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Māori Health Workforce Development Unit

WEAVING OUR WORLDS

MĀORI LEARNER OUTCOMES FROM AN EQUITY-FOCUSED & STRENGTHS-BASED PROGRAMME IN HEALTH SCIENCES

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AKO AOTEAROA NATIONAL CENTRE FOR TERTIARY TEACHING EXCELLENCE

UNIVERSITY of OTAGO Te Whare Wānanga o Otāgo NEW ZEALAND

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1. BACKGROUND

1.1 INTRODUCTION

The goal of having a graduate profile that mirrors New Zealand society is a central policy of the University of Otago's Division of Health Sciences.[1] This goal aligns with government policy priorities to increase the number of qualified Māori health professionals and to improve educational outcomes for Māori.[2]

In 2010 the Division of Health Sciences established the Māori Health Workforce Development Unit (MHWDU) in partnership with the Ministry of Health. The MHWDU aims to provide strategic leadership and deliver effective programmes for Māori students studying health sciences at Otago. The MHWDU's ultimate goal is to support Māori learners' academic success, to support retention of Māori learners in tertiary education and to increase the number of Māori gaining entry into 'difficult to enter'[3] health professional undergraduate degree study at Otago.

In 2011, a year after it was established, the MHWDU designed and implemented a new programme, Te Whakapuāwai. The aim was to increase Māori student achievement in the challenging Health Sciences First Year (HSFY) course and to address the low numbers of Māori entering into 'restricted' entry degree programmes of dentistry, medicine, physiotherapy, pharmacy, medical laboratory science, oral health, dental technology and radiation therapy at Otago.

Internal analyses of Māori student data showed educational outcomes from Te Whakapuāwai between 2011 and 2013 were positive with more Māori students progressing into and through high-level degree qualifications in health, health science and other degrees when compared with previous years. An increase in the number of Māori students entering into undergraduate health professional and other health science degree programmes was also observed.

However, despite the additional benefits the programme provided, outcomes were not equitably distributed among Māori HSFY students. Findings highlighted comparatively poorer academic outcomes for students from lower socio-economic backgrounds and/or lower decile schools.[4]

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[1] P. Crampton, N. Weaver, and A. Howard, "Holding a Mirror to Society? The Sociodemographic Characteristics of the University of Otago's Health Professional Students," *New Zealand Medical Journal* 125, no. 1361 (2012).

[2] Ministry of Health, *He Korowai Oranga* (Wellington, 2002). Ministry of Education, "Tertiary Education Strategy 2010-2015", Ministry of Education, (2012).

[3] Places in the University of Otago's health professional programmes (dentistry, medicine, physiotherapy, pharmacy and medical laboratory science) are limited, restricted to students that meet a minimum grade point entry alongside a number of other criteria specific to each programme to be considered for admission.

[4] School decile "…indicates the extent to which it [the school] draws its students from low socio-economic communities. Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities. Decile 10 schools are the 10% of schools with the

The under-representation of students from lower socio-economic backgrounds and lower decile schools is reflected in the socio-demographic profile of Māori students in HSFY and those gaining entry into professional programmes. It is also reflected across the total student population at Otago, where Māori students from lower decile schools are grossly under-represented.[5] This trend is not specific to the University of Otago, this picture for minority students, indigenous students and students from lower socio-economic backgrounds in higher education is mirrored nationally[6] and internationally.[7] Indigenous students, in particular, face numerous disadvantages that impact on their educational outcomes.[8]

1.2 WEAVING OUR WORLDS: OVERVIEW

WEAVING OUR WORLDS PROJECT AIMS

In late 2013 we partnered with Ako Aotearoa to undertake the Kaupapa Māori project, *Weaving Our Worlds*. This project emerged from the MHWDU experience working with Māori HSFY students from 2011 to 2013 and aimed to refine, deliver and evaluate the impact of an enhanced strengths- and-evidence-based support programme on the retention and academic progression of HSFY Māori learners from diverse educational and socio-economic backgrounds. We wanted to identify whether new enhancements made to the existing Te Whakapuāwai programme would further improve outcomes for Māori learners, *including* those from lower socio-economic backgrounds and lower decile schools.

WEAVING OUR WORLDS: BROAD PROJECT OBJECTIVES

The objectives of this project are:

- To refine, implement and measure the impact of a comprehensive programme that is culturally-responsive and encompasses peerassisted metacognitive development/ accelerated group study skills on Māori HSFY students (both qualitative experiences and academic and educational outcomes).
- To undertake programme delivery and research within the context of an equity focus seeking to improve the educational outcomes and experience for all Māori HSFY students *including* those from lower socio-economic backgrounds and/ or lower decile schools.

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lowest proportion of these students." Ministry of Education, "School Deciles" http://www.education.govt.nz/school/running-a-school/resourcing/operational-funding/school-decile-ratings/.

[5] Crampton et al., "Holding a Mirror to Society? The Sociodemographic Characteristics of the University of Otago's Health Professional Students."

[6] S. Gibb, D. Fergusson, and L. Horwood, "Childhood Family Income and Life Outcomes in Adulthood: Findings from a 30-Year Longitudinal Study in New Zealand", *Social Science & Medicine* 74, no. 12 (2012).

[7] H. O'Shea, A. Onsman, and J. McKay, *Students from Low Socioeconomic Status Backgrounds in Higher Education: An Annotated Bibliography 2000-2011* (Deakin, Australia, 2011).

[8] I. Anderson et al., "Indigenous and Tribal Peoples' Health (the Lancet- Lowitja Institute Global Collaboration): A Population Study," *The Lancet* 388, no. 10040 (2016).

- To advance understanding of best practice when addressing structural disadvantage, institutional and cultural responsiveness and student learning theory specific to Māori learners.
- To disseminate knowledge of critical success factors and effective practice to enhance Māori student learning development, achievement and retention in higher education in a manner that is accessible for others (practitioners, students, whānau, community and organisations).
- To support institutional change by embedding findings into practise and promoting broader applications locally, nationally and internationally.
- To demonstrably increase the number and diversity of Māori students successfully progressing through HSFY at the University of Otago.

REPORT SCOPE

The *Weaving Our Worlds* project is being undertaken in three phases. This report provides a comprehensive technical overview of Phase One (2014) and Phase Two (2015) of *Weaving Our Worlds.*

Phase One – Background and piloting (2014)

- An overview of the background, implementation and outcomes of Te Whakapuāwai 2011-2013.
- Background information on how and why the enhanced Te Whakapuāwai programme was developed for delivery to Māori HSFY cohorts in 2014 and 2015.
- More detailed theoretical and operational aspects of this enhanced programme and its delivery in 2014.

Phase Two: Review, quality improvement and outcomes analysis (2014 and 2015)

- Review of the pilot of the *Weaving our Worlds* intervention (2014) and the process of quality improving the intervention based on findings (Phase Two).
- Preliminary outcomes data for the 2014 and 2015 Māori HSFY student cohorts following implementation of the enhanced Te Whakapuāwai programme.
- Discussion about research findings to date.

The focus of this report is to highlight outcomes from initial descriptive analysis with more detailed statistical comparative analysis (encompassing 2016 data) to be undertaken in early 2017 as part of Phase Three.[9]

[9] Phase Three will be reported separately and will provide more detailed analyses of *Weaving Our Worlds* project outcomes. This will include comparisons of Māori HSFY learner outcomes 2014 and 2015 to previous years of Māori HSFY cohorts, 2011-2013. This will also include analyses of Māori HSFY student outcomes compared to non-Māori and non-Pacific domestic student outcomes. Phase Three research is currently underway.

REPORT OUTLINE

This report is divided into five parts:

Part One outlines the impetus for the *Weaving Our Worlds* project and an overview of the original support programme, Te Whakapuāwai *(2011-2013),* its outcomes and the rationale for enhancing the programme for 2014 and 2015. Part One includes the description of the evaluative aspects of the *Weaving Our Worlds* project including research aims, methodology, design and methods undertaken as part of the project.

Part Two focuses in more detail on the theoretical underpinnings of the intervention and provides detail of the enhanced Te Whakapuāwai programme delivery in 2014 and 2015, including how the programme was quality improved from 2014 to 2015. It describes the programme components of the enhanced intervention, Te Whakapuāwai, 2014 and 2015.

Part Three summarises the programme logic for *Weaving our Worlds* alongside the intervention design and the points where evaluation occurred.

Part Four provides an overview of the project's outcomes with a focus on student perspectives and academic achievement.

Part Five provides discussion and conclusion – what were the key learnings to date from the project?

1.3 BACKGROUND

This section provides relevant context to the project including a background about Health Sciences First Year (HSFY) and Te Whakapuāwai intervention delivered to the 2011 to 2013 Māori HSFY students and the rationale for the *Weaving our Worlds* project.

HEALTH SCIENCES FIRST YEAR

The University of Otago offers undergraduate and post-graduate degree programmes to about 20,000 students each year. HSFY is a popular choice of study for many students, with more than 1200 students each year enrolling in the course. The vast majority of HSFY students are first- year students new to university study.

To be eligible for the HSFY course, students must hold a New Zealand University Entrance qualification or equivalent. It is strongly recommended, but not mandatory, that HSFY students have studied physics, chemistry and biology in their senior year of secondary school.[10] HSFY is a demanding, intense and high stakes academic course where some students experience high levels of stress.[11]

[10] University of Otago, "Health Sciences" www.otago.ac.nz/healthsciences.
[11] M. Jameson and J. Smith, "Voices of Students in Competition: Health Sciences First Year at the University of Otago, Dunedin," *The New Zealand Medical Journal* 124, no. 1338 (2011).

HSFY is a one-year, two semester competitive academic course[12] from which successful applicants are accepted into the health professional degree programmes of medicine, dentistry, physiotherapy, medical laboratory science and pharmacy. Students may also go on to study degrees such as the bachelor of science in health science related subjects.

To gain admission into an undergraduate health professional programme, HSFY students must first pass all seven core-science papers that comprise HSFY and also specified grade requirements (alongside a number of other criteria specific to each professional degree programme).[13]

The first semester of HSFY consists of four papers: biological physics (PHSI191), chemistry (CHEM191), human biology (HUBS191) and cellular and molecular biology (CELS191). Students must pass all four papers to remain eligible for a health professional programme. Semester two comprises biochemistry (BIOC192), epidemiology (HEAL192) and human biology (HUBS192) with the option of an additional eighth paper. HSFY is the most direct entry pathway into a health professional programme at Otago but other pathways also exist.

TE WHAKAPUĀWAI

Impetus for development

Following the establishment of the Māori Health Workforce Development Unit (MHWDU) in 2010 a review of the support needs of Māori students in HSFY indicated significant concerns about Māori student outcomes in HSFY. This concern included findings that from 2008 to 2010 fewer than 60% of Māori students passed all first semester HSFY papers. In 2010, less than a third of Māori students gained entry to a health professional programme in the following year. Outcomes were poorer for students from lower decile schools (<5) where only around 40% passed all papers in semester one and less than a quarter of them gained entry to a health professional programme in the following year.

At the time there were no specific health sciences programmes delivered to directly support Māori HSFY students. The main academic support was provided in content focused tutorials[14] and Māori student attrition from HSFY was high.

Te Whakapuāwai was therefore developed to better support Māori HSFY students to succeed in HSFY, to be retained in tertiary education and to increase entry into health professional degree programmes at the University of Otago. The development of Te Whakapuāwai was informed by collaboration with other student support services, in particular Te Huka Mātauraka (The Māori Centre) and within the context of a comprehensive understanding of the HSFY course. Funding of

[12] Ibid.
[13] University of Otago, "Health Sciences First Year" http://www.otago.ac.nz/healthsciences/students/hsfy/ (2015).
[14] The University of Otago does have Te Huka Mātauraka (The Māori Centre), a campus-based support centre for Māori students that provides academic tutorials, counselling, a mentoring programme for first year students and scholarship advice. This service is available to all students enrolled as Māori at Otago but is not health sciences specific.

Te Whakapuāwai was provided as a component of the broader contract between the MHWDU and the Ministry of Health. Te Whakapuāwai was delivered each year from 2011 to 2013 to each cohort of Māori students studying HSFY that year.

Programme design

Te Whakapuāwai aimed to address the real and perceived challenges Māori students face entering into university study and HSFY. As an intervention, Te Whakapuāwai was developed as a wrap-around culturally responsive support programme providing tailored information and guidance to Māori HSFY students.

The components of Te Whakapuāwai *(*2011-2013) included: orientation to university, HSFY and study, regular whakawhanaungatanga events and information sharing, specific, focused and tailored additional study events (centred around Māori Centre academic tutorials). Māori HSFY students were offered greatly increased information and advice about health professional programme entry, assistance with personal goals about future tertiary study and health professional programme entry and responsive pastoral care and academic advice.

The theory and method (praxis)[15] underpinning Te Whakapuāwai drew on the strengths of Māori pedagogical practice[16] including fostering a sense of whanaungatanga amongst Māori HSFY students. This strengths-based approach is integral to supporting Māori students, with existing research outlining strategies to improve academic outcomes for Māori learners supporting this.[17] As an intervention, Te Whakapuāwai did not alter teaching practice, staffing attitudes or the nature of the existing HSFY course. Instead it consisted of a wrap-around programme intended to improve Māori learners' experience, retention and academic outcomes in HSFY. The programme was developed as an evidence-informed intervention[18] incorporating Māori values and practice into all aspects of the programme.

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[15] Praxis where theory, reflection and action take place simultaneously. It is about theory and action with an explicit goal of social transformation for marginalized groups. Paulo Friere defines praxis as "…reflection and action upon the world in order to transform it". P. Freire, *Pedagogy of the Oppressed* (Harmondsworth: Penguin Books, 1972), 33.

[16] L. Pihama et al., *A Literature Review on Kaupapa Māori and Māori Education Pedagogy* (Auckland: The International Research Institute for Māori and Indigenous Education, 2004); W. Hemara, *Māori Pedagogies a View from the Literature* (Wellington: New Zealand Council for Educational Research, 2000).

[17] R. Bishop et al., "Te Kōtahitanga Phase 3 Whānaungatanga: Establishing a Culturally Responsive Pedagogy of Relations in Mainstream Secondary School Classrooms," *Wellington: Ministry of Education*, (2007); R. Bishop, D. O'Sullivan, and M. Berryman, *Scaling up Education Reform Addressing the Politics of Disparity* (Wellington, New Zealand: New Zealand Council for Educational Research (NZCER), 2010); F. Chauvel and J. Rean, *Doing Better for Māori in Tertiary Settings: Review of the Literature* (Wellington, 2012).

[18] To best suit the context, evidence to develop Te Whakapuāwai drew on educational expertise of well-recognised existing practice supporting Māori learners at the University of Otago such as Te Huka Mātauraka and learnings from the successful Tū Kahika Scholarship programme. A wide range of research also informed the intervention, in particular Te Kotahitanga project and associated learnings (Bishop et al.); Te Rau Puāwai (L. Nikora et al., *Te Rau Puawai 2002-2004: An Evaluation* (2005). and; Rauringa Raupa report (M. Ratima et al., *Rauringa Raupa: Recruitment and Retention of Māori in the*

Guiding frameworks

The theoretical and operational framework guiding programme delivery aimed to provide the following to all Māori HSFY students:[19]

- Whakawhanaungatanga – fostering a sense of family and community amongst Māori students working together to achieve goals and having a wide peer support network.
- Manaakitanga – providing hospitality and fostering mutual respect.
- Ako – reciprocal teaching and learning.
- Mana motuhake – empowering students to have a positive university experience.
- Early support with the transition into HSFY and the University of Otago.
- A strengths-based -culturally affirming, non-deficit, non-remedial - approach.
- Increased academic support (such as tutorial assistance) and funding.
- 'Myth busting'- providing accurate information to Māori HSFY students about the course.
- Timely and tailored information and guidance.
- Advice about the course and about gaining admission into health professional degree programmes and promotion of health careers and health-related study opportunities.
- Access to staff (e.g.email addresses and phone contact details).

Evaluation and outcomes

A comprehensive evaluation plan was built into the programme's design and included a retrospective analysis of Māori student progression through HSFY and admission into professional degree programmes dating back to 2007. Tracking and monitoring Māori HSFY student progression through HSFY and into professional degree programmes (prior to the delivery of Te Whakapuāwai*)* provided baseline data for the MHWDU to measure the potential efficacy of the intervention in achieving its intended aims.

Health and Disability Workforce (Taupua Waiora, Division of Public Health and Psychosicial Studies, Faculty of Health and Environmental Sciences, AUT University, 2007).

[19] The MHWDU use institutional ethnicity data obtained through student records. Student lists for all students that self identify as Māori can be obtained and sorted by academic programme. Verified whakapapa (from iwi) is required for other processes (such as Māori sub-category applications for professional programmes). See University of Otago, "Health Sciences First Year".

Table 1.1: Māori student outcomes 2008-2010 and 2011-2013

Year	Number of Māori HSFY students (average)	% passing all 4 semester 1 papers (average)	% who sat all 7 HSFY papers (average)	% gaining entry - 4 programmes
2008-2010	70	58.3	57.2	35.2
2011-2013	91	65	65.7	44.4

This table shows the increasing number of Māori students entering HSFY over two three-year time periods. It also shows higher proportions of Māori students passing all four first semester papers and sitting all seven HSFY papers in 2011 to 2013 when compared with 2008 to 2010. One key outcome is the number of students gaining entry into health professional programmes in the year after HSFY. Of note, the greatest increase was in the most difficult to enter programmes of medicine and dentistry. Students also gained entry into other programmes including bachelor of oral health and bachelor of radiation therapy.

Student perspectives

Feedback from students involved in Te Whakapuāwai *(2011-2013)* was obtained through process evaluation surveys. Overall these were overwhelmingly positive and included the following comment:

> *They [staff] would remind you what you need to do, and don't listen to anybody and what they're saying, keep on going. Don't forget that you are doing this not only for you but for your whānau [family]... Those little things that was nice. It made you feel that they actually really want you to actually achieve your goals and make sure that you can continue with what you want and make you achieve everything that you want (Māori HSFY student, 2011 cohort).*

In particular students identified the importance of having tailored and timely information and support from Māori staff. Students were provided with phone contact details and email addresses for kaiārahi and other key staff (e.g. the Associate Dean for Māori Health Sciences). Students were also strongly encouraged to engage with services provided by Te Huka Mātauraka.

Student feedback about Te Whakapuāwai, obtained through group interviews, suggests that students felt this enhanced pastoral and academic support. One student said: "…what I like [is that] you know that somebody is there for you no matter what state you're in". (HSFY student, 2011). Many students commented on the whakawhanaungatanga they felt the programme provided. Another student reflected: "the connection between the students is one of the strengths of the programme". (Māori HSFY student, 2011).

From a staff perspective there was a noticeable shift in Māori HSFY student confidence and unity following the implementation of Te Whakapuāwai. In 2011 Māori HSFY students became a visible cohort of students on campus frequently studying together and sitting together in lectures. Tutorial attendance at the Te Huka Mātauraka (The Māori Centre) increased substantially

compared with previous years and many students felt that the tutorials were invaluable. *"I would have never have passed HSFY if it wasn't for [the Academic Coordinator] and the tutorials."* (HSFY student, 2011). "*I think the tutorials are better than the lectures."* (Māori HSFY student, 2011).

1.4 THE CHALLENGE

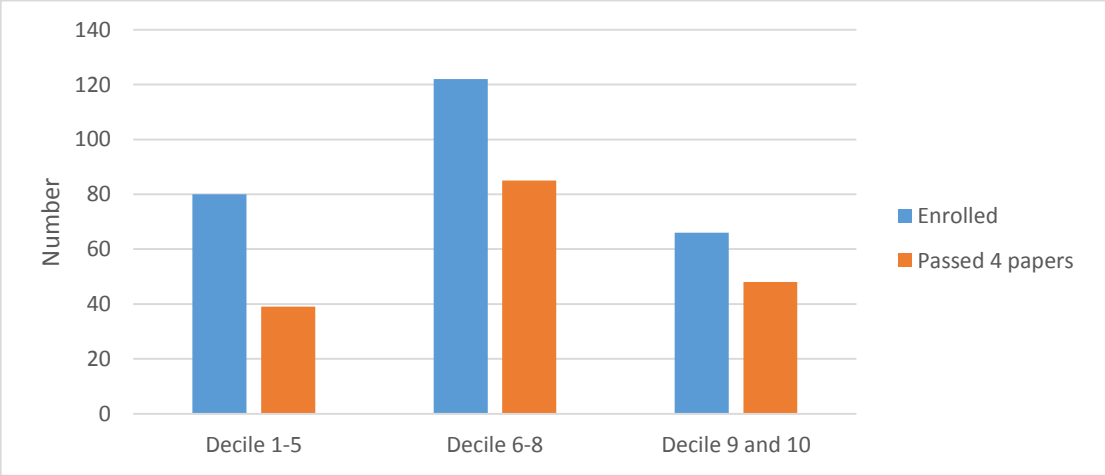
Analysis of Te Whakapuāwai suggests that the programme generated many positive outcomes for students, including progression into a professional programme, continuation and retention in tertiary study (including BSc) and favourable experiences and perceptions of the support programme and of HSFY. However, a more in-depth analysis of outcomes shows Māori students who attended lower decile schools[20] (deciles 5 and below) were markedly less likely to pass all four HSFY first semester papers when compared with students who attended middle and higher decile schools. This had a 'downstream' impact by disproportionately reducing the number of Māori students from lower decile schools able to successfully complete HSFY, apply for and then enter undergraduate health professional programmes.

In previous MHWDU research, Māori HSFY students' secondary school decile was used as an approximation for socio-economic background to investigate what factors contributed to (or hindered) successful progression through the HSFY course and into a professional programme.

Figure 1.1 shows the number of Māori students enrolled in HSFY alongside the number successfully passing all four semester one papers by school decile. The results reinforce concerns about differing outcomes and progress of Māori students from differing socio-economic backgrounds.

Although the existing Te Whakapuāwai programme had potentially contributed to improved outcomes for Māori learners, more work was needed to better understand and address how outcomes could be further improved for learners from lower decile schools and / or lower socio-economic backgrounds.

FIGURE 1.1: MĀORI HSFY STUDENTS ENROLLED AND PASSING FOUR SEMESTER ONE PAPERS BY SCHOOL DECILE (2011-2013)



[20] See footnote 4

1.5 PROJECT RATIONALE

International and national research suggests a strong relationship between low socio-economic background and lower educational attainment.[21] In New Zealand, Māori are over-represented in lower decile schools and these students are less likely to gain the advantages that a tertiary qualification can offer.[22] As a consequence Māori, particularly those from lower decile schools are grossly under-represented in the health workforce despite potentially having more suitable backgrounds to understand and meet the health needs of under-served (including predominantly Māori) communities.[23]

Existing New Zealand educational policy and strategy seeks to improve outcomes for students identified as 'priority learners', (Māori and Pacific students)[24]. However, targeted educational improvements disproportionately benefit those attending higher decile schools, perpetuating the 'gap' in educational attainment between socio-economically and/or educationally disadvantaged students and students from more privileged backgrounds.[25]

There are a number of theories positing *why* there are links between socio-economic disadvantage and low educational attainment, yet what is needed is a clearer understanding of *how* to address this important issue. There is a growing body of research informing strategies to improve outcomes for Māori students in tertiary study. However, in New Zealand there is a gap in research outlining approaches for achieving enhanced educational outcomes that include equity goals. 'Equity' in this context refers to improving academic outcomes for Māori learners across the socio-economic spectrum.

A key driver behind the *Weaving Our Worlds* project is working towards achieving within-group equity for Māori learners in higher education. This project seeks to not only increase the numbers or success of Māori entering into and through higher education and between-ethnic-group equity (Māori in comparison to non-Māori), we also seek to understand what educational practices will impact positively on outcomes for all Māori HSFY students *including* those from lower socio-economic backgrounds and/or lower decile schools.

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[21] L. Perry and A. McConney, "Does the S.E.S of the School Matter? An Examination of Socioeconomic Status and Student Achievement Using Pisa 2003," *The Teachers College Record* 112, no. 4 (2010).
[22] C. Grootveld, "Critical Perspectives on the Transformative Potential of Higher Education in New Zealand," (Victoria University, 2013).
[23] Human Rights Commission, *A Fair Go for All? Rite Tahi Tātou Katoa: Addressing Structural Discrimination in Public Services* (Wellington, 2012).
[24] Ministry of Education, "Tertiary Education Strategy 2010-2015".
[25] M. Thrupp, "Education's 'Inconvenient Truth': Part One – Persistent Middle Class Advantage," *New Zealand Journal of Teachers' Work* 4, no. 2 (2007).

1.6 WEAVING OUR WORLDS – RESEARCH

RESEARCH QUESTIONS

The overarching knowledge goal of the *Weaving Our Worlds* project was to measure the impact and outcomes of the enhanced HSFY support programme to ascertain if the programme contributed to more equitable outcomes for Māori HSFY students when compared with previous years.

Specific research questions include:

1. What was the perceived satisfaction of the enhanced intervention amongst Māori HSFY students?
2. What was the impact of the enhanced intervention on Māori student outcomes in 2014 and 2015?
3. How did the enhanced intervention impact on the diversity of Māori students including those from lower socio-economic backgrounds and lower decile schools?
4. What was the overall impact of the programme on academic outcomes when compared against previous Māori student cohorts?
5. What conclusions can be drawn from this research? Are there implications stemming from this research to inform policy and practice concerning Māori learners (and other under-represented groups) in higher education or more broadly?

In Phase Three of the project (following completion of data collection from 2016) more detailed comparative analysis will be undertaken that allows for more comprehensive analysis between three cohorts of HSFY students, i.e., 2008-2010, 2011-2013, 2014-2016.

METHODOLOGY

The *Weaving Our Worlds* project is underpinned by a Kaupapa Māori[26] and strengths- based methodology that has guided all aspects of the formation of the research questions, research design, implementation, analysis and dissemination of findings. The research team is a small team of Māori researchers with a wide range of expertise (qualitative and quantitative) committed to achieving more equitable outcomes for Māori in the health, health workforce and tertiary education sectors. Māori students are central to the research and have informed and shaped the ongoing development and delivery of *Weaving Our Worlds*. "Kaupapa Māori research has been defined as research by Māori, for Māori and with Māori,"[27] and, as a methodological approach to research and practice, is directly related to the development of practical interventions for Māori.[28] Kaupapa Māori is an inherently strengths-based approach to research

[26] L. Smith, *Decolonizing Methodologies: Research and Indigenous Peoples* (Zed Books, 1999); L. Smith and P. Reid, *Māori Research Development: Kaupapa Māori Principles and Practices* (Wellington: Te Puni Kokiri, 2000); A. Eketone, "Theoretical Underpinnings of Kaupapa Māori Directed Practice," *Mai Review* 1, (2008); S. Walker, A. Eketone, and A. Gibbs, "An Exploration of Kaupapa Māori Research, Its Principles, Processes and Applications," *International Journal of Social Research Methodology* 9, no. 4 (2006).

[27] G. Smith cited in; Walker et al., "An Exploration of Kaupapa Māori Research, Its Principles, Processes and Applications," 333.

[28] P. Moyle, "A Model for Māori Research for Māori Practitioners," *Aotearoa New Zealand Social Work Review* 26, no. 1 (2014): 30.

that rejects deficit framing of Māori and is critical of the systems and structures that maintain inequalities between Māori and non-Māori in Aotearoa.

The development of the enhanced support programme for Māori HSFY students built on Te Whakapuāwai (2011-2013), the pre-existing support programme for Māori HSFY students. A comprehensive literature review informed the introduction of new components to Te Whakapuāwai. Information gathered about best practice (particularly with an equity focus) augmented the existing programme to develop the 2014 Phase One pilot. This approach assisted our research team to determine the methods used throughout this project.

A mixed-method quantitative and qualitative approach was considered the best way to approach the research questions. This has numerous advantages[29] including providing 'depth' to the research and "richer/more meaningful/more useful answers to research questions".[30]

The decision to include non-Māori and non-Pacific HSFY student data as a comparison provides an opportunity to identify whether changes over time were consistent with non-Māori outcomes. This additional analysis is currently underway as Phase Three of the research project.

The research team comprises individuals with expertise from the disciplines of both health and education. Health research in New Zealand has well-developed approaches towards investigating social determinants of health, understanding structural disadvantage and working towards more equitable health outcomes for Māori. Working at the interface between health and education led us to draw on two tools to analyse relative deprivation of HSFY students and allow a more in-depth level of analysis to be conducted.

RESEARCH DESIGN AND METHODS

Participants

Participants in the intervention (enhanced Te Whakapuāwai) were Māori students enrolled in the HSFY course at the University of Otago in 2014 and 2015. Students identified their ethnicity at enrolment. All students who identified themselves as Māori and who were enrolled in HSFY were included. The enhanced support programme (Te Whakapuāwai) was offered to all Māori HSFY students as participants at any stage in the academic year. Students who were not Māori were not offered the programme.

Data from all HSFY cohorts (Māori and non-Māori) during the years 2008 to 2015 was collated and analysed to enable comparisons across time and between cohorts, including Māori HSFY students involved in the enhanced programme (2014 and 2015), in the original support programme Te Whakapuāwai (2011-2013) and not involved in a targeted support programme (2008-2010). Non-Māori HSFY student data (2008-2016) are being used as a control group to assess outcomes between cohorts.

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[29] R. Johnson, A. Onwuegbuzie, and L. Turner, "Toward a Definition of Mixed Methods Research," *Journal of Mixed Methods Research* 1, no. 2 (2007).
[30] Ibid., 122.

Ethics

Ethics for the research was obtained through the University of Otago Ethics Committee reference code 14/214. Consultation was undertaken with the Ngāi Tahu Māori Health Research Subcommittee at the University of Otago.

Methods

The *Weaving Our Worlds* project (2014 and 2015) comprised two phases of an intervention study and evaluation:

Phase One: *Programme refinement and Phase One delivery, 2014*

- Programme development (June 2013 - February 2014): refining of the existing Te Whakapuāwai programme to include new components and preparing staff and others for changes in programme delivery and evaluation. Steps involved developing the theory of change, programme logic, project evaluation framework, operational programme planning and staff training.
- Programme delivery and evaluation (February - November 2014): Delivery of the Te Whakapuāwai enhanced programme (pilot) to all Māori HSFY students enrolled in 2014 and collection of quantitative outcomes data and qualitative student feedback.
- Analysis of evaluation and quality improvement (November 2014 to January 2015): Evaluation of the pilot programme processes and outcomes against success indicators. Quality improvement of the pilot for 2015 delivery.

Phase Two: *Programme delivery and evaluation, 2015*

- Programme delivery / evaluation (February 2015 – November 2015): Delivery of the quality improved programme and collation of all qualitative and quantitative data, complete full project description and research findings.
- Report writing – technical report (November 2015 - February 2016).
- June 2016 to December 2016 – respond to report reviews, develop resources and disseminate findings and resource(s).

Phase Three (in- depth comparative data analyses) is ongoing and will encompass inclusion of 2016 outcomes data, and detailed comparisons between cohorts and comparing Māori HSFY student outcomes (2008-2016) to non-Māori/non-Pacific HSFY student outcomes in the same time period.

DATA COLLECTION

We collected both qualitative and quantitative data at multiple points in programme delivery. Evaluative research included online surveys (using Survey Monkey) and semi-structured interviews[31] held with focus groups comprising Māori HSFY students, previous Māori HSFY students and peer mentors (kaihautū) delivering the SWAT component. One-to-one semi-structured student interviews with Māori HSFY students and researcher observation were also used to inform programme development and research. Data was then gathered to assess the

[31] J. Mason, "Semistructured Interview," in *The Sage Encyclopedia of Social Science Research Methods*, ed. M. Lewis-Beck, A. Bryman, and T. Liao (Thousand Oaks, CA: Sage, 2004).

perceived satisfaction and experience of Māori HSFY participants in the Te Whakapuāwai programme in 2014 and 2015 and was used to improve programme design and delivery.

Quantitative research involved the collection, collation and analysis of a comprehensive dataset drawn from several sources. University of Otago institutional data was obtained for all students (enrolled at 4 April each year) in the HSFY course in the years 2008 to2015. This data included student socio-demographic information, secondary school attended, grades attained in HSFY and academic progression through HSFY for each year. This list was then filtered to retain domestic student data only by removing international fee paying students.

Measures

School decile is the main indicator of socio-economic background used in New Zealand educational research. We incorporated secondary school decile into the dataset alongside New Zealand Deprivation Index (2013) (NZDep2013) data. This index is used in health research to provide an indication of relative deprivation of households based on the home address of individuals.

The aim was to provide a better picture of the socio-demographic composition of HSFY students at Otago in the years 2008 to2015 and utilising both NZDep2013 and secondary school decile in the research allowed for a much deeper and more nuanced understanding about socio-economic and educational disadvantage amongst the students. Drawing on both indicators allows more informed understandings about the impact of the enhanced programme upon students from different school and home contexts. This project provides an opportunity to explore the impact of both NZDep2013 and secondary school decile within higher education research.

The Ministry of Education national database of school decile ratings (at 2015)[32] was used to determine the secondary school decile rating of all domestic HSFY students attending a New Zealand secondary school and was added to the main dataset of individuals. New Zealand school decile ratings for each school are available online.

All student home addresses were entered into the Classification Coding System[33] and ascribed a meshcode. The 2013 Meshblock Dataset was then used to assign the associated deprivation decile to each student (where possible) by geographically coding each student's home address.[34]

Institutional data obtained about HSFY students included students' National Student Number (NSN), a unique identifier ascribed to students entering into primary school. The New Zealand Qualifications Authority (NZQA) gave permission for NSN numbers to be used to obtain a

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[32] Ministry of Education, "Decile Ratings 2015" https://www.google.co.nz/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved (accessed 18 March 2015).

[33] Statistics New Zealand, "Classification Coding System" http://www.stats.govt.nz/methods/classifications-and-standards/classification-related-stats-standards/download-the-classification-coding-system.aspx (accessed 9 October 2015).

[34] Statistics New Zealand, "2013 Census Meshblock Dataset" http://www.stats.govt.nz/Census/2013-census/data-tables/meshblock-dataset.aspx (accessed 12 October 2015).

breakdown of students' National Certificate in Educational Attainment (NCEA) credits[35] in the science subjects of physics, biology and chemistry. Although this data is routinely collected at Otago additional permission was needed to include these findings in the research. Credit counts were added to the dataset to provide an overview of HSFY students' science background in the subjects most relevant to HSFY. The vast majority of New Zealand secondary school students obtain University Entrance via NCEA, with some exceptions for students that attended secondary school overseas or students with the option to sit Cambridge examinations or complete the International Baccalaureate.

DATA ANALYSIS

Student survey data encompassed both quantitative and qualitative aspects. Survey analysis included analysis of specific questions exploring student perceptions (likert scales) and identification and documentation of key emerging themes from more open-ended qualitative responses.

Academic achievement data was analysed using SPSS software. The research questions and outcome indicators guided analyses. Data were broken into subsets for comparison, some of which is currently being completed (Phase Three):

- Māori HSFY cohorts in the years 2008 to2010, pre- Te Whakapuāwai intervention
- Māori HSFY cohorts in the years 2011 to 2013, first three years of Te Whakapuāwai intervention
- Māori HSFY cohorts in the years 2014 to 2015, Te Whakapuāwai enhanced intervention
- Non-Māori and non-Pacific domestic HSFY students in the years 2008 to 2016

Non-Māori and non-Pacific has been chosen rather than non-Māori as Pacific HSFY students are also part of a targeted intensive support programme and thus may also be experiencing changes related to the programme they are participating in.[36] Removing Pacific students from the comparator group thus eliminates the chance that the Pacific programme will impact on non-Māori data.

MEASURES USED

NZDep2013 and secondary school decile were both used as measures of student socio-economic background. Both NZDep2013 and secondary school deciles use a 1 – 10 scale as a rating system. However, these ratings are reversed for each scale. NZDep2013 uses eight different NZ Census sourced measures to describe areas of deprivation across New Zealand broken into meshblocks. "Meshblocks are geographical units defined by Statistics New Zealand, containing a median of

[35] New Zealand Qualifications Authority, "Secondary School and NCEA" http://www.nzqa.govt.nz/studying-in-new-zealand/secondary-school-and-ncea/ (accessed 22 December 2015).
[36] http://www.otago.ac.nz/pirssu/index.html

approximately 81 people..."[37] NZDep2013 divides New Zealand into tenths and each meshblock is ascribed a value of 1-10 depending on relative deprivation. "…a value of 10 indicates that the meshblock is in the most deprived 10 percent of areas in New Zealand, according the NZDep2013 scores."[38] Conversely a value of 1 indicates the 10% of areas that have the least deprived scores.

The school rating system is weighted in reverse, schools with a decile rating of 1 being "…the 10% of schools with the highest proportion of students from low socio-economic communities, while decile 10 schools are the 10% of schools with the lowest proportion of these students."[39] School decile ratings are also drawn from census data where school attendees home addresses are used to calculate the relative deprivation for each school "...based on five socio-economic indicators for a community"[40] pertaining to income, household crowding, employment and benefit status. Schools are ranked in relation to other schools and each decile group has roughly the same number of schools. School decile ratings are used to calculate the amount of government funding each school receives, "the lower the school's decile the more funding they receive."[41]

Although NZDep2013 and school decile are similar because they both draw on census data, have measures of deprivation and use a 1-10 scale, they are different measures. NZDep2013 describes an area of deprivation and school decile describes the proportion of deprivation amongst individuals attending the school. Obviously a student may come from a more deprived home background (8-10) and attend a less deprived school (8-10). This research details the ways in which NZDep2013 scores and secondary deciles correlate and overlap amongst HSFY students.

Another measure used in the research was an individual's NCEA credits (in the subjects of physics, chemistry and biology) to better understand the educational profile of the HSFY students. 'Participation' is used to describe having some credits in a particular subject but is not specified on the basis of how many credits. 'Attainment' is used to describe having achieved at least 14 credits or more in a specific subject at a particular NCEA level.

OUTCOME INDICATORS

Outcome indicators were developed to guide research and explore research questions. Outcome indicators describe programme effectiveness as opposed to an output indictor (for example, the delivery of an activity). [42] The indicators were used to measure the impact of the enhanced intervention and differences in outcomes for learners involved in the intervention when compared against HSFY students in previous years. Church and Rogers state that "indicators enable us to perceive differences, improvements or developments relating to a desired change

[37] J. Atkinson, C. Salmond, and P. Crampton, *NZDep2013 Index of Deprivation User's Manual* (Wellington: University of Otago, 2014).
[38] Ibid.
[39] Ministry of Education, "School Deciles".
[40] Ibid.
[41] Ibid.
[42] J. Parsons, C. Gokey, and M. Thornton, *Indicators of Activities, Outputs, Outcomes and Impacts in Security and Justice Programming* (Department for International Development, 2013), 13-15.

(objective or result) in a particular context."[43] In the context of this study, Māori HSFY students at the University of Otago (2014-2016), outcome indicators were developed as a guide to measure and report on the effectiveness of the intervention according to the objectives of the programme. Academic outcome indicators are presented in more detail in Part 4.

[43] C. Church and M. Rogers, *Designing for Results, Integrating Monitoring and Evaluation in Conflict Transformation Programs* (Washington DC: Search for Common Ground, 2006), 44.

2. INTERVENTION DEVELOPMENT: THEORY, PRACTICE AND DELIVERY

2.1 THEORETICAL CONSIDERATIONS

The process of developing new components for Te Whakapuāwai, 2014, involved drawing together information gathered through literature research, phenomenological experience working with Māori learners, student consultation and programme evaluations. A variety of ideas, theories, and approaches were considered with a proviso that these were strengths-based (non-deficit), evidence-informed, and aligned well with the existing Te Whakapuāwai intervention.

The development of the enhanced intervention began with a number of assumptions. Firstly, that the original Te Whakapuāwai intervention (2011-2013) was a successful academic support programme for Māori HSFY students. Secondly, that the addition of new evidence-informed components to Te Whakapuāwai would further improve academic outcomes for Māori HSFY students. Finally, that the enhancement of Te Whakapuāwai coupled with comprehensive formative and summative evaluation would, over time lead to improved academic outcomes for students from lower decile schools and/or lower socio-economic backgrounds. The following sections describe the theoretical and operational framework (praxis) that formed the enhanced intervention.

THEORETICAL FRAMEWORK

The programme's development was underpinned by evidence on effective approaches to enhancing student performance. Educational literature features a growing body of evidence that highlights the impact of socio-psychological interventions and a number of well-recognised approaches have been shown to markedly impact on learner outcomes, retention and completion rates.

We sought to construct the enhanced Te Whakapuāwai programme as multi-dimensional and holistic, incorporating a range of theories and approaches whilst maintaining the 'bones' of the earlier 2011 to 2013 Te Whakapuāwai. Thus, imbedded throughout the 2014 to 2015 programme are progressive developments in educational theory and understandings of psychological, educational and social factors associated with student performance and persistence.

Strengths-based culturally responsive practice

> *A strengths perspective assumes that every individual has resources that can be mobilized toward success in many areas of life…The strengths philosophy explores ways to empower individuals to flourish rather than simply survive… and presupposes that capitalizing on one's best qualities is likely to lead to*

greater success than would be possible by making a comparable investment of effort into overcoming personal weaknesses or deficiencies.[44]

Strengths-based approaches are recognised in New Zealand as best practice to support Māori students from early childhood and throughout the primary, secondary and tertiary education sectors. New Zealand educationalists (particularly Māori educationalists) have advocated such approaches for several decades.

The 1970s Kohanga Reo (pre-school language learning nest) and Māori language revitalisation movement championed the strengths-based educational approach in New Zealand, reframing the question 'why are Māori students failing in education?' to 'why are Māori students *being* failed by the education system?'[45] This re-presentation of Māori 'under-achievement' instigated a paradigm shift in thinking that opposed victim-blaming in theory and practice[46] and provided a critique of the systems and structures that reproduce inequalities in outcomes. It also established an educational environment tailored to Māori learners as a successful model positioned outside of the prevailing 'mainstream' practice.

Other Māori centred models were built upon and led to a suite of education options for Māori from early childhood through to university. Māori centred practice has also been implemented across the education sector. This includes Te Kōtahitanga, a Kaupapa Māori research and professional development project developed and managed by Russell Bishop assisted by a large number of Māori researchers. This project investigated factors influencing the achievement of years nine and 10 Māori students (junior secondary school) in mainstream schools.[47] The Kōtahitanga research team identified deficit theorising as a significant contributing factor to Māori under-achievement in secondary school education.[48]

Based on findings from the research, a professional development intervention was developed and implemented across 12 schools with 422 teachers. The intervention worked with schools to operationalise a 'Culturally Responsive Pedagogy of Relations' (CRPR) between staff and students.[49] The research and consequent developments were conducted within a Kaupapa Māori

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[44] S. Lopez and M. Louis, "The Principles of Strengths-Based Education," *Journal of College and Character* 10, no. 4 (2009).

[45] G. Smith, *Reform and Māori Educational Crisis: A Grand Illusion* (Auckland: Research Unit for Maori Education, University of Auckland, 1991).

[46] Ibid.

[47] Bishop et al., "Te Kōtahitanga Phase 3 Whānaungatanga: Establishing a Culturally Responsive Pedagogy of Relations in Mainstream Secondary School Classrooms," R. Bishop et al., "Te Kotahitanga: Addressing Educational Disparities Facing Māori Students in New Zealand," *Teaching and Teacher Education* 25, no. 5 (2009), R. Bishop et al., "Te Kotahitanga: The Experiences of Year 9 and 10 Maori Students in Mainstream Classrooms," *Maori Education Research Institute, School of Education, University of Waikato and Poutama Pounamu Research and Development Centre, Hamilton and Tauranga*, (2003).

[48] Bishop et al., "Te Kotahitanga: Addressing Educational Disparities Facing Māori Students in New Zealand," Bishop et al., "Te Kotahitanga: The Experiences of Year 9 and 10 Maori Students in Mainstream Classrooms."

[49] Bishop et al., "Te Kotahitanga: Addressing Educational Disparities Facing Māori Students in New Zealand."

framework, and Māori values and pedagogical approaches informed the development of the CRPR and Effective Teaching Profile. Outcomes from the research evidenced a demonstrable increase in academic achievement for schools involved in Te Kotahitanga when compared with non-intervention schools.[50]

The Kotahitanga project and its outcomes, demonstrate the value of strengths-based culturally responsive practice for improving Māori learner academic outcomes and educational experience. Such Māori approaches to supporting Māori learners are effective across the education sector and arguably these approaches are not only effective for Māori. Kotahitanga shows that reflecting and improving the way in which under-represented students are framed and responded to may have a direct impact on student engagement and academic outcomes.

Strengths-based and culturally responsive practice assumes that each student entering into study brings with them their own strengths, that, when fostered, can enhance their learning outcomes. Further, this practice requires educators and institutions to be responsive to students, acknowledging that students should not be expected to change to 'fit' the existing culture and environment.

> *Rather than a model that assumes that students must fit into what is often an alien culture and that they leave their own cultures... The challenge is to develop ways in which an individual's identity is affirmed, honored, and incorporated into the organization's culture.*[51]

Linda Leach and Nick Zepke's New Zealand research, a synthesis of best practice pertaining to student retention and achievement in tertiary study, highlights the need for institutions to move away from 'integration' or 'assimilation' models.[52]

A strengths-based culturally responsive approach is in staunch opposition to approaches that identify groups of students as 'at risk' (typically by ethnicity, minority or socio-economic status) and then intercede by providing remedial classes and the like. The literature emphasises that educators must be mindful of using stigmatising labels that construct negative groupings of students (e.g., 'disadvantaged') as these labels may place students further 'at risk.'[53]

Deficit categorisations of students infer that particular groups of students possess "shortcomings"[54] that need to be fixed. This is a pervasive discourse in the field of higher

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[50] R. Bishop and M. Berryman, "Te Kotahitanga: Culturally Responsive Professional Development for Teachers," *Teacher Development* 14, no. 2 (2010): 185.
[51] W. Tierny, "Power, Identity and the Dilemma of College Student Departure," in *Reworking the Student Departure Puzzle*, ed. J. Braxton(Nashville: Vanderbilt University Press, 2000), 219.
[52] N. Zepke and L. Leach, "Integration and Adaptation: Approaches to the Student Retention and Achievement Puzzle," *Active Learning in Higher Education* 6, no. 1 (2005).
[53] W. Franklin, "Students at Promise and Resilient: A Historical Look at Risk," in *Schooling Students Placed at Risk: Research, Policy, and Practice in the Education of Poor and Minority Adolescents*, ed. M. Sanders and W. Jordan(New York: Routledge, 2000).
[54] T. Knight, "Equity in Victorian Education and 'Deficit' Thinking," *Melbourne Studies in Education* 43, no. 1 (2002): 102.

education that may directly impact on student outcomes and further negates what students bring and contribute to the university environment.[55] Mckay and Devlin recognise the role of the environment in their research with Australian students from lower socio-economic backgrounds:

"[i]t is only by changing the 'environments, discourses, attitudes, positionings, and relationships' within higher education institutions, that it becomes possible to create conditions under which all students are empowered to achieve and succeed."[56]

There is a limited body of international literature pertaining to strengths-based and culturally responsive approaches to supporting under-represented students in higher education. In the United States, those implementing strengths-based practice report positive outcomes.[57]

A strengths-based approach is viewed by the research team as integral to better supporting Māori learners to succeed (if not all learners) and underpins the *Weaving our Worlds* project. Existing research outlining strategies to improve academic outcomes for Māori learners supports this approach.[58] This is further articulated in the Tertiary Education Strategy where it is recognised that:

"…in tertiary education culturally responsive provision better engages Māori. This improves Māori achievement…"[59]

Fundamentally, strengths-based and culturally responsive models are premised on the inherent potential in students for excellence that students possess.

Mindset theory

Mindset theory aligns well with the strengths-based approach. Mindset theory disputes preconceived notions of intelligence or talent, instead recognising an individual's capacity to grow their intelligence. The literature is clear that students can be supported to develop and maintain a 'growth mindset' and academic outcomes should likely improve.

"There is increasing evidence that mindsets can play a key role in the under-achievement of women and minorities in math and science…"[60] Interventions that cultivate growth mindsets

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[55] M. Devlin and J. McKay, "Reframing 'the Problem': Students from Low Socio-Economic Status Backgrounds Transitioning to University," in *Universities in Transition: Foregrounding Social Contexts of Knowledge in the First Year Experience*, ed. H. Brook et al.(Adelaide: University of Adelaide Press, 2014).
[56] Ibid., 13.
[57] A strengths-based approach is used by the team delivering the Meyerhoff Scholars Program at UMBC, a programme for underrepresented (largely African American) students in STEM study that has directly contributed to an increase in the number of successful African American PhD graduates over the past 15 years; see K. Maton, I. Hrabowski, and A. Freeman, "Increasing the Number of African American Phds in the Sciences and Engineering a Strengths-Based Approach," *American Psychologist* 59, no. 6 (2004). See also S. Kana'iaupuni, "Ka'akālai Kū Kanaka: A Call for Strengths-Based Approaches from a Native Hawaiian Perspective," *Educational Researcher* 34, no. 5 (2005).
[58] Bishop et al., "Te Kōtahitanga Phase 3 Whānaungatanga: Establishing a Culturally Responsive Pedagogy of Relations in Mainstream Secondary School Classrooms," Bishop et al; Chauvel and Rean.
[59] Ministry of Education, "Tertiary Education Strategy 2014-2019," Ministry of Education, (2015).

lead to positive impacts on learner motivation, exam results and resilience.[61] Educators' perceptions about intelligence also influence student achievement.

> *…if teachers believe that students' intelligence is mostly inherent and predetermined, they are more likely to think that their effort expenditure to improve student ability does not influence or change the fixed and uncontrollable entity of student intelligence.*[62]

We aimed to incorporate mindset theory into the enhanced programme and identified ways in which we could engage with Māori HSFY students over the importance of mindset. Growth mindset messages were imbedded into the programme, and peer facilitators (kaihautū) were selected for the SWAT component based on their belief in and capacity to model a growth mindset.

This growth mindset was incorporated in 2014 at an induction session for Māori HSFY students. Students were exposed to case studies describing how student grades improved after interventions. Students were exposed to core mindset theory concepts, including that intelligence and brain connections grow with hard work and effective strategies. The induction session presented the research findings of Dweck and others to reinforce the impact that attitude can have on academic results. The kaihautū of the SWAT component also supported the presentation, sharing their experiences as previous HSFY students, and reinforced the importance of adjusting their mindset to meet new challenges and embrace new content. This session also incorporated elements designed to negate stereotype threat.

Stereotype threat

The concept of stereotype threat was first developed by Claudia Steele in 1997[63] and has since become an expansive area of research in education, particularly in the United States. Stereotype threat has been put forward as a plausible argument to partially explain the gap in educational attainment between ethnic minority and non-minority students, and between women and men,

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[60] C. Dweck, *Mindsets and Math/Science Achievement* (New York: Carnegie Corporation of New York, Institute for Advanced Study, Commission on Mathematics and Science Education, 2008), 250.

[61] C. Dweck, *Mindset: How You Can Fulfil Your Potential* (Constable & Robinson Ltd, 2012); Dweck, *Mindsets and Math/Science Achievement*; A. Fegley, "Cultivating a Growth Mindset in Students at a High-Achieving High School," (D.Ed., University of Delaware, 2010); R. Sriram, "Rethinking Intelligence: The Role of Mindset in Promoting Success for Academically High-Risk College Students," (Ph.D., Azusa Pacific University, 2010); D. Yeager and C. Dweck, "Mindsets That Promote Resilience: When Students Believe That Personal Characteristics Can Be Developed," *Educational Psychologist* 47, no. 4 (2012); D. Yeager et al., "How Can We Instill Productive Mindsets at Scale? A Review of the Evidence and an Initial R&D Agenda," in *A White Paper prepared for the White House meeting on "Excellence in Education: The Importance of Academic Mindsets* (2013).

[62] S. Shim, Y. Cho, and J. Cassady, "Goal Structures: The Role of Teachers' Achievement Goals and Theories of Intelligence," *The Journal of Experimental Education* 81, no. 1 (2013): 89.

[63] C. Steele, "A Threat in the Air: How Stereotypes Shape Intellectual Identity and Performance," *American psychologist* 52, no. 6 (1997): 109; C. Steele and J. Aronson, "Stereotype Threat and the Intellectual Test Performance of African Americans," *Journal of Personality and Social Psychology* 69, no. 5 (1995); C. Steele, S. Spencer, and J. Aronson, "Contending with Group Image: The Psychology of Stereotype and Social Identity Threat," *Advances in Experimental Social Psychology* 34, (2002).

in areas where women are under-represented such as mathematics and engineering. The basic premise of stereotype threat is that negative stereotypes (about ethnic groups, social-class, gender and so forth) impact upon group members' self- and group perception, and that this can impact upon an individual's performance in a range of spheres (particularly test situations).[64] Stereotype threat has been conceptualised differently across the literature, leading some to argue that there are numerous forms of stereotype threat with each being characterised quite differently.[65] However, the underlying tenets of the concept are largely similar, wherein students from marginalised groups feel "….at risk for being negatively stereotyped, being judged or treated in a stereotyped manner, or anticipating the possibility of fulfilling a negative stereotype" and this leads targeted students to have higher anxiety and to perform poorly in test conditions.[66]

Stereotype threat has been empirically tested in a range of settings from students in primary through to tertiary study and has included studies undertaken across many different socio-demographic groups. Typically, members of the target group are assigned to *threa*t and *non-threat* control testing situations and then presented with cues of explicit or subtle stereotype statements. Drawn from Nguyen and Ryan's extensive 2008 meta-analyses, an example of explicit stereotype threat can include emphasising a comparison groups' superiority in a test module. More subtle examples include enquiring about ethnicity or gender prior to participants taking a test.[67] Findings from meta-analyses suggest that stereotype threat does influence learner outcomes and achievement for marginalised or minority groups and that this influence extends beyond the research environment.[68] However, as Nguyen and Ryan caution, the effects manifest differently in different settings.[69] Stereotype threat is purported to impact negatively on targeted individuals' cognitive processing and undermine self-efficacy, particularly in exam situations.[70]

Clearly the impact of stereotype threat has implications for Māori students and students from lower socio-economic backgrounds in university study in an academically demanding course such as HSFY. Given HSFY is the most direct pathway into health professional programmes at the University of Otago, and that Māori (in particular Māori from lower socio-economic

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[64] Steele and Aronson, "Stereotype Threat and the Intellectual Test Performance of African Americans."

[65] J. Shapiro and S. Neuberg, "From Stereotype Threat to Stereotype Threats: Implications of a Multi-Threat Framework for Causes, Moderators, Mediators, Consequences, and Interventions," *Personality and Social Psychology Review* 11, no. 2 (2007).

[66] K. Ryan and A. Ryan, "Psychological Processes Underlying Stereotype Threat and Standardized Math Test Performance," *Educational Psychologist* 40, no. 1 (2005).

[67] H. Nguyen and A. Ryan, "Does Stereotype Threat Affect Test Performance of Minorities and Women? A Meta-Analysis of Experimental Evidence," *Journal of Applied Psychology* 93, no. 6 (2008): 1316.

[68] Steele et al., "Contending with Group Image: The Psychology of Stereotype and Social Identity Threat."

[69] Nguyen and Ryan, "Does Stereotype Threat Affect Test Performance of Minorities and Women? A Meta-Analysis of Experimental Evidence."

[70] Steele, "A Threat in the Air: How Stereotypes Shape Intellectual Identity and Performance," 1330.

backgrounds) are under-represented across the programmes, challenges associated with stereotype threat (and its impact on academic achievement) needed to be considered in the redevelopment of Te Whakapuāwai.

The implications of negating stereotype threat and building self-efficacy amongst Māori HSFY students were critically important in programme development. We note that negating stereotype threat was already a key component of Te Whakapuāwai and is innate in a Māori strengths-based approach to improving learner outcomes. The programme is (and has always been) culturally affirming for Māori students. Communication and interaction with Māori HSFY students consistently reiterated that Māori success in HSFY is the norm and is an achievable goal through role-modelling, peer interaction and maintaining high expectations.

We sought to negate stereotype threat through the enhanced intervention by showcasing Māori academic excellence as the norm. Kaihautū and more senior Māori students frequently shared their stories with Māori HSFY students about countering negative stereotypes of Māori and working together to produce the best academic results possible.

Self-efficacy

Self-efficacy is identified strongly throughout the literature as a construct integral to student's academic success and persistence. Albert Bandura describes self-efficacy as *"…the belief in one's capabilities to organize and execute courses of action required to produce given attainments".* [71] The 'predictive power' of self-efficacy on students' academic grades and persistence has been well documented[72] and strongly suggests that *"students with high self-efficacy are more likely to engage in activities, work harder, persist longer when they encounter difficulties, use effective learning strategies, and demonstrate higher achievement".*[73] Students with high self-efficacy (that is, they hold a belief in their control over their learning and academic outcomes) will actively seek to adjust and develop their approaches to learning to increase their performance. As such, self-efficacy plays a key role in students becoming effective self-regulated learners, and influences a student's ability to perceive difficult content or questions as a challenge (as opposed to being a threat or something to avoid).[74]

> *Researchers have established that self-efficacy is an excellent predictor of academic motivation and achievement. Results of investigations conducted over the last 30 years have demonstrated that students' beliefs about their academic capabilities powerfully predict a wide range of academic*

[71] A. Bandura, *Self-Efficacy: The Exercise of Control* (New York: Freeman, 1997), 25.
[72] See for example; K. Multon, S. Brown, and R. Lent, "Relation of Self-Efficacy Beliefs to Academic Outcomes: A Meta-Analytic Investigation," *Journal of counseling psychology* 38, no. 1 (1991); B. Zimmerman, "Self-Efficacy: An Essential Motive to Learn," *Contemporary Educational Psychology* 25, no. 1 (2000).
[73] D. Schunk and P. Ertmer, "Self-Regulation and Academic Learning: Self-Efficacy Enhancing Interventions," in *Handbook of Self Regulation*, ed. M. Boekaerts, P. Pintrich, and M. Zeidner(San Diego, CA: Academic Press, 2000), 631.
[74] M. Chemers, L. Hu, and B. Garcia, "Academic Self-Efficacy and First Year College Student Performance and Adjustment," *Journal of Educational Psychology* 93, no. 1 (2001): 56.

> *behaviors…self-efficacy has proven to be a more consistent predictor of academic outcomes than have any other motivation constructs. This is in part because self-efficacy initiates and sustains motivation, and enhances the development of academic skills.*[75]

Self-efficacy influences the development of more effective metacognitive strategies and is also closely related to goal setting behaviours.

The enhanced programme aimed to encourage students to become agentic in their learning (autonomy), work towards mastery (through effective self-review) and have purpose (goal setting and orientation). This entailed being very clear about expectations for students to be active and reflective about their learning. This was also actively encouraged in the SWAT sessions held at the beginning of the year and the one-to-one meetings held between Māori HSFY students and staff at key points across the year.

Metacognition and self-regulated learning

In the literature the constructs of metacognition (simply defined as 'thinking about thinking'),[76] self-regulated learning, goal-associated behaviours and motivation are well developed and closely interrelated.[77] An effective self-regulated learner is someone that regularly assesses and monitors their learning strategies and develops new strategies (building on existing knowledge and feedback) to master new tasks. We endeavoured to work closely alongside Māori HSFY students to assess their current learning strategies, encourage higher order thinking and the acquisition of enhanced learning strategies through the peer facilitated SWAT sessions and the individual support provided through meetings and interviews with students.[78]

Environmental and cultural considerations

Cultural and environmental considerations were taken into account in the redevelopment of Te Whakapuāwai. Analysis of a range of interventions to improve academic attainment for students illustrates that programme effectiveness is improved when interventions are tailored to the environment (contextually specific) and when they actively encourage student interaction and metacognitive awareness.[79] Te Whakapuāwai was originally developed to be culturally

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[75] R. Klassen and E. Usher, "Self-Efficacy in Educational Settings: Recent Research and Emerging Directions," *Advances in Motivation and Achievement* 16, (2010).
[76] E. Lai, *Metacognition: A Literature Review* (2011).
[77] M. Yusuf, "The Impact of Self-Efficacy, Achievement Motivation, and Self-Regulated Learning Strategies on Students' Academic Achievement," *Procedia - Social and Behavioral Sciences* 15, no. 0 (2011).
[78] D. Hacker, J. Dunlosky, and A. Graesser, *Handbook of Metacognition in Education* (Routledge, 2009); G. Schraw and D. Moshman, "Metacognitive Theories," *Educational Psychology Review* 7, no. 4 (1995); R. Hollingworth and C. McLoughlin, "Developing the Metacognitive and Problem Solving Skills of Science Students in Higher Education," *Teaching in the Sciences: Learner-centered approaches*, (2005).
[79] J. Hattie, J. Biggs, and N. Purdie, "Effects of Learning Skills Interventions on Student Learning: A Meta-Analysis," *Review of Educational Research* 66, no. 2 (1996); P. Ragosta, "The Effectiveness of Intervention Programs to Help College Students Acquire Self-Regulated Learning Strategies: A Meta-

responsive to students and we sought to adjust the environment and our approach to suit student needs. [80]

Some students arrive to HSFY (and university) with metacognitive skills to adapt to the challenges of the HSFY course. Other students, however, particularly those that are the first in their family to undertake tertiary study, may arrive under-prepared for the demands of HSFY lectures, laboratory assessments and tutorials. For the best start possible, HSFY students must learn how to effectively manage their time and the volume of HSFY content very quickly. Similar to most university courses, early preparation for assessments and exams is critical. The teaching style in HSFY differs markedly from high school learning and the number of HSFY students can exceed 1500 enrolled in each paper. The university environment and institutional culture can be significantly different from what students might have anticipated.

Student voice

A central objective in the enhanced intervention was for all Māori HSFY students to make gains in their learning. In implementing this project we acknowledged that some students needed more assistance in becoming familiar with the university environment and its academic demands than others. The literature emphasises looking at students' educational experiences 'through the eyes of the student' and being attuned to the impact that challenges such as stereotype threat can present. Feedback obtained from Māori HSFY students prior to 2014 informed much of the development of the enhanced intervention as students shared their perspective about what would be useful to support them through the course. The SWAT component of the enhanced intervention was largely constructed from student feedback and was based loosely on the well-known Peer Assisted Study Skills Sessions (PASS) programme.[81]

Several years of research into HSFY and the existing Te Whakapuāwai programme provided excellent insight into the Māori HSFY experience from the student point of view and comprehensive understandings of HSFY overall. Accumulated qualitative data from interviews, focus groups, open-ended survey questions, alongside informal conversations with Māori HSFY students provided a wealth of information. Our experiences working with Māori students coupled with an understanding of the institutional culture and context contributed considerably to the development, design and implementation of the enhanced intervention.

Theoretical framework: overview

The parallels between theories of eliminating stereotype threat and Kaupapa Māori approaches to supporting Māori learners are very strong. Seminal works by Māori educationalists such as Graham Smith, Linda Smith, Russell Bishop and Wally Penetito (to name but a few) have long

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Analysis," (City University of New York, 2010); S. Robbins et al., "Do Psychosocial and Study Skill Factors Predict College Outcomes? A Meta-Analysis," *Psychological Bulletin* 130, no. 2 (2004).

[80] Zepke and Leach, "Integration and Adaptation: Approaches to the Student Retention and Achievement Puzzle."

[81] University of Wollongong, https://www.uow.edu.au/student/services/pass/centre/overview/index.html (accessed 11 February 2013).

argued the importance of changing 'mindset', removing deficit thinking (stereotyping by teachers) and empowering learners to feel valued, autonomous and capable in a manner that is culturally affirming (mitigating stereotype threat and encouraging self-efficacy).[82]

Understandings about student learning development were imbedded into the individual and group components of the programme as a guiding theoretical framework and approach to better support students. The constructs identified in the literature linked well to the existing Te Whakapuāwai programme and the Māori concepts underpinning it. Our goal was to incorporate theory and practice together (praxis) with a view to improve academic outcomes for Māori HSFY students, including those from lower socio-economic backgrounds and / or lower decile schools.

2.2 PROGRAMME COMPONENTS

SWAT - A SIX-WEEK PEER FACILITATED METACOGNITIVE DEVELOPMENT/ ACCELERATED LEARNING PROGRAMME

Drawing on the literature and theory (outlined above) SWAT was developed with the goal of accelerating Māori HSFY students' metacognitive development ('thinking about thinking'), study skills and self-efficacy. There is a vast amount of literature and empirically validated case studies on the effectiveness of peer-support programmes for students, in particular a Supplementary Instruction (SI) course developed in the United States[83] and a derivative of this programme called Peer Assisted Study Sessions (PASS).

PASS (like SI) is a peer-learning programme that is used widely in many Australian and New Zealand tertiary institutes. PASS encourages students to work collaboratively in groups to devise problem-solving methods, learning strategies and reinforce key learning for particular tertiary subjects. Case studies and research pertaining to PASS suggest a positive relationship between PASS attendance and improved final academic results, particularly for under-represented and minority learners.[84] While PASS is shown to be an effective programme for many students, our goal was to work with students to develop effective skills and strategies for an entire academic course (comprising physics, chemistry, human biological systems, cellular and molecular biology and epidemiology) and not one particular paper.

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[82] G. Smith, *Transforming Education: Māori Struggle for Higher Education* (Wellington: Manu Ao Weekly Seminar); G. H. Smith, "Indigenous Struggle for the Transformation of Education and Schooling," in *Alaskan Federation of Natives Convention. United States* (2003); Smith; Bishop et al., "Te Kōtahitanga Phase 3 Whānaungatanga: Establishing a Culturally Responsive Pedagogy of Relations in Mainstream Secondary School Classrooms," Bishop et al.

[83] D. Arendale, "History of Supplemental Instruction (SI): Mainstreaming of Developmental Education," *Histories of Developmental Education*, (2002); R. Blanc, L. DeBuhr, and D. Martin, "Breaking the Attrition Cycle: The Effects of Supplemental Instruction on Undergraduate Performance and Attrition," *The Journal of Higher Education*, (1983).

[84] J. van der Meer and S. Scott, "Including Everyone: A Peer Learning Program That Works for under-Represented Minorities," *The International Journal of the First Year in Higher Education* 4, no. 1 (2013); J. van der Meer and C. Scott, "Shifting the Balance in First-Year Learning Support: From Staff Instruction to Peer-Learning Primacy," *Journal of Peer Learning* 1, no. 1 (2008).

Our work with HSFY students showed that many students were unfamiliar with how to study and manage their time effectively in an academically demanding course. We drew on many of the key elements of PASS that aligned with Māori pedagogies (such as ako and tuākana/tēina or peer-to- peer reciprocal teaching and learning) but adapted this programme to be solely study skills and strategies focused (as opposed to content focused). A six-session programme consisting of one- hour per week was developed for Māori HSFY students to begin in week one, semester one.

Māori students in professional programmes who had completed HSFY recently to a high academic standard were interviewed and if successful underwent training to become kaihautū (peer facilitators) to lead the SWAT sessions with the Māori HSFY students each week. The kaihautū training consisted of a full-day workshop where we explained the impetus behind the programme and invited them to share their thoughts and reflections as former HSFY students. Kaihautū were then provided an overview of the expectations of them as facilitators of the programme, in particular that their role was not to show students how to study but lead discussion and trials exploring possible (evidence-based) techniques for note taking, lecture summaries, pre-readings and so forth. Kaihautū were welcome to share their experiences and key learnings from HSFY with their group but the key point was that the students participating in SWAT had to draw their own conclusions and collaborate about the best study methods for them.

Kaihautū were role models for the Māori HSFY students and demonstrated that gaining entry into difficult to enter programmes such as medicine and dentistry was possible. Kaihautū were asked to model a growth mindset and positive attitude towards HSFY at all times and support their groups to become effective self-regulated learners.

The SWAT component entailed groups of no more than 15 HSFY students led by their kaihautū focusing on important skills specific to university study, e.g., constructing lecture summaries, how to prepare for tutorials, effective time and resource management, exam preparation and so forth. SWAT sessions were designed to foster communities of learning[85] amongst the students, enhance whanaungatanga and provide additional motivation for Māori HSFY students.

ONE-TO-ONE ADVISING

The concept of one-to-one advising or interviewing between students and staff is not new. Internationally institutions employ and train people in specific roles such as learning advisors, academic advisors, careers advisors and student counselors. These people conduct one-to-one sessions with students as a prime function of their roles. There are some clear distinctions between these roles, wherein learning advisors focus predominantly on students' academic development as opposed to counselors who typically counsel students on a range of socio-psychological related issues. There is not the capacity in this report to describe the similarities

[85] N. Shapiro and J. Levine, *Creating Learning Communities: A Practical Guide to Winning Support, Organizing for Change, and Implementing Programs. Jossey-Bass Higher and Adult Education Series* (San Francisco: Jossey-Bass, 1999); C. Zhao and G. Kuh, "Adding Value: Learning Communities and Student Engagement," *Research in Higher Education* 45, no. 2 (2004).

and differences between the various roles or scope of practice. Needless to say, much has been written about models for advising students in higher education and the positive relationship between advising and student retention and academic performance.[86]

The importance of purposeful interactions between students and staff is well-documented in 'first year experience' literature as integral to student retention and persistence in higher education..[87] Through the process of one-to-one meetings with students, staff might be alerted to specific challenges and issues students may be experiencing at the individual level.

The literature identified a number of advising models, guides and approaches to training[88]. However, we did not find anything that aligned tightly with our particular approach to meeting with students individually. The goal of each half-hour meeting with Māori HSFY students is to identify if the students needed additional assistance beyond what was being provided. The conversations aimed to be holistic, discussing more than the student's academic needs, covering areas such as accommodation, student loan/allowance payments, balance between study and other activities alongside discussing if students were feeling settled in the course and socially on campus. Meetings were an opportunity to get to know the students and for students to raise any concerns they might have. It also provided a chance to direct students to additional university services if they felt this would be beneficial. Importantly, individual meetings allowed for tailored course advising for each student, ensuring that students were familiar with what the requirements are for progression into a professional programme, how to plan a degree and what career pathways students could consider in the future.

STUDY WĀNANGA

We identified a need for additional intensive academic support for Māori HSFY students beyond the existing tutorial assistance. Previous Māori HSFY students identified tutors who were most helpful in assisting them to understand the HSFY content and concepts. Full weekend wānanga (or workshops) were coordinated including several hours of study on Friday evening, Saturday day and Sunday day at key points in the year. Study wānanga were piloted in 2014 (with four sessions held in semester one). Feedback from attendees was overwhelmingly positive and additional wānanga were coordinated for the 2015 cohort. Eleven sessions were held in semester one, 2015.

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[86] L. Hutson Bloom, L. He, Y., *The Appreciative Advising Revolution* (Champaign Illinois: Stipes, 2008); G. Barnes-Gregory, *Academic Advising: Beyond Course Selection* (Germany: Lap Lambert Academic Publishing, 2010); R. Fox, "Delivering One-to-One Advising: Skills and Competencies," in *Academic Advising: A Comprehensive Handbook*, ed. V. Gordon et al.(San Francisco: Jossey-Bass, 2008).

[87] R. Reason, P. Terenzini, and R. Domingo, "First Things First: Developing Academic Competence in the First Year of College," *Research in Higher Education* 47, no. 2 (2006).

[88] Bloom; G Kuh et al., "What Matters to Student Success: A Review of the Literature," *Commissioned Report for the National Symposium on Postsecondary Student Success: Spearheading a Dialogue on Student Success* (2006); Barnes-Gregory.

GROUP AND INDIVIDUAL PROGRAMME COMPONENTS

Table 2.1 provides an overview of programme components developed for inclusion into Te Whakapuāwai. The left column presents group components and the right shows components tailored individually to Māori HSFY students.

Each component and justification for inclusion to the programme is explained in more detail earlier in this section.

Table 2.1: Components added to the existing Te Whakapuāwai programme

Group Components	**Individual Components**
Whakawhanaungatanga	
Early contact and guidance with transition into HSFY and Otago	Streaming into additional tutorials for all subjects based on self – identified level of previous exposure to subjects
Kaihautū training	Individual learning assessment (Motivated Strategies for Learning Questionnaire)[89] pre- and post- SWAT sessions
A comprehensive induction into the programme for participants	Individual goal setting/ 'one-to-one meeting, week one, semester one, including hauora/ wellbeing component
Six-week peer facilitated metacognitive development/ accelerated learning programme (SWAT)	Individual goal setting/ 'check in' interview post mid-terms, including hauora/ wellbeing component
Study wānanga - pre mid-term and final exams lengthened study sessions with subject specific tutor support	Ongoing individual support and course advising for admissions into professional programmes
Ongoing group support and guidance – opportunities for course advising, fostering communities of learning and academic excellence	Semester two course advising and assistance

Conceptually the development of the enhanced intervention involved a comprehensive investigation into what *might* further improve outcomes for Māori learners in the HSFY course. Then identifying how best to put this into practice without impacting too much of Māori HSFY students' existing heavy workloads. We designed the programme to include individual, small group and full group support and sought to identify through the *Weaving Our Worlds* research project what components were successfully meeting programme objectives. An overview of the enhanced intervention programme is provided in the following section alongside some information about programme delivery of the 2014 pilot.

[89] P. Pintrich et al., *A Manual for the Use of the Motivated Strategies for Learning Questionnaire (Mslq)* (Ann Arbor: University of Michigan, National Centre for Research to Improve Postsecondary Teaching and Learning, 1991); P. Pintrich et al., "Reliability and Predictive Validity of the Motivated Strategies for Learning Questionnaire (Mslq)," *Educational and psychological measurement* 53, no. 3 (1993).

2.3 PROGRAMME DELIVERY, 2014

A total of 140 Māori students were enrolled in the HSFY course at the beginning of 2014, the highest number of Māori HSFY students on record. Students were contacted prior to their arrival at Otago by email and provided with information including key contacts. A follow-up phone call to students was made in late January to provide additional information and about participating in an introductory session about the programme, scheduled for the first day of orientation week. This first session included a 'meet and greet' and an overview of what students could expect from the enhanced support programme. An additional HSFY information session was held mid-week to provide an opportunity for students to get to know one another.

The first SWAT session was held prior to the first week of lectures at the end of orientation week and involved an interactive lecture on motivation and goal setting, introductions from the kaihautū and their advice/experiences as previous HSFY students and a presentation about growth mindset and the evidence associated with this. The following week, students were brought together to meet one another and the kaihautū, learn about the admissions procedures for professional programmes and have any questions about HSFY clarified. Students were then split into their SWAT groups based on random selection and assignment with a 1:15 kaihautū to student ratio. SWAT sessions took place on Saturday mornings for the first five weeks of classes (with one session off for an assessment).

2.4 QUALITY IMPROVEMENT AND 2015 PROGRAMME DELIVERY

Following participant feedback about the enhanced programme small adjustments were made for programme delivery in 2015. New kaihautū were selected and trained for 2015. Criteria for kaihautū selection required that students had participated in SWAT during their HSFY year, passed all seven of the HSFY papers and entered into a professional programme in 2015. SWAT sessions were condensed into fewer weeks (three instead of six) and more study wānanga were delivered in semester one. Additional academic tutorials in physics were also provided for students who did not live in a residential college (the majority living in shared flat situations). A total of 125 Māori students were enrolled in HSFY in 2015.

3. *WEAVING OUR WORLDS: PROGRAMME LOGIC AND EVALUATION*

3.1 PROGRAMME LOGIC

The *Weaving our Worlds* project encompasses:

- the enhancement, delivery and quality improvement of the Te Whakapuāwai HSFY Māori student support programme (2014-2015);
- evaluative research (process and outcomes) investigating and reporting on the effectiveness of the programme and key learnings associated with best practice and achieving equity; and
- a plan for dissemination of key learnings.

The programme logic, shown below, visually displays these aspects of the *Weaving our Worlds* project and positions them alongside the project's purpose. The programme logic thus includes the context or drivers behind the project, the priorities or values underpinning it and the inputs (resources), activities and outputs to achieve the overarching goal. The programme logic also includes the time-bound short-, medium- and long-term outcomes of the project to assist with evaluation about the effectiveness of the support programme and the *Weaving Our Worlds* project.

The programme logic illustrates the linkages between the differing aspects of the project and can be aligned with the overall project goals and expected outcomes.

FIGURE 3.1: WEAVING OUR WORLDS: PROGRAMME LOGIC

Goal: To evaluate the impact of an enhanced strengths-plus-evidence-based support programme on the retention and academic progression of Health Science First Year (HSFY) Māori learners from diverse educational and socio-economic backgrounds and disseminate findings about the programme's critical success factors, overall impact on learner development, academic progression, satisfaction and equity outcomes.

Context

Under-representation of Māori in NZ Health Workforce

Low progression of Māori through tertiary study

Low progression of socio-economically disadvantaged students through tertiary study

Priorities

Kaupapa Māori

Strengths-plus-evidence-based

Equity-focused

Inputs

Funding

Staff – programme and research

Kaihautū (peer facilitators)

Literature and evidence

Data

Resources

Facilities

Activities

Programme:

Kaihautū training

SWAT delivery

One-to-one meetings

Tutorials and wānanga

Hui – admissions information, advising and planning

Research:

Tracking and monitoring

Data collection and analysis

Communication

Outputs

Programme:

All programme components delivered

Students course advised

Quality Improvement of programme

Research:

A comprehensive database

Phase One and Two analysis – process and outcomes and report

Phase Three analysis and report

Outcomes and Impact

Short Term

0 – 12 Months

High student engagement

Students are very satisfied

Progression into semester two study is increased (when compared against previous Māori HSFY cohorts)

Students gain entry into a professional programme

Students are well advised

Programme is quality-improved

Intermediate

2 – 3 Years

Sustained outcomes from 0-12 months

There are increased outcomes (academic) for students from socio-economically disadvantaged backgrounds

Phase One and Two analysis and report complete

Phase Three analysis and report complete

Long Term

3+ Years

Project findings widely disseminated

Significant increase in number and diversity of Māori entering into and graduating from professional programmes

Evaluation

3.2 PROGRAMME AND EVALUATION MAP

The programme and evaluation map provides more detail about the relationship between programme components and the evaluation of those components. The map shows a visual overview of the enhanced programme and evaluation points.

The outer circles show the components of the programme that involve group support and activity. The inner circles show the individual components. Whanaungatanga is a core element of the programme and underpins all aspects.

With regard to evaluation and research, data collection for key qualitative and quantitative data occurs at a range of points across the year. This allows for immediate and longer-term quality improvement and specific evaluation associated with novel and longstanding components. This approach allows for specific tailored evaluation for each component of the programme, in addition to the programme overall.

Overall outcomes and the analysis plan are included in the next part of this report. Figure 3.2 also highlights that both quantitative and qualitative data are collected at multiple points.

The development and maintenance of an accurate and comprehensive database has been an important part of this project and is included within the programme logic.

FIGURE 3.2: WEAVING OUR WORLDS PROGRAMME AND EVALUATION MAP

4. RESEARCH AND EVALUATION OUTCOMES

4.1 OVERVIEW

Findings are presented in alignment with the *Weaving Our Worlds* project questions.

1) **Student profile and diversity:** Who were the Māori students in HSFY? How did they differ in terms of their key socio-demographic and educational backgrounds?
2) **Student perceptions:** How did Māori HSFY students perceive the programme and its components? What were their thoughts on the impacts on practical aspects alongside the perceived impacts for students individually? What were the impacts on students delivering the peer-led components?
3) **Participant academic outcomes:** What was the impact of the enhanced intervention on Māori student academic outcomes in 2014 and 2015?
4) **Outcomes and equity:** How did the programme impact on the diversity of Māori students across NZDep2013, school decile and secondary school science attainment? The focus here is on the impact on Māori students in HSFY, 2014 and 2015, who participated in the enhanced Te Whakapuāwai programme. There is early analysis of this aspect of the project with a planned in-depth analysis of across-cohort comparisons following 2016 when additional outcomes data will be added.

4.2 PARTICIPANT PROFILE

Participants in the *Weaving Our Worlds* project were Māori students undertaking HSFY at the University of Otago in 2014 and 2015. The socio-demographic and educational profile of students is presented in this section. Māori students, who self-identified as Māori and were enrolled in the seven HSFY papers at 4 April of the year of study, were included as participants.[90]

SOCIO-DEMOGRAPHIC PROFILE

Table 4.1: Demographic profile of Māori students in HSFY, 2014/15

Variable		2014		2015		Total	
		N	%	N	%	N	%
Gender	Female	87	62.1	82	65.6	169	63.8
	Male	53	37.9	43	34.4	96	36.2
	Total	140	100	125	100	265	100
Age group	<20 years	100	71.4	89	71.2	189	71.3
	20 to 24 years	34	24.3	34	27.2	68	25.7
	25+ years	6	4.3	2	1.6	8	3.0
	Total	140	100	125	100	265	100%
NZDep2013	1 to 3 (least deprived)	43	31.2	41	33.9	84	32.4
	4 to 6	54	39.1	26	21.5	80	30.9
	7 to 10 (most deprived)	41	29.7	54	44.6	95	36.7
	Total	138	100	121	100	259	100
School decile	8 to 10	56	41.2	48	39.7	104	40.5
	5 to 7	41	30.1	42	34.7	83	32.3
	1 to 4	39	28.7	31	25.6	70	27.2
	Total	136	100	121	100	257	100

[90] 4 April is the final date that students may change their course of study or papers at the University of Otago.

Variable		2014		2015		Total	
Years since Leaving secondary school	1 or 2 years	119	85.0	111	88.8	230	86.8
	3 to 5 years	15	10.7	10	8.0	25	9.4
	6+ years	6	4.3	4	3.2	10	3.8
	Total	140	100	125	100	265	100
Region of home address	Northland	6	4.3	6	4.8	12	4.5
	Auckland	29	20.7	16	12.9	45	17.0
	Waikato	14	10.0	9	7.3	23	8.7
	Bay of Plenty / Lakes	11	7.9	8	6.5	19	7.2
	Taranaki	3	2.1	3	2.4	6	2.3
	East Coast	5	3.6	5	4.0	10	3.8
	Wanganui / Horowhenua	14	10.0	10	8.1	24	9.1
	Hawkes Bay	1	0.7	5	4.0	6	2.3
	Wellington / Wairarapa	17	12.1	16	12.9	33	12.5
	Nelson / Marlborough	3	2.1	8	6.5	11	4.2
	West Coast	3	2.1	2	1.6	5	1.9
	Canterbury / South Cant.	11	7.9	13	10.5	24	9.1
	Otago	19	13.6	16	12.9	35	13.3
	Southland	3	2.1	6	4.8	9	3.4
	Overseas	1	0.7	1	0.8	2	0.8
	Total	140	100	124	100	264	100
North or South Island	North Island	100	71.4	78	62.9	178	67.4
	South Island	39	27.8	45	36.8	84	31.9
	Overseas	1	0.7	1	0.8	2	0.8
	Total	140	100	124	100	264	100

There were a total of 265 Māori participants in the *Weaving Our Worlds* project with 140 Māori students in 2014 and 125 in 2015. Although there were some variations between the 2014 and 2015 cohorts for key demographic factors, these variations were not large.

Māori students studying in HSFY in 2014 and 2015 were a diverse group of young people. Females made up two- thirds of participants and the vast majority were young people under 20 years of age. Most students had left school within the previous two years with a small number having left school six or more years before.

From a socio-economic perspective, the data shows that Māori students are spread across NZDep2013 scores 1 to 10 with 32.4% deciles 1 to 3 (least deprived), 30.9% deciles 4 to 6 and 36.7% deciles 7 to 10 (most deprived). This diversity is also shown in secondary school decile. Secondary school decile profile shows around 40% of students attended high decile schools (less deprived 8 to 10), 32.3% middle deciles and 27.2% lower decile schools.

Geographically the Māori students in HSFY are from throughout New Zealand with the highest proportions coming from the Auckland area (17.0%), Otago (13.3%) and Wellington regions (12.5%). Of note, there are a number of students from more rural and provincial areas. Two-thirds are from the North Island.

Analysis of iwi information on students (not presented in this table) shows that students are from a diverse range of iwi with the largest group being Ngāi Tahu (around 25% of all students) followed by Ngāpuhi (around 20% of students). Around a quarter of students reported more than one iwi.

ACADEMIC PROFILE – NCEA LEVEL 3 SCIENCE PARTICIPATION AND ATTAINMENT

A range of data about Māori student NCEA participation and attainment was collected. One important factor for HSFY success is student academic preparation, particularly in relevant science subjects – biology, chemistry and physics. An ideal preparation includes having attained a minimum 14 or more credits in NCEA Level 3 in each of these subjects. Table 4.2 shows the level of NCEA participation and attainment for Māori students in 2014 and 2015.

Table 4.2: Māori HSFY student NCEA science participation / attainment

	2014		**2015**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
NCEA Level 3 Biology						
Attainment (14+ credits)	88	62.9	82	65.6	170	64.2
Participation (1-13 credits)	20	14.3	18	14.4	38	14.3
No NCEA L3 biology	19	13.6	14	11.2	33	12.5
N/A (not NCEA L3)	13	9.2	11	8.8	24	9
TOTAL	140	100	125	100	265	100
NCEA Level 3 Chemistry						
Attainment (14+ credits)	73	52.1	67	53.6	140	52.8
Participation (1-13 credits)	32	22.9	38	30.4	70	26.4
No NCEA L3 chemistry	22	15.7	10	8	32	12.1
N/A (not NCEA L3)	13	9.3	10	8	23	8.7
Total	140	100	125	100	265	100
NCEA Level 3 Physics						
Attainment (14+ credits)	52	37.1	49	39.2	101	38.1
Participation (1-13 credits)	35	25	33	26.4	68	25.7
No NCEA L3 physics	41	29.3	33	26.4	74	27.9
N/A (not NCEA L3)	12	8.6	10	8	22	8.3
Total	140	100	125	100	265	100

Table 4.2 shows marked differences in participation and attainment of NCEA Level 3 across science subjects by Māori HSFY students. Almost two-thirds of Māori students (64.2%) attained 14 or more credits of biology and 52.8% had 14 or more credits in chemistry. However, only 38.1% had achieved this level of credits in physics (an important preparatory paper for HSFY physics). Although 25.7% of students

had some participation in physics, over a quarter (27.9%) had no NCEA Level 3 physics while 12.5% of students had no NCEA Level 3 biology and 12.1% had no Level 3 chemistry.

Overall analysis of students' educational backgrounds for the 2014 and 2015 Māori HSFY cohorts indicates that as a group, based on NCEA science attainment, many Māori students are under-prepared for HSFY from a subject perspective.

Table 4.3 shows the number of NCEA Level 3 science subjects (physics, chemistry and biology) that Māori students undertaking HSFY in 2014 and 2015 participated in, and the number of students attaining 14 credits or more in these subjects. The table shows that there were a small number of students (around 9%) who did not sit NCEA Level 3, including a number of students who undertook other qualifications (e.g., Cambridge exams) or who were older students returning to university after several years. Only 24.2% of the HSFY Māori students had the 'ideal' preparation for HSFY i.e., had attained 14 credits or more in the three science subjects at Level 3.

Table 4.3: Māori HSFY student NCEA participation/attainment by number of science subjects

	Number of science subjects	2014		2015		Total	
		N	%	N	%	N	%
Participation (any credits) number of subjects (biology, chemistry, physics)	0	7	5	4	3.2	11	4.2
	1	16	11.4	7	5.6	23	8.7
	2	36	25.7	33	26.4	69	26
	3	68	48.6	70	56	138	52.1
	N/A (not NCEA L3)	13	9.3	11	8.8	24	9
	Total	140	100	125	100	265	100
Attainment of 14 credits or more, number of subjects (biology, chemistry, physics)	0	25	17.9	14	11.2	39	14.7
	1	24	17.1	33	26.4	57	21.5
	2	45	32.1	36	28.8	81	30.6
	3	33	23.6	31	24.8	64	24.2
	N/A (not NCEA L3)	13	9.3	11	8.8	24	9
	Total	140	100	125	100	265	100

4.3 STUDENT PERSPECTIVES

What was the perceived satisfaction of the enhanced intervention amongst Māori HSFY students in 2014 and 2015? Feedback was gathered from participants about key components of the programme and their overall experiences.

ENGAGEMENT AND PARTICIPATION

Participation was measured through (where practical) attendance sheets. Māori HSFY student engagement was high although attendance at certain events proved hard to measure accurately e.g., when students were late, or where a more rigorous approach to collecting attendance would have run

counter to the kaupapa of the service. Attendance at SWAT sessions and study wānanga was consistently high with more than 80% of Māori HSFY students attending the early SWAT sessions and study wānanga.

PARTICIPANT PERSPECTIVES

Participant feedback about Te Whakapuāwai (2014-2015) was gathered in a number of ways. Students were asked to complete an evaluation at the end of each SWAT session and kaihautū also completed reflection sheets at the end of each session. Evaluations were completed for the study wānanga sessions and participants completed questionnaires via Survey Monkey about their perceived satisfaction with the programme overall including views on the one-to-one meetings with staff. Several focus groups were also held with kaihautū and SWAT participants in the middle and at the end of the academic year. Themes from these focus groups were documented.

SWAT Session Feedback, Kaihautū and Participants

Evaluation sheets of the SWAT sessions were provided weekly. Table 3.1 shows an overview of each SWAT session and reflections from students and kaihautū gathered from evaluations.

Table 4.4: SWAT session student and kaihautū feedback

Session Attended/Type /Objectives	**No. of Participants**	**Participant responses, 'what I learnt'**	**Kaihautū Feedback, 'what went well'**
Session 1: Lecture style full group presentation Expectations and responsibilities Motivation Goal-setting General information	*122*	*"I retained some un-real and possibly the best advice to date related to studying. This WILL get me past the finish line."* *"Really good to be prepared for study, motivation, and a good attitude and to see others who have gone through the course previously."* *"Felt like I learnt a lot about how to motivate myself and not panicking so much."*	*N/A*
Session 2: Study and revision begins from day one Ice-breakers Time management	*83*	*"Learning more about balancing, time and life. Good skills on time management."* *Everything, made things clear that I'm not the only one feeling behind already."* *"Meeting and getting to know everyone, so everyone's comfortable to talk in front of each other."* *"Getting to know everyone in my SWAT team that I'll be spending forever with."*	*"They started making content related jokes e.g., urgent vs non-important which means they understood."* *"Everyone talked a lot and got on well especially after the ice- breakers, they didn't want to stop talking."* *"They really liked being able to have a plan to go away with and use for the week."* *"I felt as though every member understood the key objectives."*
Session 3: Being prepared for, attending, and taking quality notes in lectures is the key to success	*75*	*"Cornell method was cool! I'm going to try it!"* *Understanding what's important to study and what's not important to*	*"They were extremely punctual coming back from the 5 min break after I mentioned the importance of time discipline last week."*

Lecture-based skills Reading techniques Note-taking		*study. Relieves stress."* *I thought going over note taking techniques was useful because uni here is completely different to how I have been doing it in the past."* *"I learnt how to efficiently pre-read finally!! It's something I previously struggled with. Also now I will try a new way to take notes, the way we learnt today it was really so helpful."*	*"Students were able to recite key messages from week 2. 4/6 students brought time management sheets and found it very helpful."* *"Everyone lacked a structured note taking system and found Cornell method structured and methodical. Great session."* *"Mentees were interactive this week. They all completed homework from last week. They seemed more enthusiastic."*
Session 4: Revising early and often will make tests much easier Revision skills Note-making Creating revision resources	*62*	*"Quick easy way to summarise."* *"Tips/tricks with flash cards."* *"The flash cards were really helpful. Feeling much more confident about the HUBS test now."* *"Learning that I need to summarise. It was really good learning what I need to know."* *"I learnt good ways to study, we did practice questions."*	*"They really enjoyed working together as well as quizzing each other on the cue cards. Got the message of how important summarising is."* *"This session was the best so far. Students were able to interact a lot more than the last couple of sessions. Everyone was interested because of having real content that they were able to discuss."* *"Simple but effective material, everyone is real close and open. Everyone really enjoyed today."*
Session 5: Being well-prepared for exams success in itself, rather than merely being the means to success Exam preparation Managing workload Revisiting learning objectives Breaking down exam questions	*67*	*"Gave a lot of good advice and shared a lot more personal experiences."* *"Covering exam content and techniques, super helpful."* *"Went over knowledge previously learnt which helped to cement it. Now know the structure of the exams which makes me feel relaxed."* *"[Kaihautū] effectively put ideas across to the group about new study techniques. We had good group discussions."* *"Everything was perfect."*	*"They really appreciate the advice/heads up on how to strategise/priorities in the exam. More personal, got to share a lot of my experiences."* *"Gave everyone a chance to share how they were revising and how it was working/not working for them."*

Feedback from Māori HSFY students participating in the SWAT component and the kaihautū were positive. Participants' reflections frequently featured positive feedback on new information gathered in the sessions and how they could apply this to HSFY.

Table 4.5 below provides an overview of student satisfaction with the SWAT component gathered from the online survey. A total of 72 students (51%) of the 2014 cohort responded to the online survey. Only 29 students (23%) of the 2015 HSFY cohort responded to the 2015 survey.

Table 4.5: Student evaluations of SWAT overall

Question	2014 'Strongly agree' or 'Agree' %	2015 'Strongly agree' or 'Agree' %
Recommending SWAT to others		
I would definitely recommend SWAT to future Māori HSFY students	100%	84.2%
Questions about 'pre-SWAT' views		
I felt anxious to attend the SWAT sessions	19%	20%
I felt excited to attend the SWAT sessions	84%	75%
I had no desire to attend the SWAT sessions	7%	10%
Questions about experience of SWAT		
The SWAT sessions support Māori students well culturally	100%	83%
I have learnt a lot from my kaihautū at SWAT	100%	80%
I have learnt a lot from other people in my SWAT group	96%	70%
I felt comfortable asking questions and sharing my thoughts in the SWAT sessions	96%	80%
Each SWAT session has been very well organised	94%	75%
The content of each SWAT session lines up well with my HSFY study	87%	75%
My kaihautū made me feel comfortable and welcome in the SWAT sessions	96%	85%
Questions about usefulness of what was learnt at SWAT		
I have learnt new study skills through the SWAT sessions	96%	85%
The strategies we learn in SWAT sessions are very useful for HSFY	96%	85%
The strategies we learn in SWAT sessions are useful in other aspects of my life	91%	60%
SWAT has impacted positively on my time management	91%	65%
SWAT has impacted positively on my studies	92%	80%
I have learnt nothing new at SWAT	8%	20%
I feel motivated by my SWAT sessions	93%	75%
I have gotten to know other Māori HSFY students better through SWAT	93%	70%

Overall responses about SWAT were positive. However, the limited number of responses to the 2015 survey (29/125) did not provide an adequate picture of the perceived efficacy of SWAT in 2015. Review of the response rate highlighted a problem with the timing of the delivery for the overall SWAT evaluation. It was not ideal and changes for 2016 in relation to survey delivery are planned.

Themes from the qualitative aspects included a perception of the positive impact of the SWAT programme on maintaining motivation and encouragement to persevere with the HSFY course. Students appreciated the small group sizes and having a mentor who had been through HSFY successfully in the previous year. Feedback about the kaihautū was extremely positive with many participants reflecting they found having a mentor 'reassuring' and having "people that have been through this before sharing their techniques and experiences..." (HSFY student, 2014) was really valuable. Importantly, many of the students reflected the key objectives of the SWAT sessions in their overall feedback with effective time management and newly acquired techniques for study being standout themes in the survey data. Thus, a combination of skill development, whakawhanaungatanga and peer-assisted learning has been successful in supporting and engaging Māori students in university study, with the MHWDU team and with each other.

Kaihautū Feedback about SWAT

All kaihautū completed reflection sheets at the end of each SWAT session and also completed the surveys provided. Kaihautū felt they had developed valuable leadership skills and learnt content applicable to their own study. All kaihautū enjoyed delivering SWAT and were grateful for the opportunity to share their HSFY experience and to assist and inspire new HSFY students.

Many of the themes that emerged about SWAT demonstrated ako (reciprocal teaching and learning) in practice:

"I learned a lot from the students and their own personal experiences. I was able to pass on my skills and knowledge and share my own personal experiences. Inspired future rangatahi Māori." (Kaihautū 2014)

The kaihautū particularly enjoyed seeing an increase in confidence amongst their SWAT groups, with one kaihautū stating that the most valuable aspect of SWAT for them was "seeing the students come into the class on the first day nervous/anxious and leave on the last confident". (Kaihautū 2015).

The kaihautū feedback about SWAT closely mirrored the feedback gathered from the participants and overall both kaihautū and participants felt they gained much from being involved with SWAT and enjoyed the programme.

Within both Māori health and Māori education, the importance of leadership and people development are highlighted as key factors underpinning positive Māori development.[91] The kaihautū feedback reinforces that not only did the programme have outcomes for the HSFY students but also that kaihautū felt they also benefited from the opportunity to develop and share skills with others.

PARTICIPANT FEEDBACK ABOUT ONE-TO-ONE MEETINGS WITH STAFF

Student reflections about the one-to-one meetings with staff aligned closely with the desired objectives for this component of the Te Whakapuāwai programme. Feedback was positive and themes emerging from the survey highlighted that for many students, the meetings assisted with shaping expectations about the HSFY course and facilitated self-reflection about personal goals and motivation.

> *"I got to speak one-on-one with [staff] about what I expect out of this and the things that I feel are going to be challenging. I felt it was helpful talking to somebody about this."*
>
> *"After having this style of interview, it made me feel reassured about my goals."*
>
> *"Nice to talk to someone who was also going to make sure we had a goal. Was able to see the reality of study and know how much harder I needed to work."*
>
> *"Helped me to set study goals and routines as well as what to expect this year."*

Many students found the one-to-one sessions informative, learning about resources available and the support staff could offer. Comments on one-to-one meetings included:

[91] E. Curtis et al., "Addressing Indigenous Health Workforce Inequities: A Literature Review Exploring 'best' practice for Recruitment into Tertiary Health Programmes," *International Journal for Equity in Health* 11, no. 1 (2012).

"Found out lots of info on how and where to get help etc - very useful :)."

"Was good to get an explanation on grades and UMAT testing for end of year admissions."

"Was made aware of the resources available. I knew I had a support network behind me."

"Made aware of everything available to me and the other Māori students and felt more connected with the program."

"Just discussing the plans for the year was great and getting feedback on whether they thought it would work or not."

The word 'support' was mentioned frequently, "knowing I had support", "a greater sense of support", was a common theme. Some students conveyed that the one-to-one meeting assisted their transition into university study at Otago and the perceived demands of the HSFY course,

"Felt better about being here, made me feel more at home."

"I related well with my interviewer, we had things in common that made me feel more supported and less alone in such an alien environment."

"Good motivation and was good to know I have Māori support."

"Being able to discuss HSFY with someone who knows what's going on."

In addition, many students highlighted that the one-to-one meetings assisted with practical aspects of the course, in particular time management and balance and their motivation for study: "…got good advice from it about managing my time etc". "I gained confidence in the way I was balancing and handling the workload."

A common challenge for HSFY students is time management associated with the high demands of the course, and subsequently this can lead to a perception that nearly all spare time should be allocated to study. Many students reflected that it was reassuring to know that they could achieve balance while working towards their goals with one student stating, "[I learnt] how to manage my time and stay on track. [Also] how to balance studies with social activities."

Although time consuming and logistically challenging, the one-to-one sessions were viewed as a valuable programme component by both students and staff. Staff saw the sessions as an opportunity to get to know the students better and to gain more depth of understanding of individual student strengths and challenges. Students reported that the sessions assisted with motivation, goal setting, time management, balance, knowledge about Otago and HSFY and a sense of support.

"The interview really helped me, it made me feel a lot better about where I was heading as it helped me to clear my head and work out what I wanted, and made me realise how much support I had."

"Gave me an idea of what was available in regards to help and the support…talked through about my commitments to netball and about balance. Main idea was what worked for ME."

PARTICIPANT FEEDBACK ABOUT STUDY WĀNANGA

Feedback from participants about the study wānanga was overwhelmingly positive. Over 85% of the HSFY Māori students attended each of these sessions in 2014 and 2015 and completed surveys about the sessions. All students that completed the surveys about wānanga reported finding the wānanga 'extremely valuable' or 'valuable.' The only 'area for improvement' suggested by participants was to hold more sessions. The number of study wānanga was increased in 2015, but 2015 students still felt they would like additional wānanga. This led to consideration of how to achieve this for 2016.

QUALITY IMPROVEMENT

The learning gained from student feedback underpinned quality improvement processes within the MHWDU for the Te Whakapuāwai programme between 2014 and 2015 and a number of changes were made in line with student feedback and suggestions. The programme components have been revised again for 2016 in response to feedback from 2015. The project team has made a commitment to respond to feedback in a meaningful and timely manner and over the course of the *Weaving Our Worlds* project a range of component changes have been implemented in response to feedback. This includes:

- Increasing the number of study *wānanga*
- Having focused sessions for HSFY Māori students living in flats (due to student's perceptions that HSFY students in residential colleges receive a greater amount of academic support)
- Enhancing the training of the kaihautū, taking a very planned and structured approach
- Consideration of having a co-facilitation approach to SWAT sessions
- Reviewing systems and enhancing systems for Māori HSFY students to book and attend one-to-one meetings
- Reviewing and enhancing the initial whole group orientation session following the HSFY Māori student pōwhiri
- Maintaining a commitment to prioritising one-to-one sessions.

4.4 ACADEMIC OUTCOMES

This section provides an overview of the outcomes achieved by Māori students who participated in Phases One and Two of the *Weaving Our Worlds* project delivered in 2014 and2015.

Table 4.6: Indicators of academic Outcome HSFY

Semester	Indicator
Semester one Outcomes	Number of papers sat
	Number of papers passed
	Individual paper outcomes
	• Pass / Fail / Did not sit
	• Mark / Grade point average, median
	Overall marks (average, median)
	Lowest mark
	Completion of semester one, having passed all 4 papers
Semester two Outcomes	Number of papers sat
	Number of papers passed
	Individual paper outcomes
	• Pass / Fail / Did not sit
	• Mark / Grade point average, median
	Overall marks (average, median)
Full-year outcomes	Number of papers sat
	Number of papers passed
	Overall marks (average median)
	Completion of full year having sat and passed all 7 papers (N %)
	Completion of full year having sat and passed all 7 papers with a B average or better.

SEMESTER ONE OUTCOMES

Semester one number of papers sat and passed

Table 4.7: Semester One papers sat (N%) by HSFY Māori students, 2014/2015

Number of papers sat	2014		2015		Total	
	N	%	N	%	N	%
0	3	2.1	0	0	3	1.1
1	0	0	0	0	0	0
2	0	0	2	1.6	2	0.8
3	4	2.9	5	4.0	9	3.4
4	133	95.0	118	94.4	251	94.7
Total	140	100	125	100	265	100

The vast majority (94.7%) of Māori HSFY students sat all four papers in semester one. Around 5% of students did not sit all semester one HSFY papers despite being enrolled.

A pass in a paper involves gaining a grade of 50% or more. The following tables show results for the number of the four compulsory HSFY papers passed by Māori students in semester one. Table 4.8 shows

that just under two-thirds (62.6%) of Māori students passed all four semester one papers. Those people who did not sit papers are included in this table also and are incorporated into the '0' papers passed group.

Table 4.8: Semester one papers passed (N%) by HSFY Māori students, 2014/ 2015*

Number of papers passed*	2014		2015		Total	
	N	%	N	%	N	%
0	17	12.1	10	8	27	10.2
1	6	4.3	6	4.8	12	4.5
2	14	10	16	12.8	30	11.3
3	16	11.4	14	11.2	30	11.3
4	87	62.1	79	63.2	166	62.6
Total	140	100	125	100	265	100

* This table also includes those students who did not complete papers (sit exams) N=10

Table 4.9 presents findings for those students who sat all four papers (excluding those who did not complete papers). Of those students who sat all four papers, almost two-thirds (63.4%) passed all four papers. Between 2014 and 2015 outcomes for Māori students in terms of passing semester papers are similar between the years (e.g., 63.5% passed four papers in 2014 and 63.2% passed four papers in 2015).

The finding that 9.2% of students did not pass any papers is of concern. Further analysis of students who passed less than four papers will be undertaken to identify areas for improving programme or student support.

Table 4.9: Semester one papers passed (N %) by Māori students who sat all four HSFY papers, 2014/2015

Number of papers passed*	2014		2015		Total	
	N	%	N	%	N	%
0	12	10.2	10	8.0	24	9.2
1	6	4.4	6	4.8	12	4.6
2	14	10.2	16	12.8	30	11.5
3	16	11.7	14	11.2	30	11.5
4	87	63.5	79	63.2	166	63.4
Total	137	100	118	100	251	100

* This table includes those students who sat all four papers

Individual paper outcomes, semester one

Table 4.10 shows outcomes for each of the four individual papers in semester one with the denominator being those Māori students enrolled in HSFY in 2014 and 2015. Findings show the majority of enrolled Māori students went on to pass each paper with CELS191 having the highest proportion passing (84.9%), followed by HUBS191 (80%) then PHSI191 (74.7%) and CHEM191 (72.5%). Outcomes for CELS191, CHEM191 and HUBS191 were very similar in both 2014 and 2015. However, there has been an increased pass rate in PHSI191, from 72.1% to 77.6% from 2014 to 2015.

Table 4.10: Individual semester one papers passed (N%) by Māori HSFY students, 2014/2015

	CELS191			CHEM191			HUBS191			PHSI191		
	2014	2015	Total	2014	2015	Total	2014	2015	Total	2014	2015	Total
	N %)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Did not sit	6 4.3%	0 0.0%	6 2.3%	4 2.9%	0 0.0%	4 1.5%	3 2.1%	0 0.0%	3 1.1%	2 1.4%	0 0.0%	2 .8%
Failed	16 11.4%	18 14.4%	34 12.8%	35 25.0%	34 27.2%	69 26.0%	26 18.6%	24 19.2%	50 18.9%	37 26.4%	28 22.4%	65 24.5%
Passed	118 84.3%	107 85.6%	225 84.9%	101 72.1%	91 72.8%	192 72.5%	111 79.3%	101 80.8%	212 80.0%	101 72.1%	97 77.6%	198 74.7%

Table 4.11 shows paper outcomes where the denominator for each of the papers are students who sat papers. It shows a high percentage of Māori students passed with highest rate for CELS191 (87%), followed by HUBS191 (80.9%), PHSI191 (75.3%) and CHEM191 (73.6%).

Table 4.11: Individual semester one papers passed (N%) by HSFY Māori students who sat papers, 2014/2015

		CELS191			CHEM191			HUBS191			PHS191		
		2014	**2015**	**Total**	**2014**	**2015**	**Total**	**2014**	**2015**	**Total**	**2014**	**2015**	**Total**
Sat	N	134	125	259	136	125	261	137	125	262	138	125	263
Passed	N	118	107	225	101	91	192	111	101	212	101	97	198
	%	88.0%	85.6%	87.0%	74.3%	72.8%	73.6%	81.0%	80.8%	80.9%	73.2%	77.6%	75.3%

Denominator – students who sat the papers

Table 4.12 shows findings for grades achieved for each of the HSFY papers undertaken in semester one. It highlights the range of grades achieved in each of the papers. CELS191 is the paper with the highest percentage of Māori students gaining A range grades. PHSI191 shows a higher number in 2015 that have B- or better grades. The fail E numbers in CHEM191 are concerning and may reflect the high numbers of Māori students who did not attain NCEA Level 3 chemistry. Taking into account the lower than ideal science preparation of many students, these outcomes are largely positive for many of the Māori students who sat semester one papers.

Table 4.12: Individual semester one HSFY Māori student paper outcomes by grade, 2014/2015

		CELS191			CHEM191			HUBS191			PHSI191		
		Year		Total	Year			Year			Year		
		2014	2015		2014	2015	Total	2014	2015	Total	2014	2015	Total
A+	N	6_a	8_a	14	4_a	7_a	11	5_a	9_a	14	5_a	6_a	11
	%	4.3%	6.4%	5.3%	2.9%	5.6%	4.2%	3.6%	7.2%	5.3%	3.6%	4.8%	4.2%
A	N	17_a	8_a	25	8_a	3_a	11	9_a	13_a	22	2_a	6_a	8
	%	12.1%	6.4%	9.4%	5.7%	2.4%	4.2%	6.4%	10.4%	8.3%	1.4%	4.8%	3.0%
A-	N	9_a	12_a	21	8_a	12_a	20	13_a	8_a	21	8_a	5_a	13
	%	6.4%	9.6%	7.9%	5.7%	9.6%	7.5%	9.3%	6.4%	7.9%	5.7%	4.0%	4.9%
B+	N	16_a	19_a	35	14_a	10_a	24	16_a	14_a	30	13_a	14_a	27
	%	11.4%	15.2%	13.2%	10.0%	8.0%	9.1%	11.4%	11.2%	11.3%	9.3%	11.2%	10.2%
B	N	14_a	10_a	24	10_a	14_a	24	11_a	11_a	22	15_a	17_a	32
	%	10.0%	8.0%	9.1%	7.1%	11.2%	9.1%	7.9%	8.8%	8.3%	10.7%	13.6%	12.1%
B-	N	18_a	11_a	29	14_a	7_a	21	8_a	11_a	19	15_a	17_a	32
	%	12.9%	8.8%	10.9%	10.0%	5.6%	7.9%	5.7%	8.8%	7.2%	10.7%	13.6%	12.1%
C+	N	12_a	14_a	26	8_a	10_a	18	14_a	7_a	21	8_a	13_a	21
	%	8.6%	11.2%	9.8%	5.7%	8.0%	6.8%	10.0%	5.6%	7.9%	5.7%	10.4%	7.9%
C	N	19_a	17_a	36	13_a	14_a	27	21_a	16_a	37	16_a	8_a	24
	%	13.6%	13.6%	13.6%	9.3%	11.2%	10.2%	15.0%	12.8%	14.0%	11.4%	6.4%	9.1%
C-	N	7_a	8_a	15	22_a	14_a	36	14_a	12_a	26	19_a	11_a	30
	%	5.0%	6.4%	5.7%	15.7%	11.2%	13.6%	10.0%	9.6%	9.8%	13.6%	8.8%	11.3%
Fail D	N	6_a	8_a	14	8_a	10_a	18	16_a	14_a	30	20_a	13_a	33
	%	4.3%	6.4%	5.3%	5.7%	8.0%	6.8%	11.4%	11.2%	11.3%	14.3%	10.4%	12.5%
Fail E	N	10_a	10_a	20	27_a	24_a	51	10_a	10_a	20	17_a	15_a	32
	%	7.1%	8.0%	7.5%	19.3%	19.2%	19.2%	7.1%	8.0%	7.5%	12.1%	12.0%	12.1%
Did not sit	N	6_a	0_b	6	4_a	0_a	4	3_a	0_a	3	2_a	0_a	2
	%	4.3%	0.0%	2.3%	2.9%	0.0%	1.5%	2.1%	0.0%	1.1%	1.4%	0.0%	.8%
Total	N	140	125	265	140	125	265	140	125	265	140	125	265

Each subscript letter denotes a subset of year categories whose column proportions do not differ significantly from each other at the .05 level.

Table 4.13 shows findings for paper outcomes among those who sat each of the papers including the mean and median mark and the percentage passed with a B or better (gained 70% or better). The table shows those findings for 2014 and 2015 combined. The mean mark was highest for CELS191 (65.8%) followed by HUBS191 (64.3%), PHSI191 (61.0%) and CHEM191 (58.8%). The median mark follows the same pattern.

Findings for median mark and pass with a B or better highlight that although many Māori students are passing papers (e.g., 73.6% passing CHEM191) many of the grades may be at the lower end of passing (e.g., C-, C). For CHEM191, although 73.6% of students passed the paper, the median mark of 59.5 and the small proportion gaining a B or better suggests that for many Māori students CHEM191 marks are in the lower passing range. Findings for CHEM191 and PHSI191 are similar with just over a third of Māori students in HSFY (2014 and 2015) passing these papers with a B or better.

Table 4.13: Semester one Māori HSFY paper outcomes, 2014/2015 combined

	Sat paper (N)	% pass total cohort	% pass those who sat	Mean	Standard Deviation	Median	Pass with a 'B' or better
CELS191	259	84.9%	87.0%	65.8 (63.5-68.1)	18.8	68.0	45.9%
CHEM191	261	72.5%	73.6%	58.8 (56.4 – 61.2)	19.9	59.5	34.5%
HUBS191	262	80.0%	80.9%	64.3 (62.2 – 64.9)	17.2	64.0	41.6%
PHSI191	263	74.7%	75.3%	61.0 (58.9 – 63.2)	17.5	62.0	34.6%

Table 4.14: Semester one Māori HSFY paper outcomes (mean, median and % B grade or better), 2014/2015

	2014		2015		2014	2015	14	15
	Mean mark (95%I)	SD	Mean mark (95%CI)	SD	Median mark	Median mark	>=B	>=B
CELS191	67.2 (64.6-70.)	15.6	64.2 (60.4-68.0)	21.7	68	67	46.3	45.6
CHEM191	58.9 (55.7-62.1)	18.8	59.7 (55.0-62.4)	21.0	59	60	32.4	36.8
HUBS191	64.0 (61.2-66.7)	15.9	64.6 (61.4-68.0)	18.6	62	67	39.4	44.0
PHSI191	60.4 (57.7-63.1)	15.8	61.8 (58.3-65.1)	19.2	59	65	31.2	38.4

Findings show that the mean mark was very similar in both 2014 and 2015 for each paper. The 2015 median was at least five marks higher than 2014 for both HUBS191 and PHSI191. In addition, the proportion of Māori students gaining a B or better is higher for all except CELS in 2015 compared with 2014. This may reflect an increase in achievement among students in 2015. However, comparison with non-Māori is required to determine if this increase is consistent with overall papers changes or is observed in Māori only.[92]

Overall Semester One Marks

The overall outcomes for semester one are shown in Table 4.15. This summary shows most Māori students completed semester one papers (92%) and of these, nearly two-thirds (63.4%) passed all four compulsory papers. Just over a quarter (27%) passed all four with a B or better in all papers. The average mark across the four papers was 62.7 and the average median mark was 62.8.

[92] Although a number of changes were made to the Te Whakapuāwai programme in response to the review, evaluation and feedback following 2014, it is not possible to interpret changes between 2014 and 2015 as specifically attributed to Te Whakapuāwai, without careful analysis of a 'non-intervention' control. Analysis comparing Māori with non-Māori and non-Pacific student achievement from the same time period will contribute to better understanding this.

Table 4.15: Semester one summary of outcomes for Māori HSFY students, 2014/2015 combined

Sat all 4 papers N (% of total cohort)	251 (94.7%)
Passed all 4 papers N (% of total cohort) and (% of number who sat all 4 papers)	166 (62.6%) and (66.2%)
Passed all 4 papers with a B or better in all papers	66 (27%)
Mean number papers passed	3.1 (3.0-3.3)
Median number of papers passed	4
Average mark (in papers sat)	62.7 (60.6-64.7)
Median mark (in papers sat)	62.8

Overall, these are positive outcomes for the Māori students in semester one in 2014 and 2015. The average number of papers passed with a median of four papers is a positive result for a demanding first semester with four intensive papers, ideally suited to students with NCEA Level 3 science subject backgrounds.

SEMESTER TWO OUTCOMES

Analysis of semester two outcomes involved taking account of the number of students who sat papers when considering pass rates and average marks. It remains important to know, of the original cohort of students, how many are still progressing in semester two and what are overall outcomes. In addition, specific attention to the three semester two papers and their outcomes provides valuable information about subjects of particular strength and areas of particular challenge.[93]

Semester Two: Number of papers sat and passed

The following table shows that 64.9% of the original cohort of Māori students enrolled in HSFY continued on to sit all semester two papers with the remaining third of students divided into sitting no papers in semester two (12.5%), sitting one paper (10.2%) or two papers (12.5%). A higher percentage of students in 2015 (67.2%) sat all three papers when compared with 2014 (62.9%).

Table 4.16: Semester two papers sat (N%)by HSFY Māori students, 2014/2015

Number of papers sat	2014		2015		Total	
	N	%	N	%	N	%
0	15	10.7	18	14.4	33	12.5
1	15	10.7	12	9.6	27	10.2
2	22	15.7	11	8.8	33	12.5
3	88	62.9	84	67.2	172	64.9
Total	140	100	125	100	265	100

When the number of papers passed is taken as a percentage of the total cohort of students enrolled, the picture for semester two is as follows.

[93] A number of Māori students took up the opportunity to undertake an eighth additional paper in semester two. However, results for these additional papers are not included in this report.

Table 4.17: Semester two papers passed (N%) by HSFY Māori students, 2014/2015

Number of papers passed	2014		2015		Total	
	N	%	N	%	N	%
0	41	29.3	41	32.8	82	30.9
1	13	9.3	9	7.2	22	8.3
2	10	7.1	9	7.2	19	7.2
3	76	54.3	66	52.8	142	53.6
Total	140	100	125	100	265	100

This table shows just over half (53.6%) of Māori students who were enrolled in HSFY across 2014 to 2015 passed all three second semester papers with almost a third (30.9%) not passing any semester two papers. This figure reflects the fact that only 64.9% of the Māori students in HSFY in 2014 and 2015 sat all three papers. Table 4.18 shows the number and percentage of students who sat zero, one, two or three papers in semester two alongside the number and percentage of students who passed the papers they sat. Overall, it shows that of the students who sat all three papers in 2014, 76 students (86.4%) passed all three papers, in 2015 66 students (78.6%) and in total 82.6% of students who sat three papers passed all of them. This analysis suggests there are positive outcomes for those students who progress on to sit all semester two papers though there are poorer outcomes for students who sit two or fewer HSFY papers in semester two.

Table 4.18: Semester two papers sat and passed by HSFY Māori students, 2014/2015

	2014				2015				Total			
Papers sat N	**N (%)**	**Pass N**	**N**	**%**	**N (%)**	**Pass N**	**N**	**%**	**N (%)**	**Passed N**	**N**	**%**
0	15 (10.7%)	**0**	15	100	18 (14.4%)	**0**	0	100	33 (12.5%)	**0**	33	100
1	15 (10.7%)	**0**	14	93.3	12 (9.6%)	**0**	9	75	27 (10.2%)	**0**	23	85.2
		1	1	6.7		**1**	3	25		**1**	4	14.8
2	22 (15.7%)	**0**	8	36.4	11 (8.8%)	**0**	5	45.5	33 (12.5%)	**0**	13	39.4
		1	7	31.8		**1**	4	36.4		**1**	11	33.3
		2	7	31.8		**2**	3	18.2		**2**	9	27.3
3	88 (62.9%)	**0**	4	4.5	84 (67.2%)	**0**	9	10.7	172 (64.9%)	**0**	13	7.6
		1	5	5.7		**1**	2	2.4		**1**	7	4.1
		2	3	3.4		**2**	7	8.3		**2**	10	5.8
		3	76	86.4		**3**	66	78.6		**3**	142	82.6

SEMESTER 2 PAPER OUTCOMES

Table 4.19: Individual semester two papers passed (N%) by Māori HSFY students, 2014/2015

		BIOC192			HEAL192			HUBS192		
		2014	2015	Total	2014	2015	Total	2014	2015	Total
Didn't sit	N	41	38	79	25	20	45	31	26	57
	%	29.3%	30.4%	29.8%	17.9%	16.0%	17.0%	22.1%	20.8%	21.5%
Failed	N	17	15	32	34	33	67	11	17	28
	%	12.1%	12.0%	12.1%	24.3%	26.4%	25.3%	7.9%	13.6%	10.6%
Passed	N	82	72	154	81	72	153	98	82	180
	%	58.6%	57.6%	58.1%	57.9%	57.6%	57.7%	70.0%	65.6%	67.9%

Table 4.20: Semester two Māori HSFY student papers passed among those who sat papers, 2014/2015

		BIOC192			HEAL192			HUBS192		
		2014	2015.0		2014.0	2015.0		2014.0	2015.0	
Sat		99	87	186	115	105	230	98	99	208
Passed	N	82	72	154	81	72	153	98	82	180
	%	82.8%	82.8%	82.8%	70.4%	68.6%	69.5%	89.9%	82.8%	86.5%

Table 4.21: Individual semester 2 Māori HSFY student paper outcomes by grade, 2014/2015

		BIOC192			HEAL192			HUBS192		
		Year		Total	Year		Total	Year		Total
		2014	2015		2014	2015		2014	2015	
A+	N	4_a	6_a	10	3_a	0_a	3	1_a	3_a	4
	%	4.0%	6.9%	5.4%	2.6%	0.0%	1.4%	.9%	3.0%	1.9%
A	N	12_a	15_a	27	10_a	5_a	15	16_a	15_a	31
	%	12.1%	17.2%	14.5%	8.7%	4.8%	6.8%	14.7%	15.2%	14.9%
A-	N	10_a	3_a	13	8_a	14_a	22	11_a	8_a	19
	%	10.1%	3.4%	7.0%	7.0%	13.3%	10.0%	10.1%	8.1%	9.1%
B+	N	5_a	9_a	14	12_a	5_a	17	13_a	13_a	26
	%	5.1%	10.3%	7.5%	10.4%	4.8%	7.7%	11.9%	13.1%	12.5%
B	N	14_a	12_a	26	13_a	16_a	29	15_a	7_a	22
	%	14.1%	13.8%	14.0%	11.3%	15.2%	13.2%	13.8%	7.1%	10.6%
B-	N	10_a	11_a	21	10_a	7_a	17	7_a	15_b	22
	%	10.1%	12.6%	11.3%	8.7%	6.7%	7.7%	6.4%	15.2%	10.6%
C+	N	12_a	6_a	18	13_a	13_a	26	12_a	13_a	25
	%	12.1%	6.9%	9.7%	11.3%	12.4%	11.8%	11.0%	13.1%	12.0%
C	N	9_a	7_a	16	9_a	8_a	17	15_a	3_b	18
	%	9.1%	8.0%	8.6%	7.8%	7.6%	7.7%	13.8%	3.0%	8.7%
C-	N	6_a	3_a	9	3_a	4_a	7	8_a	5_a	13
	%	6.1%	3.4%	4.8%	2.6%	3.8%	3.2%	7.3%	5.1%	6.3%
Fail D	N	6_a	5_a	11	12_a	13_a	25	10_a	11_a	21
	%	6.1%	5.7%	5.9%	10.4%	12.4%	11.4%	9.2%	11.1%	10.1%
Fail E	N	11_a	10_a	21	22_a	20_a	42	1_a	6_b	7
	%	11.1%	11.5%	11.3%	19.1%	19.0%	19.1%	.9%	6.1%	3.4%
	N	99	87	186	115	105	220	109	99	208
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The previous tables show that more than 80% of Māori students who sat BIOC192 and HUBS192 passed these papers. However the percentage passing HEAL192 was lower (69.5% of those who sat the paper). Pass rates among Māori students who sat papers were lowest for HEAL192 (30.5% not passing) and for BIOC192 (17.2% not passing) and for HUBS 192 (13.5% not passing). When semester two papers are looked at alongside semester one papers, analysis shows that HEAL192 has the highest rate of failure of the seven papers, with 10.0% of those sitting CELS191, 26.5% sitting CHEM191, 19.1% of HUBS191 and 24.7% of those sitting PHSI191 failing compared to 30.5% of students who sit HEAL192 not passing.

This analysis reinforces that HEAL192 followed by CHEM191 and PHSI191 are the papers with the lowest pass rates among Māori students and are all areas for ongoing focus. Although it is possible to explore the relationship between students' chemistry and physics attainments in secondary school, there is not the equivalent leading to preparation for HEAL192. As a result of the analysis undertaken for the *Weaving Our Worlds* project, the MHWDU team plan to explore in more detail, factors associated with academic success in HEAL192, including the relationship with school decile and NCEA subjects.

Table 4.22: Semester two Māori HSFY paper outcomes, 2014/2015 combined

	Sat paper (N)	**% pass total cohort**	**% pass those who sat**	**Mean**	**Standard Deviation**	**Median**	**Pass with a 'B' or better**
BIOC192	186	58.1	82.8	67.8(65.1-70.5)	17.7	70	48.4%
HEAL192	217	57.7	69.5	66.3(63.9-68.7)	16.0	69	39.1%
HUBS192	208	67.9	86.5	70.8(68.8-72.9)	13.6	73	49.0%

Table 4.23: Semester two Māori HSFY paper outcomes (mean, median and % B grade or better), 2014/2015

	2014		**2015**		**2014**	**2015**	**14**	**15**
	Mean mark (95%I)	**SD**	**Mean mark (95%CI)**	**SD**	**Median mark**	**Median mark**	**>=B (%)**	**>=B (%)**
BIOC192	68.3 (64.9-71.6)	15.6	67.3 (63.1-71.6)	19.7	70.0	70.0	45.5	51.7
HEAL192	68.2 (65.0-71.3)	15.0	64.4 (60.8-68.1)	17.0	70.0	68.0	40.0	38.1
HUBS192	71.5 (69.0-74.0)	12.0	70.1 (66.8-73.3)	15.1	73	73	51.4	46.5

When comparing years 2014 and 2015 for both BIOC192 and HEAL192, the range of grades are similar though for HUBS192 the percentage passing dropped from 70% to 65.6% and the percentage who failed this paper increased from 10.1% in 2014 to 17.2% in 2015.[94]

[94] As with other comments about 'between year' variation, it is important to consider paper variation between years using a control group – in this case non-Māori / non-Pacific students undertaking HSFY.

Table 4.24: Semester two summary of outcomes for Māori HSFY students, 2014 and 2015 combined

Sat all 3 papers N (%)	172 (64.9%)
Passed all 3 papers N (%) (if sat all 3 papers)	142 (82.6%)
Mean number papers passed (if sat all 3 papers)	2.6 (2.5-2.8)
Median number of papers passed	3
Passed all 3 papers with a B or better in all papers (denominator = those who sat all 3 papers)	67 (38.7%)
Average mark (among those who sat all 3 papers)	68.4(66.2-70.7)
Median mark (averaged for those who sat all papers)	70.3

Almost two thirds (64.9%) of the cohort of students enrolled earlier in the year went on to sit all three semester two papers. Of those who sat all three papers, the vast majority (82.6%) passed all three papers with 38.7% gaining a B grade or better in all three papers. The average mark among those who sat three papers was 68.4 marks with a median of 70.3%. Overall, as with semester one, students who sat all three papers had on average, very good outcomes.

HSFY FULL-YEAR OUTCOMES

Papers sat and passed HSFY full year

The following table shows that almost two-thirds of Māori students enrolled in both 2014 and 2015 sat all seven HSFY papers (64.5%) with a slightly higher proportion in 2015 (66.4%) sitting all seven papers when compared with 2014 (62.9%). Very few of the students sat three papers or fewer with 11.7% sitting four papers, 9.1% sitting five and 11.7% sitting six.

Table 4.25: HSFY total year papers sat (N%) by Māori students enrolled in 2014/2015

Number of papers sat	**2014**		**2015**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
0	3	2.1	0	0	3	1.1
1	0	0	0	0	0	0
2	0	0	2	1.6	2	0.8
3	1	0.7	2	1.6	3	1.1
4	14	10.0	17	12.8	31	11.7
5	15	10.7	9	7.2	24	9.1
6	19	13.6	12	9.6	31	11.7
7	88	62.9	83	66.4	171	64.5
Total	140	100	125	100	265	100

Table 4.26: HSFY total year papers passed (N%) by Māori students enrolled in 2014/2015

Number of papers passed	2014		2015		Total	
	N	%	N	%	N	%
0	3	2.1	0	0	3	1.1
1	0	0	0	0	0	0
2	0	0	2	1.6	2	0.8
3	3	2.1	5	4.0	8	3.0
4	36	25.7	34	27.2	70	26.4
5	12	8.0	9	7.2	21	7.9
6	10	7.1	9	7.2	21	7.9
7	78	54.3	66	52.8	142	53.6
Total	140	100	125	100	265	100

The above table shows the number of papers passed by the 2014 and 2015 students with the denominator being those students enrolled in HSFY semester one. Just over half (53.6%) of students enrolled in HSFY in semester one passed all seven papers. Very few students passed fewer than three papers and around a quarter (26.4%) passed four papers.

Of Māori students who sat all seven HSFY papers (N=171), 81.1% passed all seven. Among those who sat all seven papers, 89% passed six or more papers. This shows that outcomes for students who were able to sit all seven papers were very good, with the vast majority passing all seven papers.

INDIVIDUAL PAPER OUTCOMES – ACROSS HSFY

Table 4.27: Māori HSFY student paper outcomes, 2014-2015 combined

	Number who sat	% Pass	Mean mark	Median mark	% with 'B' or better
CELS191	259	87.0%	65.8 (63.5-68.1)	68.0	45.9%
CHEM191	261	73.6%	58.8 (56.4 – 61.2)	59.5	34.5%
HUBS191	262	80.9%	64.3 (62.2 – 64.9)	64.0	41.6%
PHSI191	263	75.3%	61.0 (58.9 – 63.2)	62.0	34.6%
BIOC192	186	82.8%	66.1 (63.5-68.8)	69.0	48.4%
HEAL192	217	69.5%	60.2 (57.6-62.9)	63.0	39.1%
HUBS192	208	86.5%	67.5 (65.4-69.7)	69.0	49.0%

This table shows CELS191 and HUBS192 had the highest percentage of students passing. HUBS192 and BIOC192 had the highest mean and median marks. CHEM191 in semester one and HEAL192 in semester two had the lowest percentage pass rates and lowest mean marks. The table shows that the three most challenging papers for Māori students who participated in Te Whakapuāwai programme in 2014 and 2015 were CHEM191, PHSI191 (semester one) and Heal192 (semester two).

Table 4.28: HSFY paper outcomes among Māori students who sat all seven papers, 2014/2015

	Mean mark		Median mark	
	2014	**2015**	**2014**	**2015**
CELS191	74.3	73.1	74.5	76
CHEM191	68.7	70.0	68.5	73
HUBS191	71.1	73.6	73	75
PHSI191	67.1	70.3	67	70
BIOC192	68.3	67.3	70	70
HEAL192	68.2	64.4	70	68
HUBS192	71.5	70.1	73	73

Among those Māori students who sat all seven papers (2014=88, 2015=83) the mean and median mark varied between 2014 and 2015, thoughonly by small amounts. Most notable improvements between 2014 and 2015 are in CHEM191, PHSI191 and HUBS191, where both the mean and median mark improved. For CELS191, BIOC192 and HUBS192, the picture between 2014 and 2015 is mixed with very similar mean and median marks. HEAL192 is the only paper where there is a trend for both mean and median marks to be lower in 2015 than2014.

Table 4.29: Summary of full-year outcomes for Māori HSFY students, 2014 and 2015 combined

Sat all 7 papers N(%)	171 (64.5%)
Passed all 7 papers N(%) (if sat all 7 papers)	142 (83.0% of those who sat 7)
Mean number papers passed (if sat all 7 papers)	6.5 (6.4-6.7)
Median number of papers passed	7
Passed all 7 papers with a B or better in all papers (denominator = those who sat all 7 papers)	51 (19.2%)
Average mark (among those who sat all 7 papers)	70.1 (68.3-72)
Median mark (averaged for those who sat all 7 papers)	71

Around two-thirds sat all seven papers and of these most (83%) passed all seven.

SUMMARY: OUTCOMES FOR MĀORI STUDENTS IN 2014 AND 2015

These findings show mainly positive though diverse outcomes for Māori students who participated in the enhanced Te Whakapuāwai programme (2014 and 2015). Most students enrolled in semester one sat all four papers with nearly two-thirds passing all four. Chemistry and physics appeared to be the most challenging papers in semester one though the pass rates of >70% for these papers was positive, particularly given the degree of science gaps in the background of the students. Semester one outcomes were slightly better in 2015 than 2014, particularly for physics, though this needs to be analysed in more detail. With regard to semester two, among those students who sat all papers, outcomes were also positive, particularly for BIOC192 and HUBS192 (>80% pass rates in these papers and just under 50% of those sitting the papers gaining a B or better).

CHEM191 is of ongoing concern and although the percentage of students who passed was 73.6%, the mean mark (58.8%), median mark (59.5) and the percentage with a B average or between (34.5%) was the lowest for these measures. This suggests that although students are passing, many are passing very marginally. The second paper of particular concern is HEAL192 where the percentage passing among those who sat this paper was the lowest of all papers (69.5%). Of note, HEAL192 was one paper where outcomes were comparable in 2015 than 2014.

Physics is the area of 'least preparation' when student NCEA at Level 3 is taken into account. It is positive, however, to see more than 75% passing the PHSI191 paper. Analysis of full-year data indicates that almost two-thirds of Māori students in 2014 and 2015 sat all seven papers, with 83% of these passing all seven and 19% passing all seven with at least a B average in each paper.

One limitation of these findings is that the outcomes presented are only for papers that are included in the HSFY suite of seven compulsory papers. It is important to note that for most students who did not go on to sit or complete the seven papers, alternative papers were undertaken, and often undertaken successfully. Thus, non-completion of seven HSFY papers is not an indication of non-completion or not successfully passing the first year of tertiary study.

4.5 OUTCOMES AND EQUITY

The previous section showed that although the majority of Māori students participating in the enhanced Te Whakapuāwai programme in 2014 and 2015 had positive outcomes, a number did not pass one or more of the HSFY papers. Specific papers (CHEM191, PHSI191 and HEAL192) were particularly challenging.

A key driver for the *Weaving Our Worlds* project was to refine, implement and evaluate the impact of an intervention on outcomes across the full diversity of Māori students enrolled in HSFY at Otago University. Identifying factors associated with better outcomes is crucial if ongoing gains to accelerate Māori academic student achievement are to be achieved.

Important questions include: How did outcomes differ between students from differing socio-economic backgrounds? What impact did science preparation have on outcomes in HSFY? Did the enhanced Te Whakapuāwai intervention delivered to Māori HSFY students in 2014 and2015 lead to positive outcomes for all Māori students? Data collection and analysis to fully answer these questions is underway as part of Phase Three of *Weaving our Worlds*. Our view was that the addition of 2016 data would strengthen the capacity to make robust comparisons with previous time periods (i.e., 2008 to2010 and 2011 to 2013) and comparison with non-Māori non-Pacific cohorts.

This section provides some analysis highlighting the approach we took to understand the socio-economic and educational diversity of the Māori HSFY students, alongside early analysis exploring the impact of these factors on students.

RELATIONSHIP BETWEEN SCHOOL DECILE, NZDEP2013 AND SCIENCE ATTAINMENT

Table 4.30 reinforces the finding of a diverse spread across school deciles and NZ Dep2013 deciles shown in the earlier table describing student backgrounds. The largest group of Māori students in Table 4.30 are those who attended lower decile schools and who were from homes of highest relative deprivation (N=51, 20.3%). The next largest group, are those in the middle of both NZDep2013 and school decile (N=38, 15.1%) followed by those at the most advantaged end (NZDep2013 1-3, school deciles 9 and 10, N=33, 13.1%).

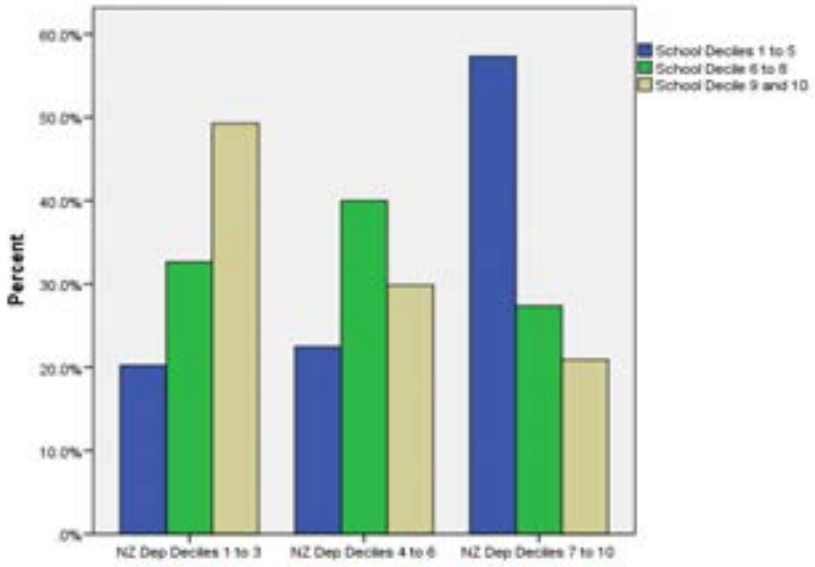
Table 4.30: Māori HSFY students by home domicile NZDep2013 and school decile, 2014/2015 combined

NZ Deprivation Index (2013) decile (home address)	School Decile			Total
	School Deciles 1-5	School Deciles 6-8	School Deciles 9 and 10	
	N (%)*	N (%)*	N (%)*	N(%)*
NZ Dep 7-10	51 (20.3%)	26 (10.4%)	14 (5.6%)	82 (32.7%)
NZ Dep 4-6	20 (8.0%)	38 (15.1%)	20 (8.0%)	78 (31.1%)
NZ Dep 1-3	18 (7.2%)	31 (12.4%)	33(13.1%)	91 (36.3%)
Total	89 (35.5%)	95 (37.8%)	67 (26.7%)	251

- % is the percentage of the total cohort of Māori students in 2014 and 2015 where there was complete data for NZDep2013 and school decile (N=251).[95]

Table 4.3 and Figure 4.1 shows 56% of students from NZDep2013 7-10 homes attended decile 1 to 5 schools with a smaller proportion attending decile 6-8 schools (28.6%) and a small proportion attending decile 9 and 10 schools (15.4%). Among the 78 students living in NZDep2013 4-6 areas, a quarter (25.6%) attended lower decile schools, a half (48.7%) attended school deciles 6-8 and a quarter (25.6%) attended high decile schools. Among those students living in decile 1-3 home areas, 22% attended lower decile schools, 37.8% school deciles 6 to 8 and 40.2% deciles 9 and 10 schools. The figure shows very clearly the tendency for students from higher deprivation homes to attend lower decile schools and vice-versa for students from lower relative deprivation homes. Statistically, there is a moderate negative correlation between NZDep2013 and school decile.[96] This analysis demonstrates the likely cumulative advantage and disadvantage associated with socio-economic position.

FIGURE 4.1: MĀORI HSFY STUDENTS BY NZDEP2013 AND DECILE OF SCHOOL, 2014/15



[95] There were a small number of Māori HSFY students with missing data (N=14 students). These students were those who attended international schools or had addresses that were difficult to code (e.g., P.O.Box addresses). An analysis of their data suggests that excluding these students from the analysis will not impact on key findings.

[96] Pearson correlation -0.41 P<0.001 for the relationship between School Decile and NZ Deprivation among Māori students.

NCEA science attainment and relationship to NZDep2013 and school decile

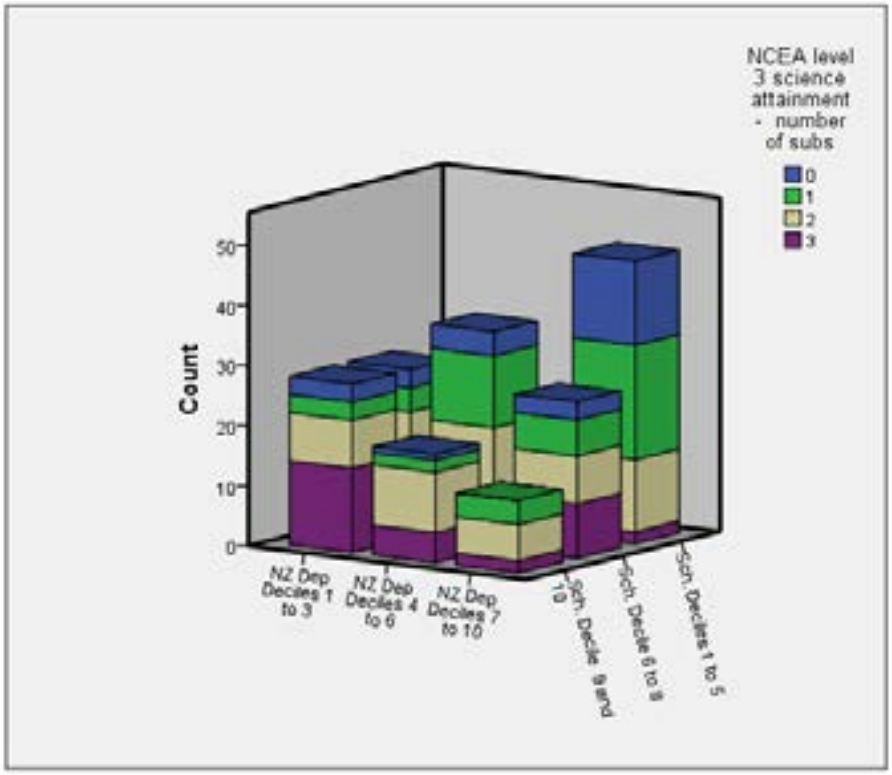
The correlation between home and school relative advantage and disadvantage is likely compounded by access to science subject attainment at NCEA Level 3.

Only around a quarter of Māori students who were enrolled in HSFY in 2014 and 2015 had attained 14 or more credits in all three science subjects, with only around one in three having two subjects and the remainder having one or no science level attainment at NCEA Level 3. The following table and figure presents data illustrating the relationship between school decile, NZDep2013 and science participation (ANY number of credits in each of the three science subjects) and science attainment (14+ credits in each of the three subject areas).

Table 4.31: Māori HSFY students by school decile, NZDep2013 and participation / attainment in three subjects of NCEA Level 3 science, 2014/2015

NZ Deprivation Index (2013) decile (Home address)	**School Decile**			**Total**
	School deciles 1-5	**School deciles 6-8**	**School deciles 9 & 10**	
	N (%)*	**N (%)***	**N (%)***	**N(%)***
Science Participation				
NZDep 7-10	16 (31.4%)	17 (65.0%)	9 (65.0%)	42 (51.2%)
NZDep 4-6	8 (40.0%)	22 (73.0%)	10 (50.0%)	40 (51.3%)
NZDep 1-3	13 (72.0%)	20 (64.5%)	18 (54.5%)	61 (67.0%)
Total	37 (41.6%)	59 (62.1%)	37 (55.2%)	133 (53.0%)
Science Attainment				
NZDep 7-10	2 (3.9%)	9 (34.6%)	2 (14.3%)	13 (12.0%)
NZDep 4-6	2 (10.0%)	9 (23.7%)	5 (25.0%)	16 (20.5%)
NZDep 1-3	6 (33.0%)	13 (41.9%)	14(42.4%)	33 (42.3%)
Total	10 (11.2%)	31 (32.6%)	21 (31.3%	62 (24.7%)

FIGURE 4.2: PROFILE OF MĀORI HSFY STUDENTS, 2014/2015, BY SCHOOL DECILE, NZ DEP2013 AND NUMBER OF SCIENCE SUBJECTS ATTAINED AT NCEA LEVEL 3



The above table (4.31) and figure (4.1) are of particular concern because they highlight a relationship between science attainment and NZDep2013 / school decile. Māori students from home deciles 1-3 were 3.5 times more likely than those from home deciles 7-10 to have attained three science subjects at NCEA Level 3. Those students who attended school deciles 9 and 10 were 2.8 times more likely to have science attainment at Level 3. When NZDep2013 and school decile are combined, the differences are more marked and those students from high decile schools and lower relative home deprivation were eight times more likely to have attained three science subjects at NCEA Level 3. Thus when viewed together, school decile and NZDep2013 provide an important way of capturing levels of advantage and disadvantage.

Limited science preparation provides a difficult challenge for achieving academic success in HSFY where the recommended preparation is to have attained chemistry, biology and physics to NCEA Level 3, i.e., at least 14 credits or more in each subject. The physics and chemistry weekend study wānanga component of the Te Whakapuāwai was introduced in 2014 and 2015 to support academic achievement for all Māori students in HSFY, particularly to engage and increase outcomes for those with 'science-gaps'.

RELATIONSHIP BETWEEN BACKGROUND FACTORS AND OUTCOMES IN HSFY

In order to understand if the Te Whakapuāwai intervention was effective, the outcomes will be analysed in relation to differing student background factors. Findings exploring the relationship with students' schooling background focuses particularly on school decile for ease of measurement and recognition as an indicator of educational advantage or disadvantage. Previous analyses reinforce the more pronounced impact of both school decile and NZDep2013 combined. Table 4.32 below shows findings presented by school decile groups comparing student outcomes from school deciles 1-5, 6-8 and 9 and 10.

Table 4.32: Māori HSFY student outcomes by school decile, 2014/2015

	School decile 1-5	*School decile 6-8*	*School decile 9 and 10*	*Total*
	N (% within school decile)	***N (% within school decile)***	***N (% within school decile)***	***N (% of total N)***
% passing 4 semester one papers	51 (57.3%)	58 (61.1%)	50 (74.6%)	159 (63.4%)
% passing 4 Semester one papers with a B or better	10 (7.9%)	16 (21.3%)	21 (35.6%)	44(22.2%)
Mean number papers passed S1	2.8 (2.5-3.2)	3.1 (2.9-3.3)	3.5 (3.2-3.7)	3.0 (2.7-3.1)
Average mark across 4 S1 papers	60.1 (56.7-63.4)	62.1 (58.7)	66.8 (62.9-70.6)	62.9 (60.5-65.2)
Median (averaged across 4 papers)	59	61	67	64.5
Sat 3 semester two papers	57 (61.3%)	56 (58.3%)	55 (80.9%)	168 (65.4%)

HSFY outcomes differ markedly between Māori students on the basis of school decile with a clear gradient showing better outcomes among Māori students from higher decile schools, compared to those from middle decile and lower decile schools.

Whereas 74.6% of Māori students who had attended decile 9 and 10 schools passed all four HSFY semester one papers, almost 20% fewer (57.3%) of those from school deciles 1-5 passed all four papers. The greatest gap between outcomes is "passing all four papers with a 'B' average or better". Whereas over one in three Māori students (35.6%) from high decile schools passed all four papers with a B average or better, only one in 12 (7.9%) of Māori students from school deciles 1-5 passed all four papers with a B or better. This has important implications for entry into Otago's health professional programmes.

Passing all semester one papers is an important goal of HSFY students as it provides a platform for progression to completing semester two and all seven HSFY papers. The following table shows the number and percentage of Māori students in HSFY in 2014 and 2015 that passed all four HSFY papers in semester one. It shows that when NZDep2013 is considered, there is a higher percentage passing from NZDep2013 1-3 (74.4%), followed by 4-6 (59.0%) and 7-10 (57.1%). When considered together with school decile, Māori students from high decile schools and NZDep2013 1-3 were 1.7 times more likely to pass all four papers (84.8% cf 51%) compared to Māori students from areas of higher deprivation / lower decile schools.

Table 4.33: % Māori HSFY students passing all four semester one papers, 2014/2015, by secondary school deciles and NZDep2013

NZ Deprivation Index (2013) decile (home address)	School Decile			Total
	School Deciles 1-5	School Deciles 6-8	School Deciles 9 and 10	
	N (%)*	N (%)*	N (%)*	N(%)*
NZDep 7-10	26 (51.0%)	17 (65.4%)	9 (64.3%)	52(57.1%)
NZDep 4-6	11 (55.0%)	22 (57.9%)	13 (65.0%)	46 (59.0%)
NZDep 1-3	14 (77.8%)	19 (61.3%)	28 (84.8%)	61 (74.4%)
Total	51 (57.3%)	58 (61.1%)	50 (74.6%)	159 (63.4%)

Secondary School Science Preparation and Paper Outcomes

The following table shows attainment for specific subjects by student's school decile, followed by outcomes for HSFY semester one individual subjects.

Table 4.34: Māori HSFY student science attainment at secondary school and semester one paper outcomes, 2014-2015, by student secondary school decile

	School decile 1-5	School decile 6-8	School decile 9-10	Total
	N (% within school decile)	N (% within school decile)	N (% within school decile)	N (% of total N)
NCEA L3 science attainment in all three subjects	10 (11.2%)	31 (32.6%)	21 (31.3%)	62 (24.7%)
NCEA L3 chemistry attainment	35(37.6%)	58 (60.4%)	45 (66.2%)	138 (53.7%)
NCEA L3 biology attainment	53 (57.0%)	68 (70.8%)	48 (70.6%)	169 (65.8%)
% with NCEA L3 physics attainment	26 (28.0%)	44 (45.8%)	29 (42.6%)	99 (38.5%)
No (0) science subject attainment at NCEA L3	25 (26.9%)	10 (10.4%)	4 (5.9%)	39 (15.2%)
HSFY Semester 1 Papers				
	N (% within school decile)	N (% within school decile)	N (% within school decile)	N (% of total N)
CELS191 pass	74 (79.6%)	82 (85.4%)	62 (91.2%)	218 (84.8%)
CHEM191 pass	62 (66.7%)	67 (69.8%)	59 (86.8%)	188 (73.2%)
HUBS191 pass	68 (73.1%)	79 (81.3%)	58 (85.3%)	204 (79.4%)
PHSI191 pass	62 (66.7%)	73 (76.0%)	59 (86.8%)	194 (75.5%)

For each of the science subjects, attainment is lowest among students from lower decile schools. Biology is the subject most likely to be attained by students from low decile schools with only 28% attaining 14 or more credits in physics and 37.6% attaining NCEA Level 3 chemistry. There is very little difference between science subject attainment in mid-decile schools compared to high decile schools.

How did this impact on HSFY Māori student outcomes? Findings for individual papers suggest that when the students' science attainment at NCEA Level 3 is taken into account the results are positive. Among students from school deciles 1-5, pass rates in CHEM191, CELS191, HUBS191 and PHSI191 surpassed the rate of relevant science attainment at NCEA Level 3. For example, Māori students were 1.7 times more likely to pass HSFY CHEM191 than to have attained Level 3 chemistry at NCEA Level 3. Similarly, students were 2.3 times more likely to pass PHSI191 than have attained physics at Level 3 NCEA.

An important analysis is the relationship between the number of NCEA Level 3 science subject credits attainment and the relationship with outcomes in HSFY, particularly for chemistry and physics. Analysis indicates that for chemistry, 95.2% of Māori students who had 24-plus chemistry credits at NCEA Level 3 passed CHEM191, as did 82.4% of those with 14-23credits, 58.6% with 1- 14 credits and 53.1% with 0 credits. This pattern is also shown for physics attainment with 92.3% of students with 24+ physics credits passing PHSI191 in HSFY, 90% of those with 14-23 credits, 73.5 with 1-14 and 56.8% with 0 credits.

Summary

The above set of analyses indicate a complex and overlapping relationship between socio-demographic background of the Māori students in HSFY (2014 and 2015) and the relationship with HSFY outcomes. Analysis clearly shows a relationship between school decile and HSFY outcomes. It also shows that those students from both low school deciles and higher home deprivation were more vulnerable to lower science subject NCEA Level 3 attainment. Advantage and disadvantage appears thus to accumulate, and the importance of maintaining an equity lens to the project and to the programmes is very much reinforced by this set of outcomes.

Despite this, analysis of individual papers indicates that the Māori students in HSFY in 2014 and 2015 passed semester one papers at higher rates than their science preparation would have predicted. For both chemistry and physics, considerable focus was put on additional study wānanga and engagement of very high quality tutors with motivation and skills in tutoring Māori students in physics and in chemistry. It is possible that this contributed to better than what would have been predicted based on their secondary school science background.

4.6 COMPARATIVE ANALYSIS – EARLY CONSIDERATIONS

OVERVIEW

As part of the development of the *Weaving Our Worlds* project, analyses comparing Māori in 2014 and 2015 with previous cohorts was identified as one way to determine the potential effectiveness of the enhanced Te Whakapuāwai. This involves comparison with Māori students from Te Whakapuāwai (2011-2013) and Māori students in (2008-2010) who had not been exposed to Te Whakapuāwai or any other targeted intervention. The students from this time would have received support from the Māori Centre and from residential colleges (if applicable). However, this was not the comprehensive approach to support delivered in the Te Whakapuāwai programme.

It is further recognised that, despite the HSFY papers being the same papers from year to year, there is variation in pass rates and thus, it is important to interpret changes over time with an analysis of what has happened to non-Māori and non-Pacific student outcomes. Outcomes analysis highlighted a number of challenges in determining whether and in what ways the enhanced Te Whakapuāwai has made a difference to the academic outcomes of Māori students who were part of the intervention (2014 and 2015 cohorts). Phase Three of the project aims to address these challenges in more depth and in particular will add 2016 data to the final enhanced intervention cohort. Thus, the following section is considered provisional in relation to across-cohort analysis. More detailed analysis will be undertaken in late 2016 following completion of the 2016 academic year and entry of 2016 outcomes into the *Weaving our Worlds* student outcomes database.

The following analysis presents findings to date. These have been used to inform quality improvement and tailoring of the 2016 Te Whakapuāwai programme. One limitation is that there are, as yet, no formal statistical tests of significance applied to the differences shown in this data.

COMPARISONS BETWEEN COHORTS – DESCRIPTIVE ANALYSIS

Table 4.35 presents a range of outcomes for Māori students, for each of the three time periods: 2008 to 2010 pre-Te Whakapuāwai, 2011 to 2013 early Te Whakapuāwai, and 2014 and 2015, enhanced Te Whakapuāwai.

Table 4.35: Māori HSFY student academic outcomes for Māori student across time

Indicator	2014-2015	2011-2013	2008-2010
% passing 4 papers semester 1	63.4%	64.2%	50.7%
% passing 4 papers school deciles 1-5	57.0%	48.8%	42.0%
% sitting 3 papers semester two and 7 papers across full year	65.4%	65.8%	57.0%
% sitting 3 papers semester two and 7 papers across the full year school deciles 1-5	61.3%	55.6%	33.3%
% passed all 3 semester two papers (of those who sat 3)	82.8%	87.6%	85.6%
% passed all 3 semester two papers (of those who sat 3) school deciles 1-5	82.5%	77.8%	77.4%
% passed all 7 papers (of those who sat)	81.1%	84.2%	83.9%
% passed all 7 papers (of those who sat) school deciles 1-5	80.7%	68.9%	74.2%
Semester one papers			
CELS191 % pass paper	84.8%	84.8%	78.7%
CELS191 % pass paper school decile 1-5	79.6%	79.0%	69.6%
CHEM191 % pass paper	73.2%	70.3%	65.7%
CHEM191 % pass paper school decile 1-5	66.7%	58.0%	50.7%
HUBS191 % pass paper	79.4%	84.8%	78.7%
HUBS 191 % pass paper school deciles 1-5	73.1%	80.2%	82.6%
PHSI191 % pass paper	75.5%	76.2%	63.2%
PHSI191 % pass paper school deciles 1 to 5	66.7%	65.4%	47.8%
Semester two papers			
BIOC192 % pass paper	83.0%	87.4%	82.2%
BIOC192 % pass paper school deciles 1-5	82.3%	81.3%	75.8%
HEAL192 % pass paper	70.0%	78.8%	84.6%
HEAL192 % pass paper school deciles 1-5	64.5%	67.6%	72.3%
HUBS192 % pass paper	86.6%	94.6%	91.0%
HUBS192 % pass paper school deciles 1-5	86.8%	87.5%	86.3%

The above table shows that for many indicators the 2014 and 2015 cohort appears to have better outcomes when compared with the 2008 and 2010 cohort. This is particularly marked for the percentage passing all papers and for individual papers. When outcomes focused on students from school deciles 1-5 are analysed, this shows a marked improvement in 2014 and 2015 when compared with 2008 and 2010.

Non-Māori / Non-Pacific outcomes across three time periods

Table 4.36: Non-Māori / non-Pacific HSFY student semester one outcomes for each time cohort

Outcome indicator	2014-2015	2011-2013	2008-2010
% passing 4 papers semester one	72.3%	76.3%	73.6%
% passing 4 papers school deciles 1-5	62.7%	66.2%	66.9%
S1 Average mark (total)	67.9 (67.1-68.60)	70.1 (69.5-70.7)	69.6 (69.0-70.3)
Median mark (total)	69.75	72.75	72.0
S1 Average mark among students from school deciles 1-5	63.2 (61.3-65.1)	64.9 (63.2-66.6)	65.8 (64.3-67.4)
Median mark among students from school deciles 1-5	64.5	66.75	68.25
CELS191 % pass paper	89.8%	90.8%	87.3%
CELS191 % pass paper (school deciles 1-5)	82.7%	85.9%	84.8%
CHEM191 % pass paper	78.3%	80.5%	79.0%
CHEM191 %pass paper school deciles 1-5	67.6%	70.5%	71.3%
HUBS191 % pass paper	85.1%	91.8%	95.3%
HUBS191 % pass paper school deciles 1-5	75.9%	86.6%	93.1%
PHSI191 % pass paper	82.8%	86.0%	83.5%
PHSI191 % pass paper school deciles 1 to 5	76.2%	79.9%	77.1%

The purpose of analysing non-Māori and non-Pacific outcomes (across time periods) in this report is to determine whether changes in outcomes experienced by Māori students over time periods reflect changes that occurred for all people or whether they reflect the impact of interventions, leading to change.

The above table illustrates outcomes for non-Māori and non-Pacific students over the same time periods as shown for Māori students in Table 4.35. It shows some fluctuations over time periods. However, for many the degree of 'across-time' difference is not as marked as for Māori students, for example in relation to physics pass rates among low decile students. Whereas only 47.9% of Māori HSFY students from decile 1-5 schools passed PHSI191 in 2008 to 2010, this had increased markedly by 2014 and 2015 when 66.7% of Māori students from decile 1-5 schools passed the paper. For non-Māori and non-Pacific students there was no real change in pass rates between students during 2008 to 2010 for PHSI191.

For both Māori, and non-Māori and non-Pacific, students there is a trend (from 2008-2010 to 2014-2015) for HUBS191 and HEAL192 to have lower percentage pass rates among students overall and among students from low decile schools. This suggests a change in the paper outcomes overall and a more detailed analysis is required in order to understand Māori student changes in the context of overall paper changes.

Table 4.37 positions findings for non-Māori and non-Pacific students alongside Māori students showing the percentage who passed all four first semester papers across cohorts. It shows that for non-Māori and non-Pacific students there were small changes across time periods in the percentage who passed all four papers. However, for Māori, differences between cohorts were marked, including among those students

from low decile schools. Table 4.37 shows a large reduction in the gap between Māori and non-Māori non-Pacific between cohorts. This early analysis of comparisons with earlier cohorts exploring total Māori students and those from low decile schools provides a very promising picture of the impact of the original Te Whakapuāwai programme and the positive impact of the enhanced Te Whakapuāwai programme delivered in 2014 and 2015. Whereas there was a small drop in the percentage of non-Māori and non-Pacific students from lower decile schools passing all four papers in semester one in 2014 and 2015 compared with 2011 and 2013 (62.7% cf 66.2%), for Māori there was a marked increase in students passing all four papers in 2014 and 2015 compared with 2011 and 2013 (57.0% cf 48.8%).

Table 4.37: % Māori and Non-Māori/ Non-Pacific HSFY students passing all four semester one papers by cohort

	Non-Māori/Non-Pacific %	Māori %	Difference NMNPI - M
Across all school deciles			
2008-2010	73.6	50.7	22.9
2011-2013	76.3	64.2	12.1
2014 and 2015	72.3	63.4	8.9
Students who attended school deciles 1-5			
2008-2010	66.9	42	24.9
2011-2013	66.2	48.8	17.4
2014 and 2015	62.7	57.0	5.7

These analyses indicate small changes for non-Māori and non-Pacific students between cohorts alongside marked changes for Māori. Comparison with non-Māori and non-Pacific students in the next phase of analysis is essential to control for fluctuations in outcomes on a year-by-year basis, in addition to being able to measure changes in between-group inequity. Importantly, this comparison is also essential in determining the impact of the enhanced intervention on students from lower decile schools, providing a control group against which to make sense of changes across time.

SUMMARY

The first part of this section presented findings from student feedback and evaluations of the programme and its components, in particular the SWAT sessions and kaihaūtu, one-to-one meetings with staff and intense science study wānanga. There was overwhelmingly favourable feedback from students who identified benefits across knowledge, confidence, motivation, security and skills. The impact of whakawhanaungatanga and access to supportive and well-informed students and staff were all highlighted.

Analysis of outcomes for Māori students in HSFY (2014-2015) for key indicators of importance for HSFY (semester one, semester two and across the year) showed the picture for outcomes was complex. However, for around two-thirds of Māori students, overall outcomes were positive and for around one-third of the students outcomes were more mixed.

Analysis of Māori student backgrounds highlighted the overlapping nature and complex interplay of home and school backgrounds. For HSFY, access to secondary school sciences is also highlighted as an issue for many Māori students. When 2014 and 2015 HSFY Māori student outcomes were measured comparing students from different socio-economic and science preparation backgrounds, the findings show better outcomes among students who attended higher decile schools, were from areas of lower relative deprivation and had greater NCEA Level 3 science attainment. Despite this trend, analysis indicates that there were many positive outcomes for Māori students from across diverse backgrounds and for some papers such as CHEM191 and PHSI191 the 'gap' is closing.

The final section showing comparisons among Māori students between years shows that for CELS191, CHEM191 and PHSI191 Māori outcome improvements are greater than would be expected on the basis of non-Māori and non-Pacific student outcomes. This is particularly so for students who attended school deciles 1-5.

As described above, these analyses are intended to provide a guide for more detailed analyses to follow. We will test in more detail the hypotheses generated from these descriptive findings, firstly, that the original Te Whakpuāwai intervention led to marked improvement for academic outcomes for Māori students. We will also test whether the enhanced Te Whakapuāwai delivered to Māori students from 2014 to 2016, has led to further improved outcomes particularly among those students who have experienced structural disadvantage (both socio-economic and educational).

5. DISCUSSION AND CONCLUSIONS

5.1 DISCUSSION

The *Weaving Our Worlds* project is a Kaupapa Māori project that aimed to identify the impact of a strengths-plus-evidence-informed intervention on academic outcomes and student experience for Māori Health Sciences First Year (HSFY) students at the University of Otago. In particular, the focus was on investigating impacts on students from lower socio-economic backgrounds, lower decile schools and those with educational gaps in science subject attainment.

This report has detailed how the intervention evolved, providing an overview of Te Whakapuāwai 2011-2013 and how and why the enhanced Te Whakapuāwai programme was developed for delivery. The theoretical and operational aspects of the enhanced intervention were also presented to highlight what the enhanced Te Whakapuāwai programme was and how each component was intended to boost the academic outcomes and experience of Māori HSFY students.

This section will focus on discussion about aspects of the research, the research questions and the implications and impacts of the project.

RESEARCH

Weaving Our Worlds encompasses a complex qualitative and quantitative study that involves collation and analyses of a comprehensive dataset about HSFY students in the years 2008-2015 with a further year, 2016, being added to complete the dataset for Phase Three.

A number of measures were used to provide a profile of Māori HSFY students including, NZDep2013, secondary school decile and NCEA credits attained in biology, physics and chemistry. Academic outcomes for each HSFY cohort were included enabling analyses of relationships between different variables and academic outcomes and to allow comparisons between subgroups of students over time and across years.

The inclusion of secondary school decile and NZDep2013 score allowed for a more sophisticated level of enquiry about diverse HSFY students. This data shows a striking relationship between NCEA science attainment and NZDep and secondary school decile, with students from more deprived areas and lower decile schools less likely to have obtained 14 NCEA credits or more in chemistry, biology and physics (and thus be inadequately prepared for HSFY). This relationship is being explored in more detail.

Using both measures allows for more a more comprehensive overview of how students from different socio-economic background progress through HSFY in each paper and whether the 'gap' in outcomes for Māori from more deprived home and school backgrounds had narrowed over time. This report provides a descriptive picture of Māori student progression through HSFY.

Considering NZDep2013 and secondary school decile together has provided a clearer understanding of the socio-economic profile of HSFY students and has enabled more in-depth analyses about the impact of the enhanced intervention on participant outcomes.

Another important area of focus was considering student's NCEA science background entering into HSFY and their academic progress through HSFY. Although NCEA data highlighted a number of concerns about academic preparedness for the HSFY course, particularly for students from lower decile schools and areas of higher deprivation, there were some interesting findings pertaining to how well participants with limited previous science exposure did in HSFY in 2014 and 2015. For example, although only 11.2% of participants within school deciles 1-5 attained 14 credits or more in the three NCEA science domains (thus were academically under-prepared for HSFY), 79% of the cohort within these school deciles passed CELS191, 66.7% passed CHEM191, 73.1% HUBS191 and 66.7% PHSI191 in semester one. These outcomes are positive when considering the large percentage of students within this decile grouping (88.8%) that did not attain 14 credits or more in all three science subjects. For both CHEM191 (chemistry) and PHSI191 (physics), considerable focus was put on additional study wānanga and engagement of very high quality tutors with motivation and skills in tutoring Māori students in physics and chemistry.

The comprehensive dataset allows us to explore the complexities pertaining to socio-economic disadvantage, educational background and academic attainment amongst HSFY students. Often background factors overlap, engendering accumulated disadvantage for some students. However, this does not necessarily mean that students who are more socio-economically disadvantaged and/or educationally disadvantaged cannot progress successfully through HSFY. Analyses of academic outcomes for participants indicates, in descriptive analyses to date, some improvements over time in terms of academic progression from semester one into semester two and overall pass rates for the seven HSFY papers.

A major challenge is to determine, within the context of this complexity, whether the programme was effective in improving Māori academic outcomes and whether it was effective in making a difference for students with socio-economic or educationally disadvantaged backgrounds. Access to data from other years has allowed for comparisons with previous Māori students undertaking the same course. Data provided in this report indicates that there are indeed changes in Māori student academic outcomes between time periods. For most HSFY subjects, Māori students in the intervention group (2014-2015) have shown improved outcomes for many of the indicators identified, particularly when compared with students from 2008 to 2010 and particularly among students who attended decile 1 to 5 secondary schools.

One limitation in the scope of this report has been to provide a more detailed and more sophisticated statistical analysis of the comparisons over time to draw more robust conclusions. Phase Three of the project will require further understanding about the overall impact of the intervention on Māori HSFY student outcomes in 2014, 2015 and 2016.

Access to non-Māori and non-Pacific data for 2008 to 2015 has provided a platform for analysis of academic outcome differences between Māori and non-Māori/non-Pacific students over the three time cohorts. The analysis, presented in this report highlights that there are different patterns over time, with outcomes of non-Māori and non-Pacific students showing small changes only across time periods for many outcome indicators. For Māori, in contrast, there were a number of marked outcome differences across time periods, e.g., pass rates for PHSI191 and CHEM191. This is promising and suggests a

narrowing of the academic achievement gap between Māori and non-Māori/non-Pacific students and also between Māori from lower decile schools.

Perhaps, most difficult to interpret within this initial analysis, are findings for outcomes where there were marked changes over time among both Māori and non-Māori/non-Pacific students. Of note for both HUBS191 and HEAL192, across both Māori and non-Māori/non-Pacific data there was a clear trend towards a lower pass rate in 2014 and 2015 compared with earlier years. Thus, understanding Māori outcome change in this context is currently underway in order to be more certain of differences in patterns of outcomes over time and to ensure that conclusions about effectiveness of the enhanced Te Whakapuāwai are robustly drawn.

A further possible contributor to Māori HSFY student academic outcomes is whether the students attended a foundation year course in the year before undertaking HSFY. The MHWDU oversees Tū Kahika, a programme that supports between 15 and 20 Māori students annually to complete the University of Otago's Foundation Studies year in order to build preparedness for HSFY.

Phase Three of the research will investigate more detailed and nuanced analysis reflecting on Māori changes over time within the context of comparison with non-Māori and non-Pacific outcomes, and the impact of attendance at foundation year for Māori student outcomes in HSFY.

STUDENT PERCEPTIONS

The project team has evaluated the impact of each of the new components of Te Whakapuāwai as well as the impact of the programme overall. Both qualitative and quantitative evaluative methods were used. Evaluation of 'new' components added to the Te Whakapuāwai programme (SWAT, intensive study wānanga, one-to-one meetings with staff) indicates that for students, kaihautū and staff, these components have had a very positive impact, particularly in engaging and supporting Māori students very early on during their first year at university. The SWAT programme was greatly appreciated by the Māori students and many reported gaining motivation, skills and reassurance within a culturally responsive environment.

There was favourable feedback from students who identified benefits of the programme including increased knowledge, confidence, motivation, sense of security and skills. The impact of whakawhanaungatanga and access to supportive and well-informed students and staff were all appreciated. Importantly, participant feedback about the various components of the enhanced programme, reflect the prime objectives of the programme (and its component parts) to support students to feel more motivated and confident about the HSFY course and to support their academic path.

The decision to include additional intensive subject-based wānanga (e.g., all weekend physics tutorials) was much valued by the many Māori students who attended them. The high participation rate (> 85%) alongside student feedback reinforced the value of these sessions. In addition, a higher percentage of Māori students passed HSFY CHEM191 and PHSI191 than would have been predicted on the basis of NCEA Level 3 chemistry and physics attainment. The conclusion is reinforced even further by the finding that pass rates for CHEM191, CELS191, PHSI191, BIOC192 and HUBS192 have improved over time periods

to a degree that is out of keeping with the amount of change that would have been expected based on non-Māori and non-Pacific changes in outcomes.

The decision to build on the existing Te Whakapuāwai programme (2011-2013) has also been effective and the continuation of the existing components *(*whakawhanaungatanga*,* timely advice and support, linking to academic and pastoral support, motivational hui) was important for the success of the intervention. Māori students have persistently and consistently highlighted the value of whakawhanaungatanga, in reducing feelings of isolation and providing a sense of reassurance and support. This is important given only about 13% of Māori students who were part of the project had home bases in Otago, with the remainder living away from their home regions while studying.

PARTICIPANT ACADEMIC OUTCOMES

Participant feedback about the enhanced programme, shows that the programme was well received and appreciated. Importantly, the quality of the pre-existing support programme was not compromised by the introduction of new components in 2014 and 2015. As a research team implementing the enhanced intervention we feel that the new components added value to Te Whakapuāwai whilst maintaining a strengths-based (anti-deficit) and culturally responsive approach towards supporting Māori students. SWAT, one-to-one meetings with students and study wānanga in particular were rated highly by participants as aspects of the programme that better supported student learning and adjustment to first-year study. Participants also appreciated the opportunity to be guided by more senior students (kaihautū) and felt more motivated to set and achieve their goals and more informed about what to expect from the HSFY course.

Project findings suggest that the enhanced intervention did contribute to improved academic outcomes for Māori HSFY students in 2014 and 2015, including those from areas of higher deprivation and lower decile schools. Comparisons between the 2008 to 2010 Māori HSFY Māori cohorts and the 2014 and 2015 Māori HSFY cohorts show an improvement for participants across nearly all indicators (however further statistical analyses are required in order to prove whether what is shown in a descriptive way, stands up to statistical testing).

The theoretical elements of the enhanced intervention are difficult to measure, however our observations show that participants were very receptive to the ideas being presented (such as mindset growth training) and felt well-supported throughout HSFY. The strengths-based approach underpinning the programme is viewed as a critically important aspect of Te Whakapuāwai (and other programmes being implemented by the MHWDU). We were surprised at the lack of available literature about this approach and it is hoped that our research and future publications will make a contribution to the concept of strengths-based approaches to student support. Many tertiary institutions attempt to categorise students as 'at risk' and then intervene to improve student outcomes. In the *Weaving Our Worlds* project we sought to deliver the enhanced intervention to all Māori HSFY students without differentiating students by background (and potentially stigmatising them). The entire approach sought to build on students' strengths and foster a culture of academic excellence amongst each cohort where students could also support one another. Again, although difficult to measure, participant feedback

highlighted that students found the additional academic support, mentors and opportunities to get to know one another and work together very valuable, culturally, socially and academically.

OUTCOMES AND EQUITY

A number of challenges were identified including those associated with how to better support students with inadequate science preparation prior to HSFY. In addition, some changes in outcomes for Māori students in particular HSFY papers over time are of concern and will be addressed internally. Considerable attention is being paid to analysing the impact of socio-economic disadvantage on Māori HSFY learner outcomes. Early analysis of data indicates that Māori HSFY students enrolled in HSFY in 2014 and 2015 did achieve better outcomes when compared with HSFY Māori students from similar socio-economic and educational backgrounds (from previous cohorts) who did not receive the intervention. These outcomes are promising and suggest that the enhanced intervention is both effective and important from an equity perspective.

The comprehensive database has made it possible to compare outcomes for Māori students who participated in the enhanced Te Whakapuāwai, compared with those (from previous years) who had participated in the earlier Te Whakapuāwai (2011-2013) and pre-Te Whakapuāwai (2008-2010). Analysis indicated that there were a range of improvements for Māori students who had participated in Te Whakapuāwai (2011-13) and those in the *Weaving Our Worlds* project intervention (2014-2015). Analysis showed that these changes were particularly evident for CHEM191, PHSI191 and CELS191. Analysis compared against non-Māori and non-Pacific student outcomes for the same time periods would suggest that these improvements in academic success are meaningful improvements and suggest that the Te Whakapuāwai programme (2011-2013) was effective in improving outcomes, compared with students who were pre-Te Whakapuāwai (2008-2011). Further, the enhanced Te Whakapuāwai programme (2014-2015) led to further improved outcomes particularly among those from lower decile schools and in other key areas.

As a result, there is sufficient evidence to strong suggesti that the enhanced Te Whakapuāwai did indeed make a difference for students from low decile schools and with some science attainment gaps. Further analysis of the data will allow us to identify how factors work together to support positive academic achievement across the diversity of Māori learners in HSFY.

A number of implications from this research have been identified including current and future research, implications for Māori tertiary student programme development and delivery, and broader implications for the tertiary and secondary school sectors.

IMPLICATIONS FOR RESEARCH

Phase One of *Weaving Our Worlds* was invaluable in providing an opportunity to identify, select from and adapt strategies and initiatives that would be effective in increasing Māori student academic achievement within tertiary education. Key learnings in relation to the research process include recognising the benefits of developing and maintaining a comprehensive database, bringing together student background information with HSFY outcomes. The use of both qualitative and quantitative research has been important to ensure the presence of student voices and to provide a platform for

responsive quality improvement. An additional learning for the team was the importance of having a detailed and robust literature review and analysis prior to embarking on programme enhancements and development.

From a quantitative perspective, this project has provided valuable data for student outcomes, indicated the impact of the programme for diverse students and generated a number of hypotheses that will be addressed further in analyses during the next phase of the project.

The development and maintenance of a comprehensive database has been a large and time-consuming task and particular care has been taken in quality control aspects of database management (checking for accuracy against individual records, replicating analyses). This report has presented mainly descriptive analyses as a first stage of analysis. The project team looks forward to the next phase, where more complex statistical analyses will be used to focus in more detail on the question of the nature and extent of the impact of the intervention on academic outcomes. We recognise that the data will also enable us to investigate further factors associated with differing academic outcomes in HSFY. Identification of factors associated with systems and structures is a priority for further data analysis (e.g., changes in papers that are either positively or negatively disproportionately impacting on students from disadvantaged backgrounds).

In undertaking evaluative research, while also delivering the programme, we learnt valuable lessons related to the logistics and challenges of delivering and evaluating an intervention at the same time. The process of undertaking evaluation that is able to directly feed into programme delivery is consistent with 'action research', ensuring learning (e.g., from student surveys) has a direct and at times immediate impact on programme delivery and outcomes and takes the voice of stakeholders into account, in this case students. A challenge for managing this logistically is the risk that students may hold back from providing more negative feedback due to issues of power imbalance or perhaps because they want to be kind rather than negative. In the future, opportunities for more independent evaluation will be useful to explore student views. An additional challenge is associated with the logistics of ensuring research components such as student surveys are delivered in a timely and effective way while simultaneously delivering programmes. The lower than ideal response rate for the survey of student perspectives about SWAT (2015) reflects that 'multi-tasking' may not lead to effective research processes, particularly in a team where student services are prioritised. For 2016, the MHWDU is considering options to ensure high quality delivery of both the programme and evaluation.

IMPLICATIONS FOR SERVICE DEVELOPMENT AND DELIVERY FOR MĀORI HSFY STUDENTS

The project team has learnt and continues to learn a great deal from this project, and has been acting on this learning to improve its programme delivery to Māori HSFY students over the duration of the *Weaving Our Worlds* project. Changes made to the programme in response to the learning are described in this report and include enhancements to the SWAT programme, logistical changes to a number of the programme components to respond to student preferences and realities (such as timetabling), increased focus on those students who are flatting or have other responsibilities (for example, mature students with families) and increasing the number and duration of intensive study wānanga.

Further changes for 2016 that will be implemented on the basis of learning from the *Weaving Our Worlds* project include:

- Urgent exploration of how to support better outcomes for HEAL192 with consideration of establishing the kind of intensive wānanga held for PHSI191 and CHEM191 in semester one, for HEAL192 in semester two.
- A greater focus on identifying and prioritising individual contact (including one-to-one meetings) with students who have greatest cumulative challenges (related to school decile, home area deprivation, secondary school science attainment and living circumstances).
- Continued enhancement of the programme for students not living in halls of residence, particularly within the context of increasing numbers of Māori HSFY students who are flatting.
- The MHWDU provides support programmes for Māori students studying in other courses (such as medicine) and is actively planning to run modified versions of SWAT and one-to-one interviews for those students transitioning into health professional programme study.

WIDER IMPLICATIONS

One group of implications relates to the secondary school sector – the project highlighted the concerning low levels of science attainment achieved by Māori students attending lower decile schools and the compounding impact of student NZDep2013. This is consistent with other New Zealand research.[97] More work is needed to understand what factors are contributing to this low rate of science attainment, including whether this is school related access to NCEA Level 3 science or whether students are not taking or offered the relevant subjects. One way of increasing outcomes for HSFY Māori students from lower decile schools would be to ensure students are well-advised about science attainment and to ensure access to science study at all levels up to NCEA Level 3.

Evaluation indicates that the 2014 and2015 Te Whakapuāwai was a culturally responsive and carefully constructed strengths-based programme that led to improved outcomes for HSFY Māori learners including learners from lower socio-economic backgrounds. The project team is confident that the programmes delivered by the MHWDU are making a difference to improving outcomes for Māori students in HSFY and other programmes including health professional degree programmes.

One downstream implication of increasing Māori student numbers in HSFY and subsequent increase in numbers of Māori students in health professional programmes is that there has been over a 100% increase in the number of Māori students across health professional programmes at Otago over the past five years. Whereas in 2008-2010 there was an average of 16 Māori students per year gaining entry into medical school from HSFY at Otago, in 2014 and 2015 this has increased to an average of around 40 Māori students per year gaining entry to medical school from HSFY. The impact of this and the growth in Māori gaining entry to dentistry, pharmacy, physiotherapy and other programmes has the potential to have a significant impact on the Māori health workforce in the future.

[97] I Madjar et al., "Stumbling Blocks or Stepping Stones?: Students' Experience of Transition from Low-Mid Decile Schools to Universities," (2010).

5.2 CONCLUSIONS

The *Weaving Our Worlds* project has reinforced the value of exploring in considerable depth, the impact and outcomes for Māori tertiary learners participating in an evidence- and strengths-based programme. Te Whakapuāwai programme was delivered to a diverse group of Māori students (N=265), all undertaking HSFY at Otago University in 2014 and 2015. The results show a high degree of participation and satisfaction with the programme, with many students recognising the benefits of gaining up-front support, motivation and skills early on in their year of study. Analysis of academic achievement indicates positive academic outcomes for many of the students. Analysis further showed the impact of socio-demographic and educational backgrounds (school decile, NZDep2013 score and secondary school science attainment) on Māori HSFY student outcomes. Findings from academic outcomes suggest that it is possible to reduce inequity in Māori student academic achievement by taking a strengths-based, culturally responsive and evidence-based approach to best practice in programme development and delivery.

There were many learnings and implications from this project leading to recommendations for further research, future programme development and delivery, broader systems and institutional issues (across the education sector). A striking implication of effectively supporting increased Māori student achievement in HSFY is the downstream impact of having growing numbers of Māori entering and graduating from a range of health professional and health science degree programmes – thus providing a positive impact on both health and education. Many of the learnings from the *Weaving Our World* project are already imbedded in the practice of the MHWDU. Planning is underway to consider how best to disseminate the key learnings, particularly in relation to supporting Māori tertiary student academic achievement. Furthermore, the opportunity to analyse the database on completion of the 2016 academic year will allow for a robust testing of the hypothesis that the enhanced programme is effective in meeting the needs of Māori students across diverse backgrounds.

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