A MIXED METHODS ACTION RESEARCH PROJECT INVESTIGATING STEM TO STEAM USING THE APISCOPE AS A TOOL FOR DIFFERENTIATED TEACHING AND LEARNING

TLRI GRANT HOLDERS:

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PROJECT START DATE:
JANUARY 2018

PROJECT FINISH DATE:
DECEMBER 2019

Project description:

This mixed methods action research project places an observational beehive at the centre of an exploration of differentiated teaching and learning. Through the study of a living system, a STEM context is created. We are keen to understand STEM learning through observation-led teaching and expressed through the creative arts for intermediate aged priority students.

PROJECT INGREDIENTS:

One Apiscope:

one living system

containing 50,000 bees

and one queen.

Two researchers

two schools

with 660 children

learning five key competencies ...

over four curriculum areas

Aims:

Our established team of intermediate teachers, working with an interdisciplinary team of researchers, and community-based experts in arts, sciences, maths, and beekeeping, have been collaborating since 2014 to understand the potential of the Apiscope, an observational beehive, for developing innovative, differentiated teaching and learning. This TLRI provides an opportunity to continue collaborating through a mixed methods research project that aims to:

1) Understand how teachers can use an observational beehive to stimulate the design and implementation of differentiated teaching and learning based on:

- STEM (Science, Technology, Engineering & Mathematics) content
- Observation-led processes of learning
- Expressions of learning through the arts

2) Determine the impact of differentiated teaching and learning with the Apiscope on students' knowledge, skills and attitudes in relation to:

- Literacy and numeracy, when developed through STEAM (from STEM to STEAM means including the arts as a vital tool to expand expressions of learning)
- Key competencies of using language, symbols and texts; managing self; relating to others; thinking and participating and contributing

3) Explore the relationship between differentiated STEAM teaching and learning, and changes to the knowledge, skills and attitudes of priority learners who may have special needs (including giftedness), identify as Māori or Pasifika, or come from low socioeconomic backgrounds.

Importance of this research:

This project explores how teachers differentiate in response to learner differences – abilities, culture, language, gender, socioeconomic and so on. Differentiated teaching maximises all students' access to and participation in learning. This project differentiates rich content, through observation-led teaching and learning, expressed through the arts, addressing inequities in access to and participation in STEAM.

Mixed Methods Action Research:

Through a systematic, collaborative inquiry, our team is 'learning by doing' with one another and a growing network of passionate experts in sciences, arts, education - and bees! Basically, we plan to start by assessing learners' knowledge and skills related to bees and teachers' readiness to differentiate content, processes and products. Analysis of those baseline results will lead to the creation of professional learning and support for teachers so that they can plan differentiated STEM to STEAM opportunities for their students. Post-analysis of artefacts of teaching and learning will help us understand how teachers differentiate and the difference it makes. Ivankova's Mixed Methods Action Research framework has been adopted to enable a participatory method converging research and practice: practice-led research and research-led practice. The choice of analytical strategies has direct implications for how differentiated teaching is designed, implemented and evaluated, and this project uses existing methods for quantitative and qualitative data analyses.

Our partners:

Angela Lowe and Jared Simons,
Newlands Intermediate School

Ian Hastie, Simon Flockton, and Paascalino Schaller,
Avalon Intermediate School

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