

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Appendix Two: Participant Information Sheet

The Integration Of Clinical And Hauora Maori Content: An e-learning case study

INFORMATION SHEET

11th February 2013

Tena koe,

The purpose of this study is to evaluate the feasibility of an online module that integrates content from both Psychological medicine and Hauora Maori curricula. This research is part of a broader research project named ‘Educating for Equity’ (E4E) which is an international research project looking at reducing disparity in chronic disease care and improving outcomes for Indigenous populations. It will also form the data for a Masters of Health Science thesis.

This is a collaborative effort between the E4E project team and Psychological medicine at the University of Otago. The E4E project team and Psychological medicine are very grateful for your participation in this project.

This project has received ethics approval from the University of Auckland Human Participants Ethics committee (ref: 2010/039).

What will the study involve?

The study will involve completing a schizophrenia and Hauora Maori e-learning module consisting of an interactive presentation of content, pre and post assessments (multiple choice questions), and an evaluation within a two hour time allocation.

Demographic data held by the university (such as age, gender and ethnicity) may be used to identify groups of students with differing performance in the module.

What will happen to the information collected?

All of the data will be analysed and secured online by the research team. The study data will be retained for 10 years, after which time they will be destroyed using usual University protocols.

All information will be confidential and unidentifiable in future publication. The data and their findings will be used in a write up for a Masters of Health Science thesis.
Why take part?
As a University we are seeking to ensure that the training we give our medical students is responsive to Māori patients and their whanau. Your participation will also assist us with further development of online resources.

You are required to undertake the e-learning module as part of your course. However, your participation in the research component of this e-learning case study is entirely voluntary (your choice). You do not have to take part in this research. If you do agree to take part, you are free to withdraw from the process at any time, without having to give a reason, and this will in no way affect you or your position as a student. Please feel free to contact us directly if you have any questions about this study (see details below).

What happens next?
Once the data has been collated and analysed, as previously mentioned, it will form the basis of a Masters of Health Science thesis.

You are welcome to ring or email us directly in regards to this study.

This study has been approved by the University of Otago Human Ethics Committee. If you have any questions or concerns about your rights as a participant in this research study you can contact an independent health and disability advocate. This is a free service provided under the Health and Disability Commissioner Act. Telephone (NZ wide): 0800 555050, Free Fax (NZ wide): 0800 2787 7578 (0800 2 SUPPORT). Email (NZ wide): advocacy@hdc.org.nz.

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Appendix Three: Multiple Choice Test Questions

Hauora Māori pre- and post-test multiple choice questions

Which of the following questions might best help you explore the wairua dimension of schizophrenia in a clinical interview?

- Can you tell me your religion?
- What are your spiritual beliefs?
- Do you go to your marae often?
- Is there a place you like to go that helps you feel relaxed/at peace?
- What do you feel may be a trigger to your current relapse?

When taking a history from a Māori patient, they comment that their whānau perceived that they are porangi. What does porangi mean?

- Curse.
- Has breached tapu.
- Frustrated.
- Sick/fatigued.
- Mentally unwell.

The whānau of the Māori patient you are working with comment that they think his behaviour is a result of mate Māori. What is mate Māori?

- Cursed.
- Has breached tapu.
- Frustrated.
- Sick/fatigued.
- Mentally unwell.

The whānau of the Māori patient you are working with comment that they think his behaviour is a result of makutu. What is makutu?

- Cursed.
- Has breached tapu.
- Frustrated.
- Sick/fatigued.
- Mentally unwell.

A Māori patient and/or their whānau may request that the clinical interview commences with a karakia. Which statement best describes the purpose of a karakia?

- Simply a religious prayer.
- To emphasise the continuity of the physical and spiritual worlds.
- To acknowledge God.
- To acknowledge the patient/whānau spiritual beliefs.
- To acknowledge spiritual intervention as a component to healing.
The Māori patient tells you that they do not believe they are having hallucinations, they instead describe to you a ‘gift’ they feel they have been given by their ancestors. The gift is called ‘matakite’. Which statement best describes what does matakite mean

- They see faces/visions.
- They hear specific narratives.
- They feel when their ancestors are close.
- They provide support for their whānau.
- They have a role to lead karakia.

The consultant asks you to take an in-depth history of a Māori patient with schizophrenia. Which of the following options would be less likely to engage the patient?

- Identify where the patient comes from and discuss this with them.
- Introduce yourself, your role and what you are there for.
- Use whakawhanaungatanga.
- Explore the patients understanding of their presenting complaint.
- Ensure that you pronounce the patient’s name correctly.

You find out there are Māori health providers in the community who offer mental health support services. Which of the following options related to community health services and Māori is not correct?

- It is important for community health services and primary health organisations to have good ethnicity data in order to identify who are their Māori patients and ascertain their needs.
- Māori health providers are available in some centres to provide health promotion, prevention or primary care services.
- Cost is no longer a barrier to accessing treatment and care in primary care services for Māori.
- Cultural competency is now an expected part of the on-going competency for medical practitioners in New Zealand.
- Within a primary care setting, the principals of the Treaty of Waitangi provide a useful framework for primary care to contribute to Māori health outcomes.

Which of the following is least likely to be appropriate to discuss with the patient’s whānau in a clinical interview?

- The impact of the patient’s illness on the whānau.
- Experience of the whānau with other people with schizophrenia.
- How the whānau is managing the schizophrenia within the home environment.
- Whether the whānau has any specific tikanga requirements (during treatment/clinical interview).
- That Māori are genetically predisposed to this illness.

Which statement best describes a risk factor for schizophrenia in Māori that can be associated with colonisation?

- Poverty.
- Alcohol/Drug use.
- Single parent families.
- Trauma.
- Other co-morbidities.
Which of the following components are **not** part of the Iwi Katoa dimension of the Meihana model?

- The effect that the duration of untreated psychosis had on the patient and their functioning.
- The factors that have contributed to the delay in diagnosis.
- The Kaupapa Māori mental health services available.
- The Māori targeted resources for the patient and whānau to access.
- The current epidemiological profile of Māori and schizophrenia.
- The clinical practice guidelines.

Which of the following would you not normally ask about during the mihimihi stage with a Māori patient with schizophrenia?

- Name.
- Age.
- Ethnicity.
- Adherence with medication.
- Occupation.

Which of the following is least likely to be important when beginning an assessment of a Māori patient with schizophrenia?

- Correct pronunciation of patient’s Ingoa.
- Awareness of patient use of Te reo.
- Providing an opportunity for karakia.
- Seeing the patient alone to ensure confidentiality.
- Involving a Māori mental health worker.

Which of the following is least likely to be appropriate when attempting whakawhanungatanga with a Māori patient with schizophrenia?

- Involving a Māori health worker.
- Asking where the patient lives and discussing your familiarity with that area.
- Asking the relationship status of the patient and stating your relationship status.
- Discussion of your experiences growing up that are similar to the patient.
- Discussion of your and the patient’s familiarity with psychiatric assessments.

Which of the following is **least likely** to be important when working with the Māori whānau of someone with schizophrenia?

- Whānau use of rongoa.
- Collateral history from the whānau.
- Whānau experiences with schizophrenia.
- Whānau experiences with other mental illness.
- Whānau beliefs about medication.
Which of the following statements regarding the influence of Māori culture on expression of positive symptoms is most likely to be true:

- If the content of a delusion involves Te Ao Māori themes it is unlikely to be a symptom of psychosis.
- Considering Ngā Ai Tai can assist in understanding the significance of possible psychotic symptoms involving Te Ao Māori themes.
- If the content of delusion involves it is highly likely to be a symptom of psychosis.
- Hallucinations of ancestors who have passed are not consistent with schizophrenia.
- The content of psychotic symptoms is determined by the type of schizophrenia.

Which of the following is least likely to contribute to possible differences in the studies investigating the prevalence of schizophrenia among Māori:

- limitations in reliability of diagnosis.
- inconsistent recording of ethnicity.
- access to health care access.
- responsivity from mental health services.
- genetic differences.

“medication is the answer – but [Māori] just don’t take their pills – if cannabis was prescribed, I’d bet they’d bloody take that.” This is best considered as an example of:

- Generalisation.
- Systemic racism.
- Internalised racism.
- Interpersonal racism.
- Institutionalised racism.

Which of the following statements regarding the significance of Māori beliefs values and experiences for Māori experiencing schizophrenia is least likely to be correct:

- Māori are diverse and not all concepts will be held by all Māori.
- Māori concepts of illness have the same (if not greater) validity as Western concepts (such as schizophrenia) for the person and whānau experiencing the illness.
- Clinicians attempting to distinguish between schizophrenia and mate Māori is a critical skill.
- A simple distinction is often not possible even for experienced psychiatrists and skilled Māori tohunga-kaumatua.
- A comprehensive approach to understanding and addressing the distress for the patient and whānau which is inclusive of all avenues for assistance without prejudicing one over others is required.

Which of the following is least likely to contribute to higher readmission rates for Māori with schizophrenia compared to non- Māori?

- Māori first admissions may be more acute and lead to a more chronic course.
- Māori first admissions may have a longer duration of untreated psychosis and lead to a more chronic course.
- Māori have higher rates of non-compliance with medication.
- After discharge, Māori may return to environments in the community that are not conducive to recovery.
- Current treatment methods are inappropriate for Māori.
Which of the following is least likely to be correct?

- There is a higher risk of developing schizophrenia in relatives of people with schizophrenia.
- The rate of concordance of schizophrenia in monozygotic twins is approximately 40%.
- The rate of concordance of schizophrenia in dizygotic twins is approximately 10%.
- Adoption studies show that children of schizophrenic mothers are more likely to develop schizophrenia.
- Māori have greater genetic risk of schizophrenia.
- Māori are biologically predetermined to mental illness – especially psychosis.

**Schizophrenia pre- and post-test questions**

Positive features of schizophrenia include:

- Anhedonia.
- Avolition.
- Thought disorder.
- Visual hallucination.
- Delusions of reference.

A person with schizophrenia TYPICALLY has:

- Passive aggressive personality.
- Illusions.
- Delusions.
- Cataplexy.
- All of the above associations.

Negative symptoms of schizophrenia include all of the following EXCEPT:

- Poverty of thought.
- Blunted affect.
- Auditory hallucinations.
- Social; withdrawal.
- Poverty of speech.

A 55-year-old man is brought to A&E. The police are concerned for his welfare. On examination he is poorly kempt with dirty fingernails, soiled clothing and he talks very quietly. He is expressionless and answers with one word answers or very brief sentences. The most likely diagnosis other than schizophrenia include:

- Major Depression.
- Delirium.
- Parkinson’s disease.
- Schizoid personality disorder.
- Hypothyroidism.

An increased risk of developing schizophrenia is NOT associated with:

- the mother experiencing obstetric complications.
- The mother experiencing influenza during pregnancy.
- The mother being obese during pregnancy.
- The mother experiencing malnutrition during pregnancy.
- The mother experiencing rubella during pregnancy.
Believing that other people can hear your thoughts is best described as:

- passivity phenomenon.
- thought broadcasting.
- auditory hallucinations.
- ideas of reference.
- religious delusions.

Which of the following is least likely to be a reason to consider use of the mental health act for patients with schizophrenia:

- Suicidal thinking.
- Refusal to accept treatment.
- Severe self-neglect.
- Aggression and hostility towards family associated with psychotic symptoms.
- Damage to property associated with psychotic symptoms.

Which of the following is least likely to be involved in the aetiology of schizophrenia

- Environmental factors.
- Neurodevelopmental pathways.
- Anatomical differences in the brain.
- Neurotransmitter abnormalities.
- HPA axis abnormalities.

Which of the following neurotransmitters is least likely to be involved in schizophrenia

- Dopamine.
- Serotonin.
- Noradrenaline.
- Glutamate.
- Oxytocin.

Which of the following regarding the dopamine hypothesis is incorrect

- All antipsychotic medications work via effects on dopamine.
- Dopamine agonists can provoke psychotic symptoms.
- Antipsychotics are dopamine antagonists.
- Dopamine is a key neurotransmitter in limbic pathways.
- L-dopa can cause hallucinations.

A person with schizophrenia TYPICALLY has:

- A sociopathic personality.
- Depersonalisation.
- Auditory hallucinations.
- Gender dysphoria.
- All of the above associations.
Which of the following is NOT an important principle in the treatment of schizophrenia?

- Therapeutic skepticism.
- Assertive community treatment.
- Psychosocial interventions.
- Pharmacological interventions.
- Risk Management.

Which of the following psychosocial interventions is least likely to be helpful in the treatment of schizophrenia?

- Psychoeducation.
- Cognitive behavioural therapy.
- Insight orientated psychodynamic therapy.
- Social skills training.
- Cognitive remediation.

The following are DSM criteria for schizophrenia:

- Loosening of association (disorganised speech).
- Obsessional ruminations.
- Affective flattening.
- Violent outbursts.
- Compulsive behaviour.

The typical age of onset of schizophrenia is:

- 15-25 years.
- 25-55 years.
- 35-55 years.
- 45-60 years.
- >60 years.

Which one of the following is true about schizophrenia:

- Is more common in women.
- Is mainly a disorder of Western culture.
- Has a peak age at onset of 30-35 years.
- Is linked to increased rates of suicide.
- Is mainly caused by stress.

Which of the following are true about schizophrenia:

- The most common age of onset is between 25-35.
- It is more common in men.
- It is more common in the lower socioeconomic group.
- It is caused by a dopamine deficiency in the brain.
- Medication non adherence is associated with relapse.
With regard to the genetic basis of schizophrenia:

- a person with a “schizophrenia gene” will always develop schizophrenia.
- the concordance rate for schizophrenia is lower for monozygotic than dizygotic twins.
- adoption studies indicate children of mothers with schizophrenia do not have an increased risk of developing schizophrenia.
- only one gene has been associated with schizophrenia.
- genes impart a susceptibility to develop schizophrenia.

A 35-year-old man has complained of experiencing auditory hallucinations and his family report that he has become more socially withdrawn. The following statement/s are true regarding schizophrenia:

- The risk of suicide in this man is approximately the same as that for the general population.
- There is benefit from social rehabilitation therapies.
- Early use of antipsychotic medication worsens the prognosis.
- He should be sectioned under the Mental Health Act and treated.
- Because of the Privacy Act, you should not consult with his family.