

# Virtual bioprocess simulation laboratory for teaching and learning

Funded through Ako  
Aotearoa's Northern  
Regional Hub Project

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## Overview of the project

There is great potential in applying virtual technology to support teaching and learning. A 3D virtual bioprocess simulation will enable users to learn about both basics of laboratory safety and fermentation principles. Once procedures and exercises within the simulator have been carried out, users will have a deeper understanding about fermentation principles, common lab procedures, experiment design and analysis of data. This software would be an efficient, low-cost option to educators and students within fields such as Biotechnology, Biology, Biochemical Engineering, Biochemistry, Genetics, Microbiology and more.

## Progress to date

- Detail the experimental practices and equipment of the relevant real-world lab
- Draft comprehensive use-cases to identify specific components needed for the interface and the underlying mathematical model of the physical system
- Initial design (specification) of the user interface
- Design (specification) of the physicochemical model
- Develop prototype of the mathematical model

## Next steps

- Develop and test 2D and 3D prototype of the interface
- Test prototype of the mathematical model in the interface
- Design data recording/visualisation/storage components
- Design web-based teaching/management components

## Emerging issues

Nothing to report

## Feedback from other groups

We have received feedbacks at national and international levels supporting that there is a great potential in applying this 3D virtual bioprocess simulation in teaching curriculum. This system will enable users to learn about fermentation principles, common lab procedures, experiment design and analysis of data.

# Whare tapa rima - the five sided home: a best practice holistic learner support model project

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Left to right: Nikki Going, Dr. Cecilia Zhang, Susan F. Stevenson, Dr. Melissa Hackell

## Overview of the project

Research evidence justifies further attention and investment in learner support services (Prebble et al, 2004). Learner support is a critical component of a quality learning environment in which effective teaching and learning can take place. Digital media and guidebook are being designed to guide the successful implementation of a Whare Tapa Rima – The Five Sided Home: A best practice holistic learner support model. This model has underpinned learner support for diverse learners at FREEDOM for the past 5 years.

The video and guidebook are designed to:

1. Support engagement and retention of tertiary learners
2. Implement holistic learner support in tertiary education in New Zealand
3. Background the model and its benefits
4. Provide exemplars of best practice to empower institutions to implement the model and improve learner support

The New Zealand tertiary learning environment poses difficulties for Maori, Pacific and International students whose identities, cultural references and worldviews are largely absent. Whare Tapa Rima is an effective model for implementing learner support in a tertiary sector that is increasingly characterised by learners from diverse cultural backgrounds. A holistic

learner support model can both support and value diversity and play a significant role in improving academic success, raising completion rates and reducing learner non-continuation. This project presents a model for learner support that builds on applications of Mason Durie's original Whaiora: Whare Tapa Wha model (Durie, 1994). Whare Tapa Wha has been successfully applied in the development and evaluation of health services in New Zealand to address equity in Maori health outcomes. Following Moeau's 1997, introduction of the fifth dimension (Moeau, 1997), this project adapts and extends the Whare Tapa Rima model and specifies its applicability for learner well-being and support at a higher education institute in New Zealand.

## Progress to date

The team has completed a robust research and ethics committee process. The Committees provided valuable feedback on the research design and interviewing and consenting process. This feedback has been incorporated into the design of the Living Whare Tapa Rima research phase of the project which will get underway in the next month. An extensive literature review is progressing that uses the Whare Tapa Rima - The Five Sided Home metaphor to argue for consideration of how we build learner support in tertiary institutions.

The model challenges existing models of learner support in education that limit learner support to academic/pastoral care. Alternatively, this model encourages institutions to explore multiple interconnected dimensions of learner support.

Concepts of 'holism' and 'emergence' provide insight into how to apply the model in practice (Guthrie, Bertrand Jones and Osteen, 2017). Whare Tapa Rima provides a holistic conceptual map to orient our attention on the complex dynamic interactions within a support system and to make sure that the support systems we develop are multi-dimensional and robust.

'Emergence' is about how the links between the various dimensions of the support model contain the creative potential for support networks to emerge. Learner support is not done by a single person but emerges within and between people. Recognition that context is something we co-create with faculty, staff and learners allows us to consider how we can consciously and purposively design our learning contexts in ways that support learner well-being and success.

## **Next steps**

Next steps for the project include:

1. The completion of an extensive literature review
2. Further consultation with FREEDOM's Maori advisor
3. Interviews with FREEDOM learners
4. Focus group with personnel and faculty

## **Emerging issues, highlights and challenges**

Possible challenges for this project may be quality videography of the exemplars.

A highlight would be support from FREEDOM's Maori advisors.

Another highlight has been the collaboration between all the members of the team to develop the ethical framework and questionnaire.