STARPATH SCIENCE PROJECT

Supporting science teachers in using student achievement data

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Aims:

• To develop and support science HODs and teachers in using achievement data.

• To create greater opportunities for underrepresented groups of students (priority learners) to learn science at senior levels.
Exploratory study on data use in science departments

• In November 2012, interview data were collected from 9 science HODs from Starpath schools

1. What are the current practices of Science Heads of Department in using achievement data for improving student outcomes in their departments?

2. How do we build data analysis and interpretation skills with the Science Heads of Department/teachers, with a focus on improving science learning outcomes of priority learners?
Case study on science pathways in schools

Year 9 Compulsory
Science

Year 10 Compulsory
Science

Year 11 Compulsory
65 Māori students
- Advanced L1
- General Science L1
- Bridging Science L1

Year 12
32% out of 314 Yr 11; 13 Māori students
- Biology L2
- Chemistry L2
- Physics L2
- Sustainability Science L2
- Bridging Science L2

Year 13
56% out of 100 Yr 12; 6 Māori students left school with L3 qualifications
- Biology L3
- Chemistry L3
- Physics L3
- Science L3
- Bridging Science L3
Findings

- Lack of junior level standardised science tests
- Lack of reliable evidence of student performance in science for decision-making
- Achievement data used only for placement rather than supporting instructional decisions
- Limited skills and knowledge on data analysis and interpretation
- Limited monitoring and tracking of the progress of priority learners
Using Science: Thinking with Evidence (STwE)

• In 2013-14, 6 schools participated in a study to investigate the use of a standardised science assessment tool.
  • What impact does the use of a standardised junior science assessment tool have on teachers to support priority learners in science pathways?

• Science - Thinking with Evidence (STwE) is a standardised MCQ assessment developed by New Zealand Council of Educational Research (NZCER). [www.nzcer.org.nz](http://www.nzcer.org.nz/)
Why focus on “thinking with evidence?”

“Thinking with evidence” is central to developing competencies and dispositions for using science knowledge:

• asking relevant critical questions
• evaluating the value of a claim
• reading patterns in compound visual texts
• critical thinking about cause and effect
• an appreciation of the relative scale of events
• setting aside prior knowledge when irrelevant to the question at hand
• not rushing in (noticing details, taking time to think)
## Content in STwE

<table>
<thead>
<tr>
<th>NOS sub-strands</th>
<th>Student may be asked to:</th>
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</table>
| Understanding about science     | • Identify whether a statement is supported by evidence  
|                                 | • Decide what the evidence means  
|                                 | • Find evidence to support a statement                                                                                                                                 |
| Investigating in science        | • Thinking about key feature of scientific investigations  
|                                 | • Identify questions that can be answered by the evidence presented, or identify questions for further investigations                                                                                          |
| Communicating in science        | • Read and correctly interpret scientific texts of the form:  
|                                 |   • One or more numeric texts  
|                                 |   • One or more visual texts  
|                                 |   • Combination of visual and numeric texts                                                                                                                                                          |
| Participating and contributing  | • Making judgements  
|                                 | • Prioritizing  
|                                 | • Weighing up possible alternatives  
|                                 | • Applying what is known in one context to a new context  
|                                 | • Recognising which fact to consider  
|                                 | • Making predictions |
Welcome Finau

Choose the section you want from the following:

- **PAT: Mathematics**
- **STAR**
- **PAT: Reading Comprehension**
- **PAT: Listening**
- **PAT: Reading Vocabulary**
- **Science Thinking with Evidence**

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**NZCER Marking**

Reporting, Analysis and Online Testing

**Science Thinking with Evidence**

Assessment Management

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Test</th>
<th>Term</th>
<th>Year level</th>
<th>View</th>
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<td>1</td>
<td>9</td>
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Showing 1 to 4 of 4 entries

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NZCER
Introducing five science capabilities

Five basic capabilities in the science learning area have been identified from our Nature of Science (NOS) research. We asked what capabilities could contribute to a functional knowledge of science. We also thought about what these capabilities would look like for students at different ages and what we might expect to see them do and say.

Within each capability you will find over ten resources to explore and use in the classroom. Explore the capabilities and resources below. These capabilities are a guide for adapting teaching and learning and are not an exhaustive list. The boundaries between the capabilities are blurry. Any learning activity could provide opportunities to strengthen more than one of them, but for planning, teaching and assessment purposes, it is useful to foreground one specific capability.

The five science capabilities

- Gather & Interpret data
  Learners make careful observations and differentiate between observation and inference.

- Use evidence
  Learners support their ideas with evidence and look for evidence supporting others’ explanations.

- Critique evidence
  Not all questions can be answered by science.

- Interpret representations
  Scientists represent their ideas in a variety of ways, including models, graphs, charts, diagrams and written texts.

- Engage with science
  This capability requires students to use the other capabilities to engage with science in “real life” contexts.
Comparing individual student reports
Comparing groups of students - Pasifika

The visualisation tool used is Fathom™
https://www.mentis.co.nz/fathom

mean = 55.8

mean = 48.9791
Comparing groups of students - Maori

- Mean = 48.9791
- Mean = 55.8

Frequency of

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<th>Asian</th>
<th>European</th>
<th>Maori</th>
<th>Other</th>
<th>Pasifika</th>
</tr>
</thead>
</table>

Scale score

- Low
- Middle
- High

Mean = 48.9791
Mean = 55.8
Acknowledgement:

The slides on STwE were adapted from the Starpath STwE Symposium 25th October 2013 presentation by Cathie Johnson.