

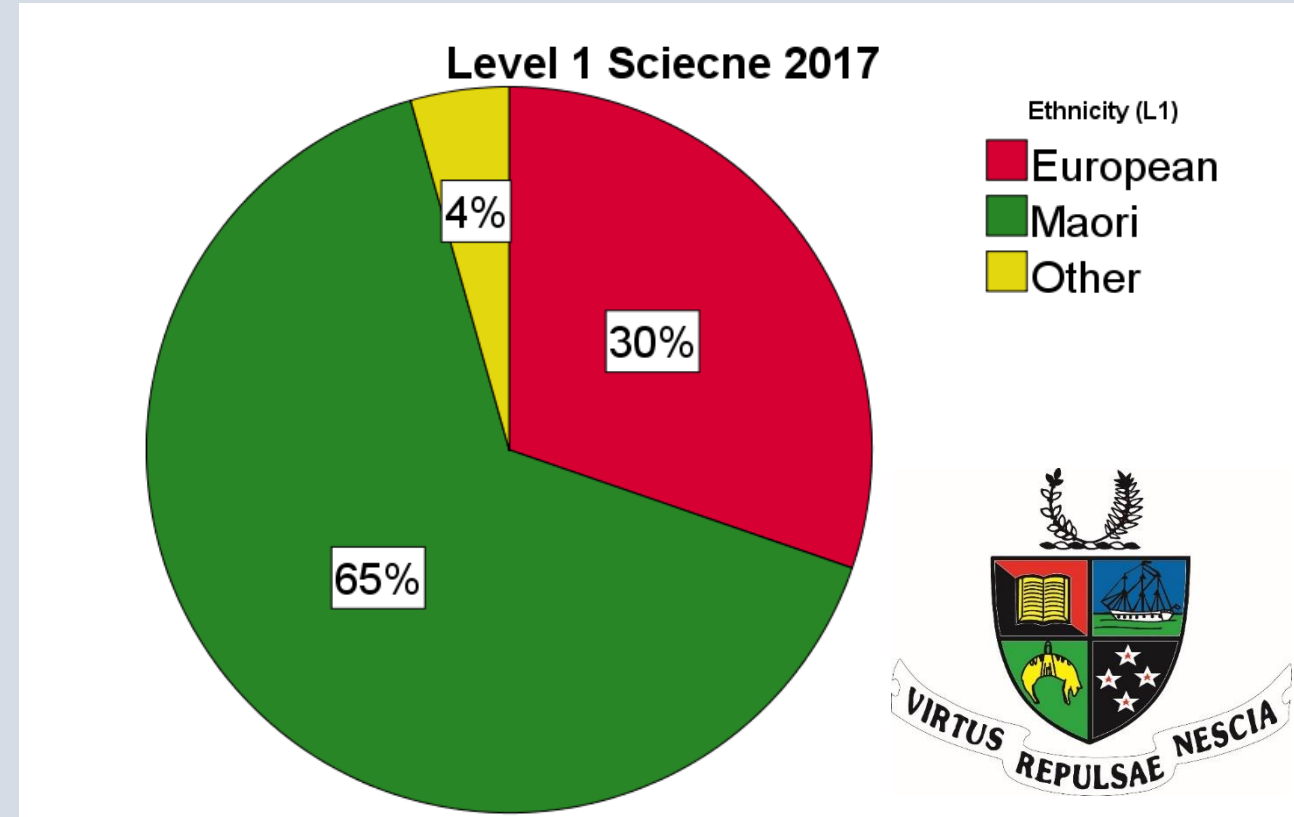
# Closing the Gap in Level 1 Science

Darcy Fawcett

Head of Science, Gisborne Boys' High School

[darcyf@gisboyshigh.net](mailto:darcyf@gisboyshigh.net)

New Zealand Association for Research in Education Conference 2018



# Why?

Enhance student performance and close the gap between Maori and Pakeha

# How?

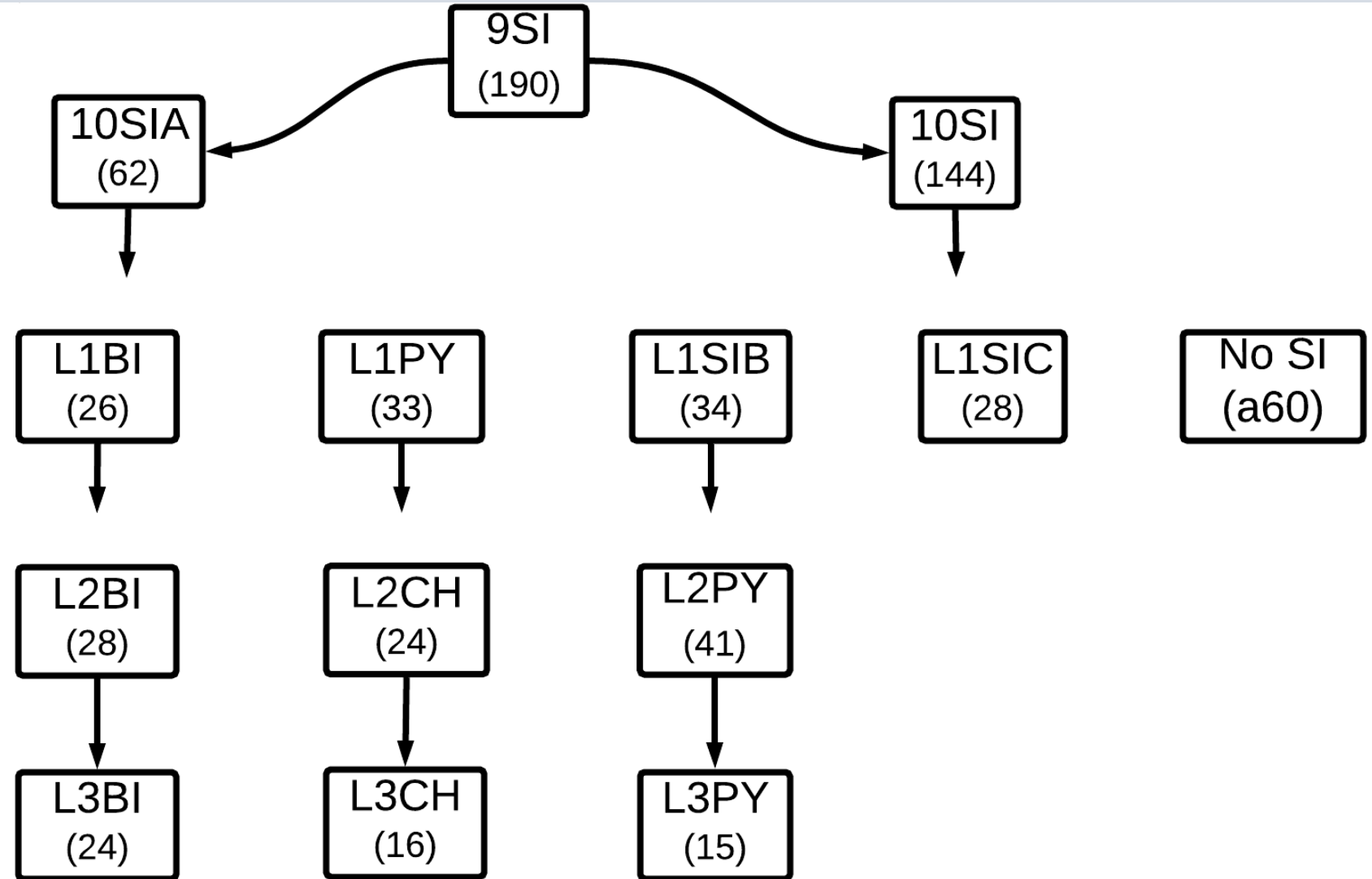
Use evidence to inform and evaluate practice. Attend to what's significant!

# What?

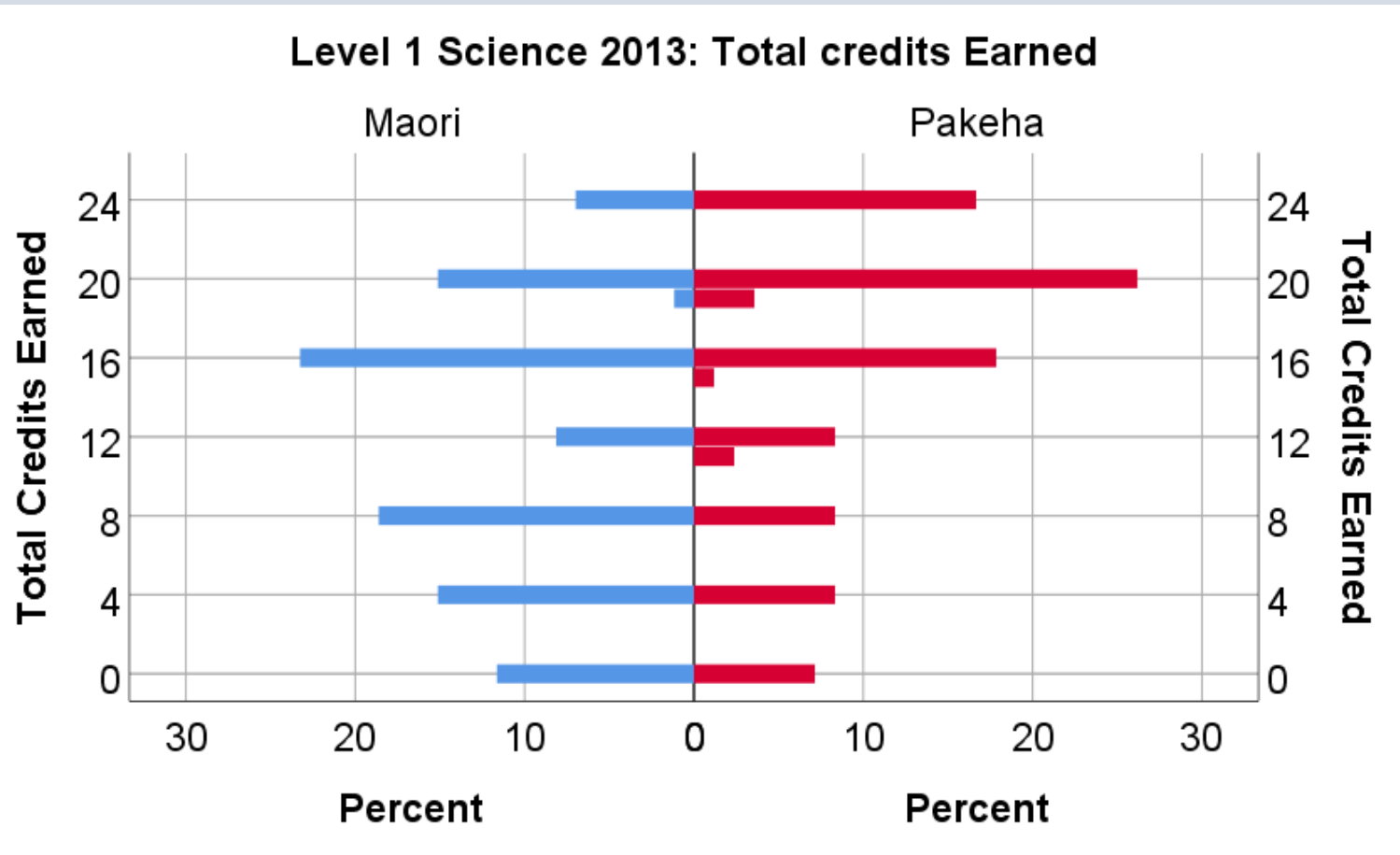
Developed an evidence based programme that fits the needs and aspirations of all

# Science offering in 2013

L1 focused on  
academic L2

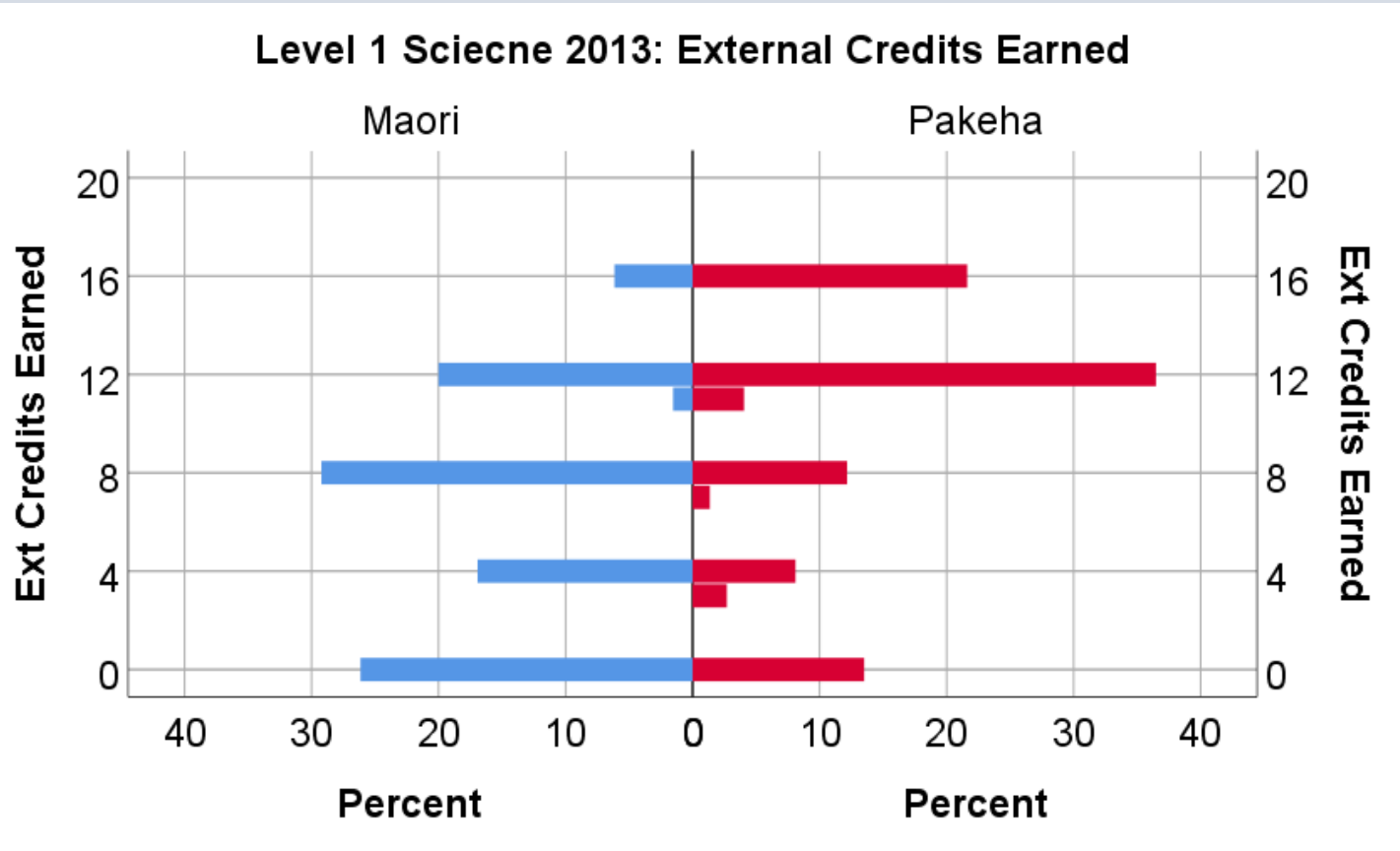


# Level 1 Science 2013: Maori earn less credits than Pakeha



Total Credits	n	md <sub>cr</sub>	
Maori	86	12.0	
Pakeha	84	16.0	
Test	U	p	r
Mann-Whitney	4,603	0.002	.240

# Why? Maori earn less external credits than Pakeha.

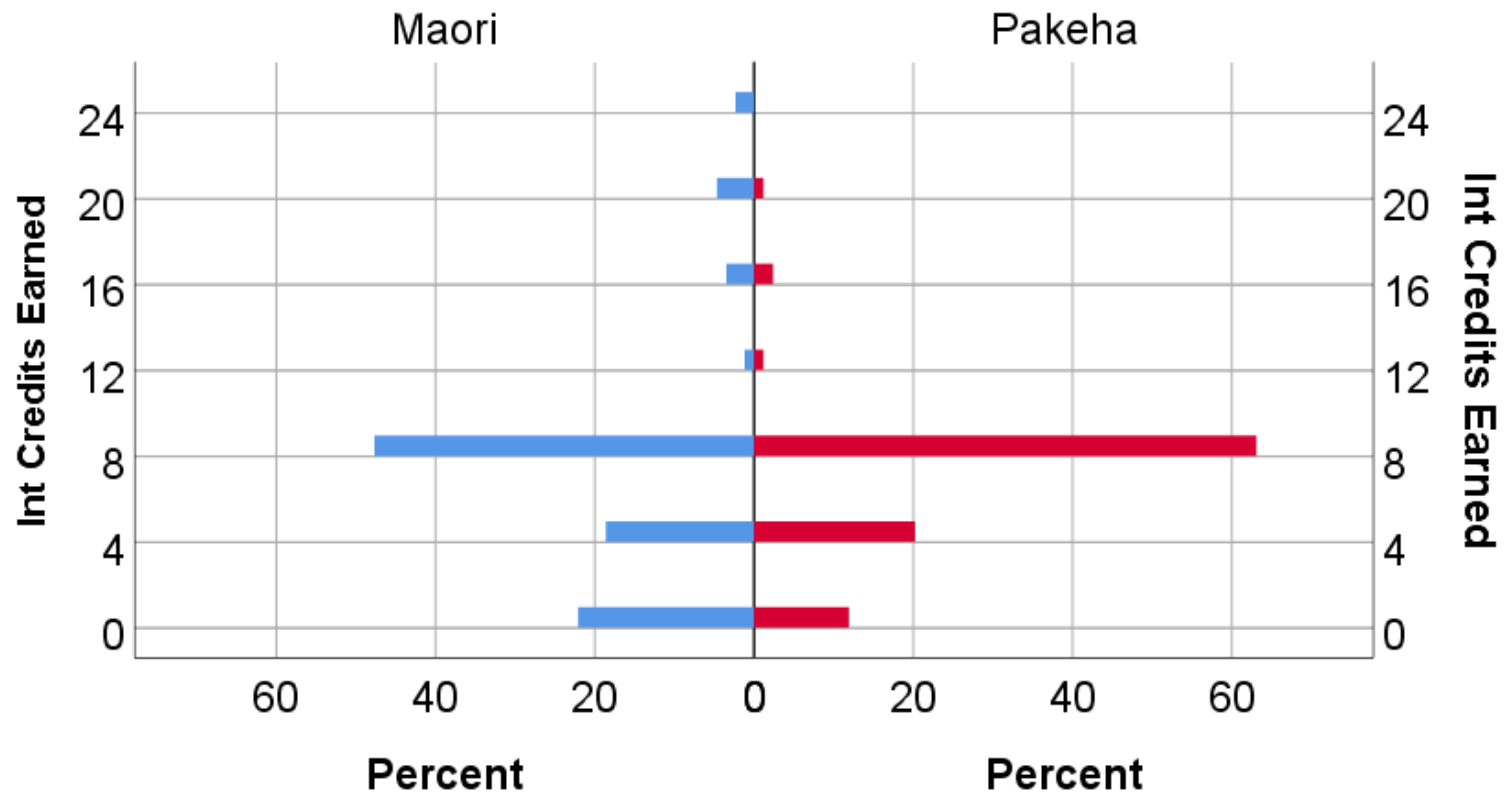


Externals	n	md <sub>cr</sub>	
Maori	74	8.0	
Pakeha	65	12.0	
Test	U	p	r
Mann-Whitney U	2,945	.009	.221

**Action:** Teachers to focus on completing and improving externals.

# But with eagle-eyed hindsight

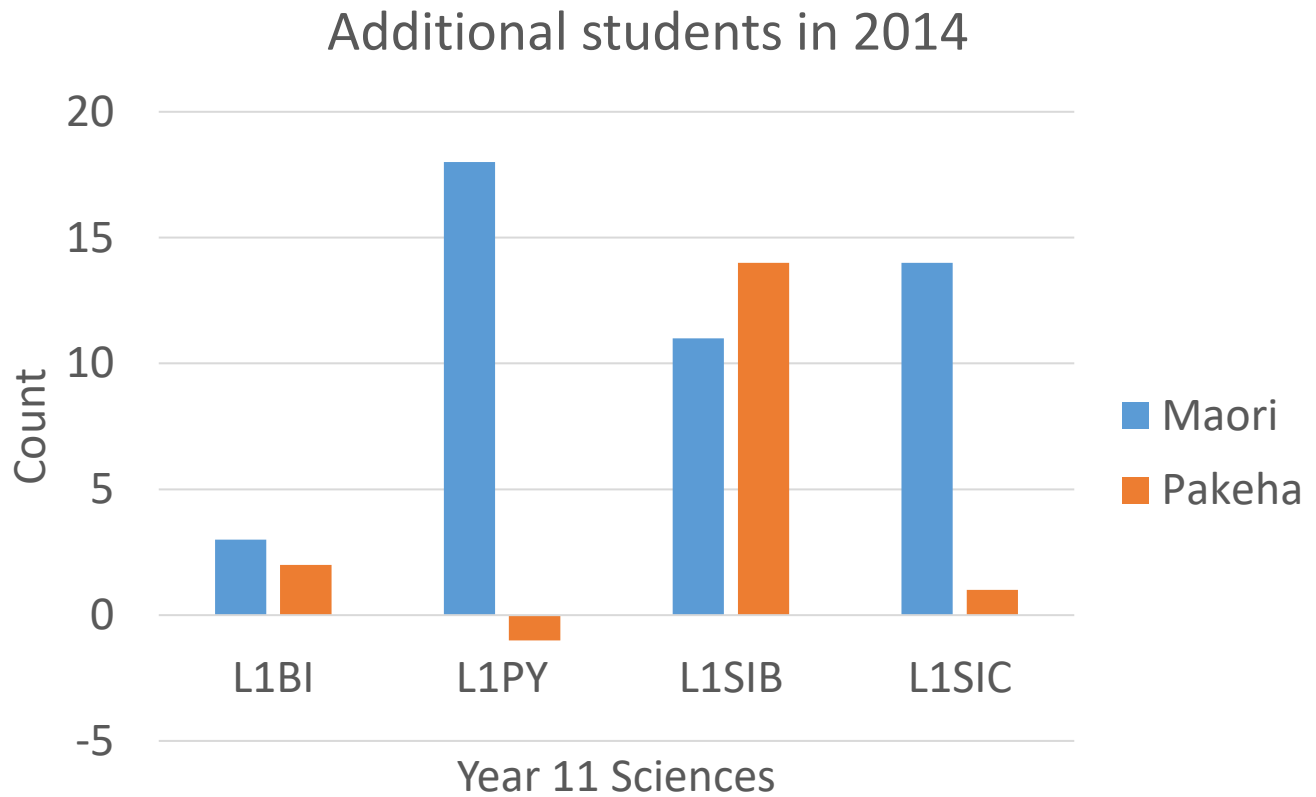
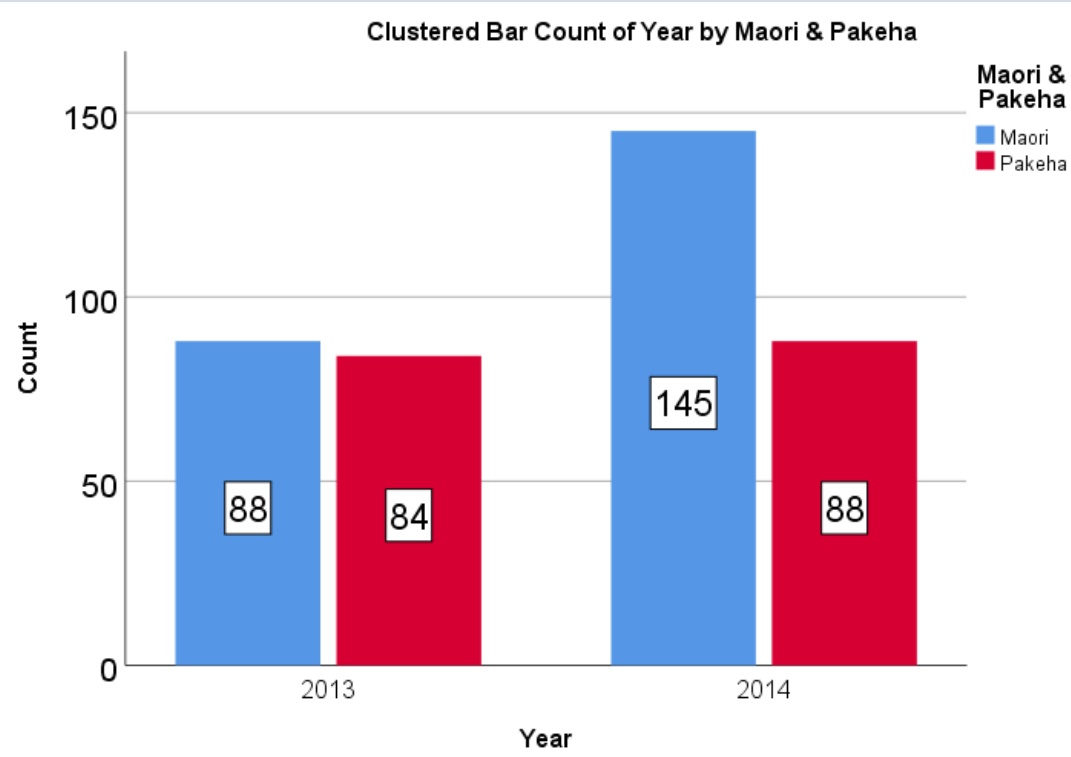
Level 1 Science 2013: Internal Credits



Internals	n	md <sub>cr</sub>
Maori	86	8.0
Pakeha	84	8.0
Test	U	p
Mann-Whitney	3,811	.493

Maori and Pakeha earn the same internal credits across all subjects

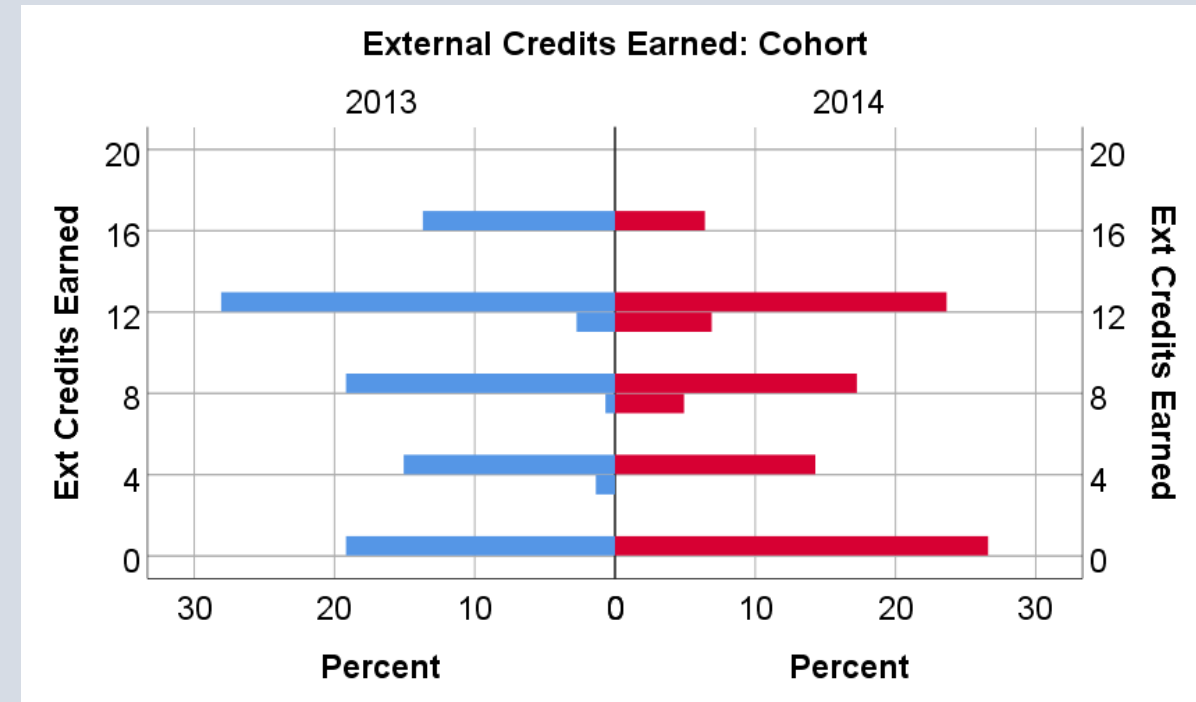
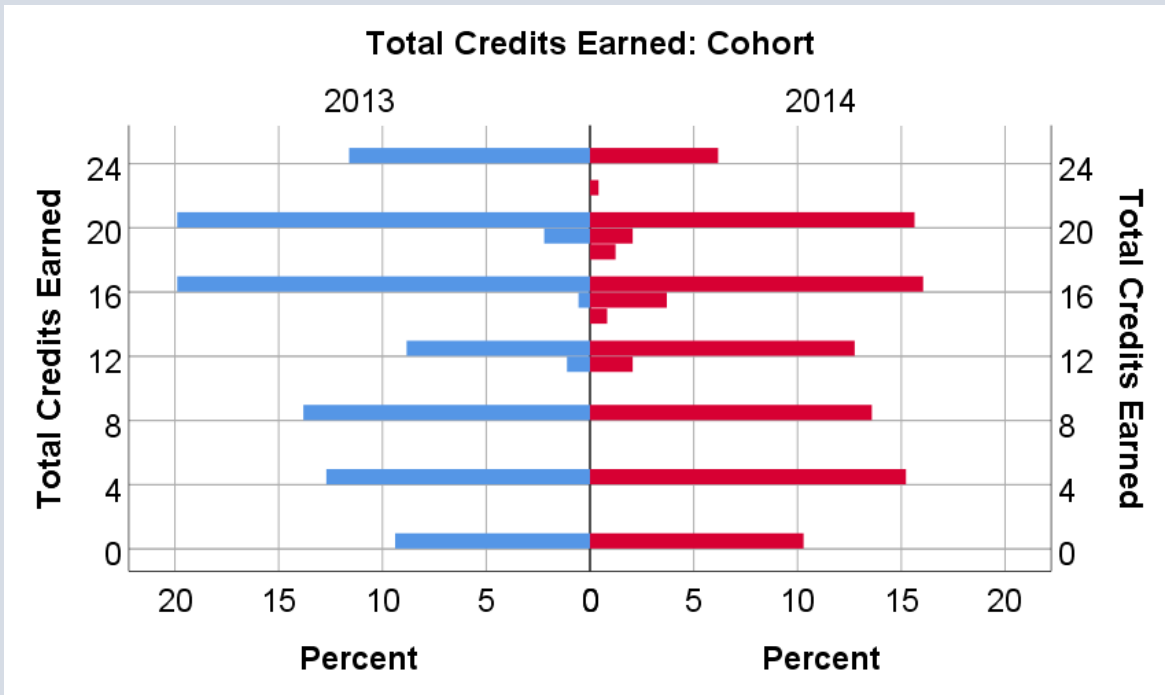
# In 2014 Science was made compulsory at Year 11



But we're still going to smash those externals!

However...

# 2014: A disaster - 27% get 0 external credits

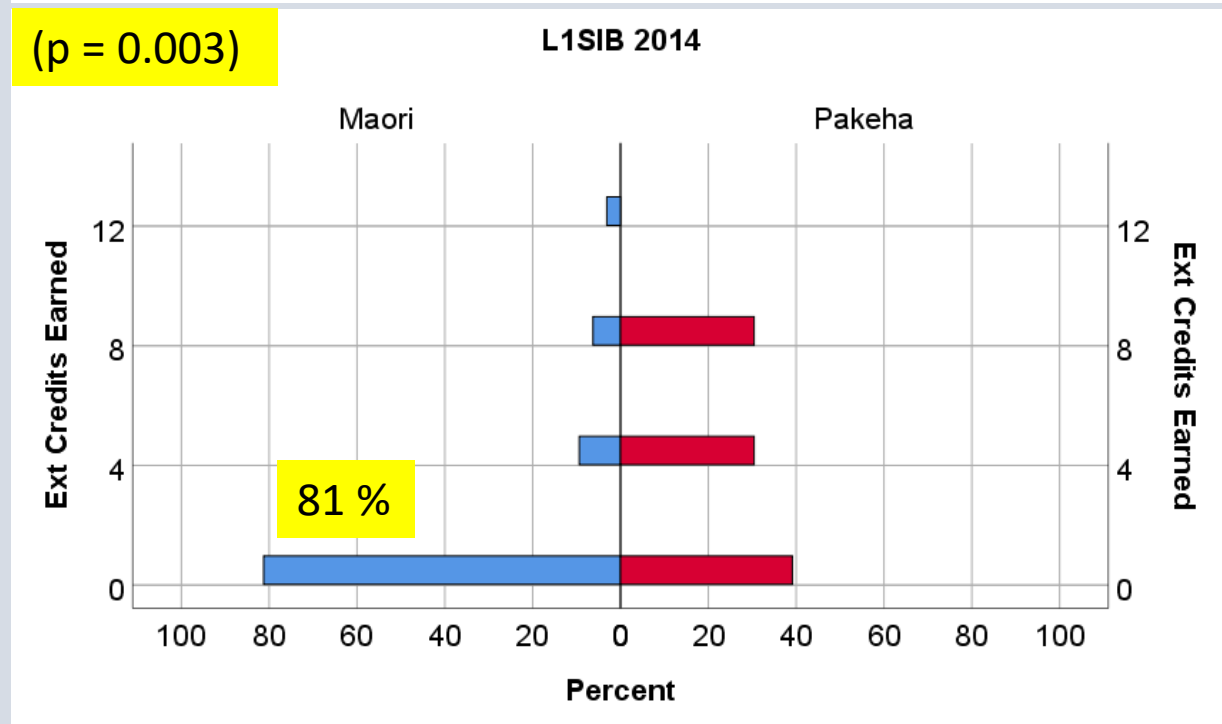
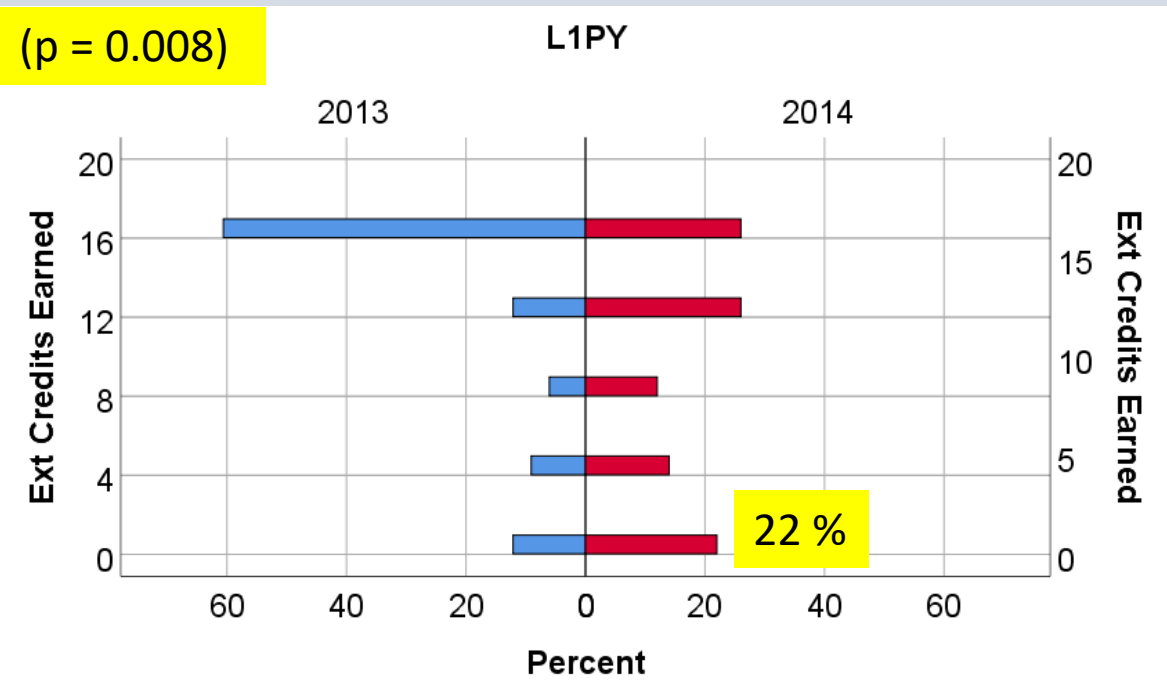
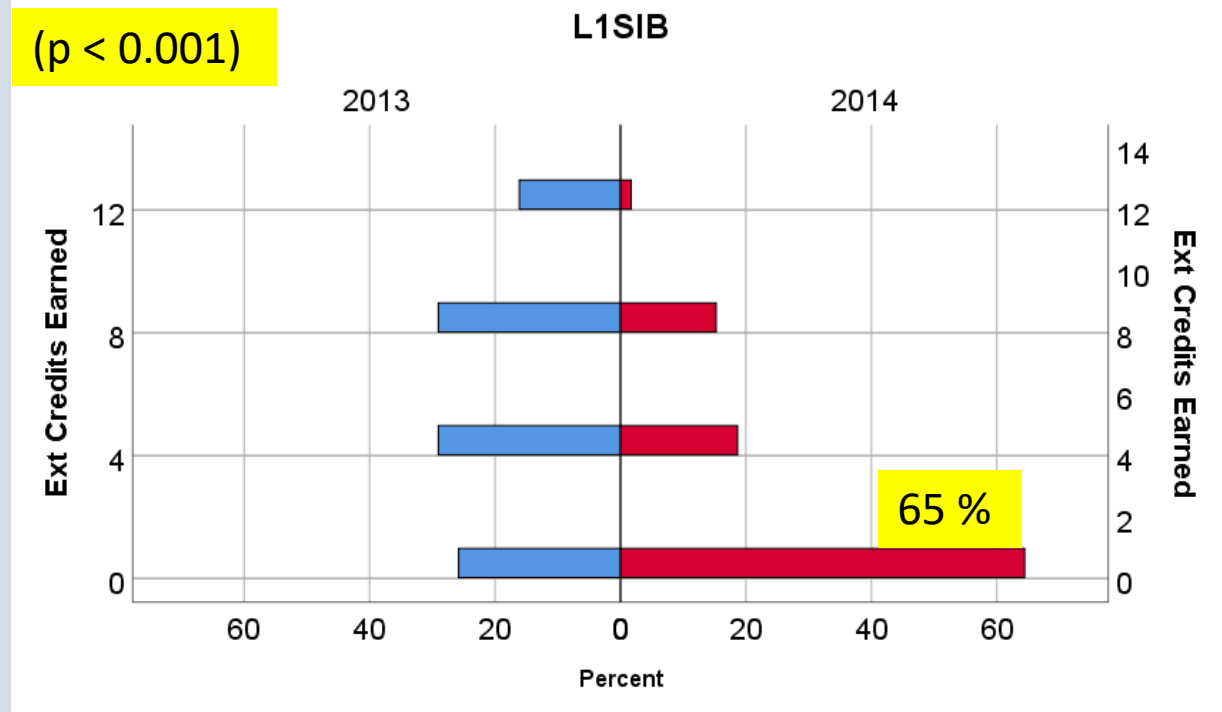
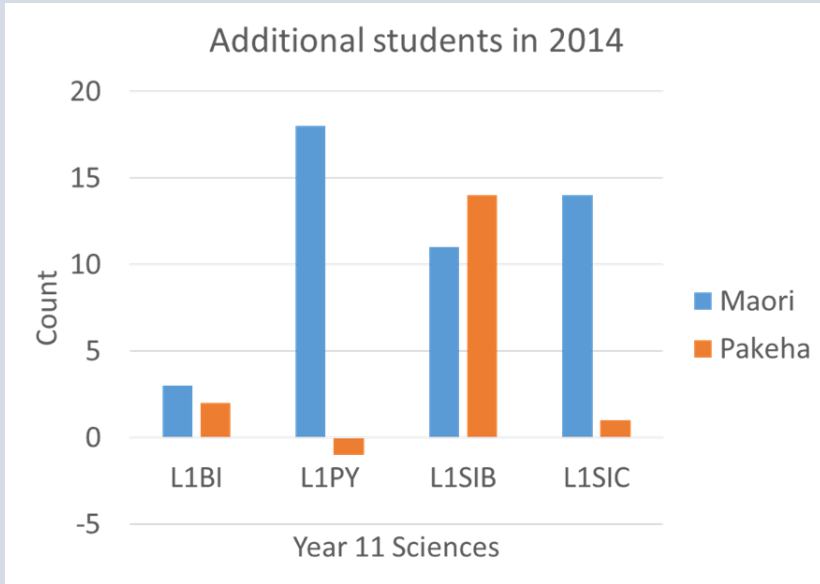


Total credits	n	md <sub>cr</sub>	mn <sub>cr</sub>
2013	181	16.0	13.4
2014	243	12.0	12.0
Test	U	p	r
Mann-Whitney	19,634	<b>.056</b>	.093

Externals	n	md <sub>cr</sub>	mn <sub>cr</sub>
2013	146	8.0	8.1
2014	203	8.0	6.9
Test	U	p	r
Mann-Whitney	12,809	<b>.027</b>	.118



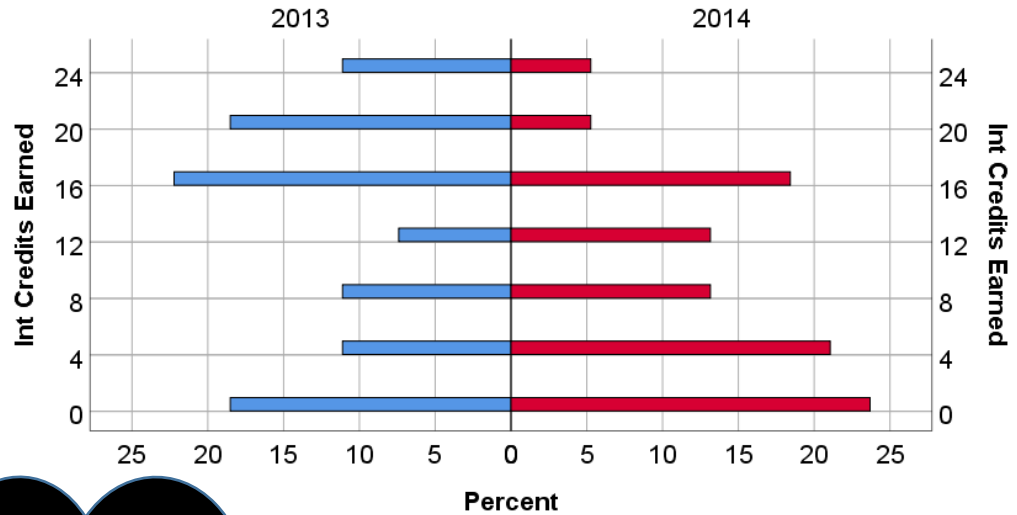
# So what happened?



No deficit thinking!

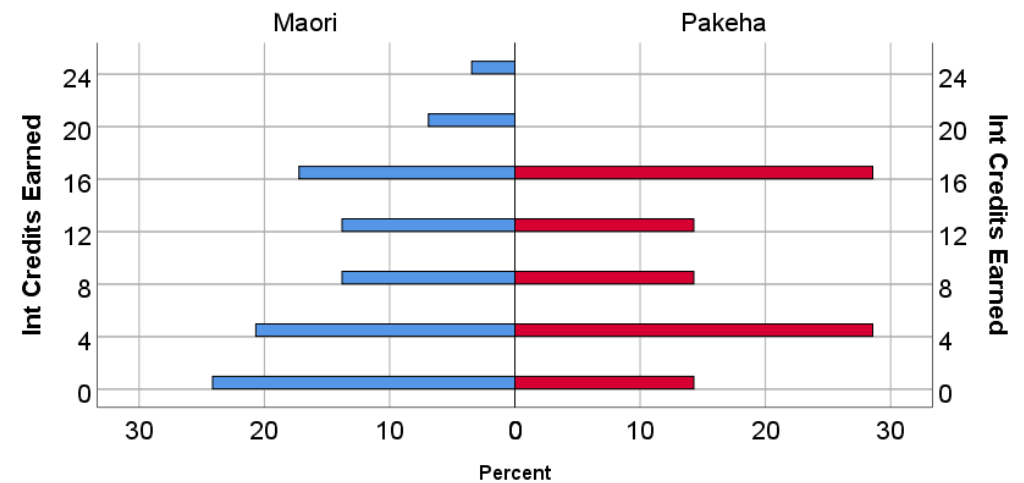
(p > 0.05)

L1SIC



(p > 0.05)

L1SIC



My drive to increase external results was a disaster for our students

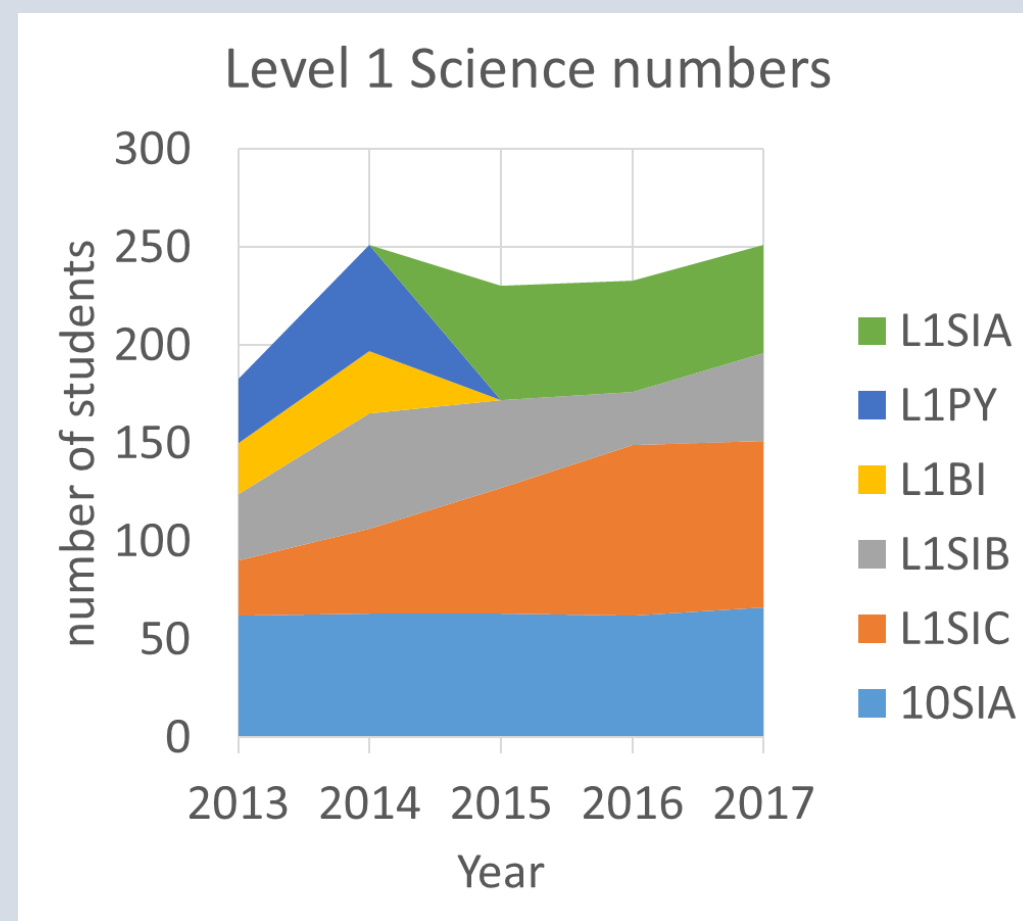
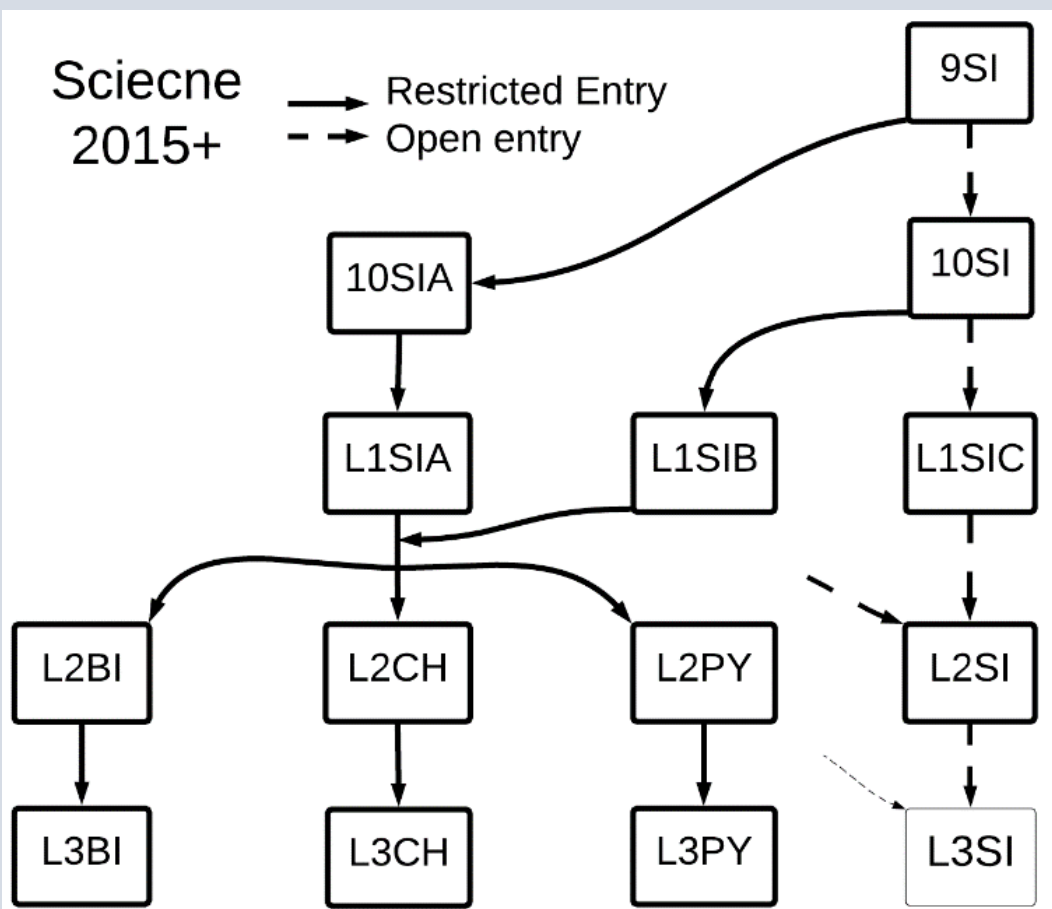
What do the students want/need?

Careers

- ~30/200 university bound.
- L2 support for Trades and Forces

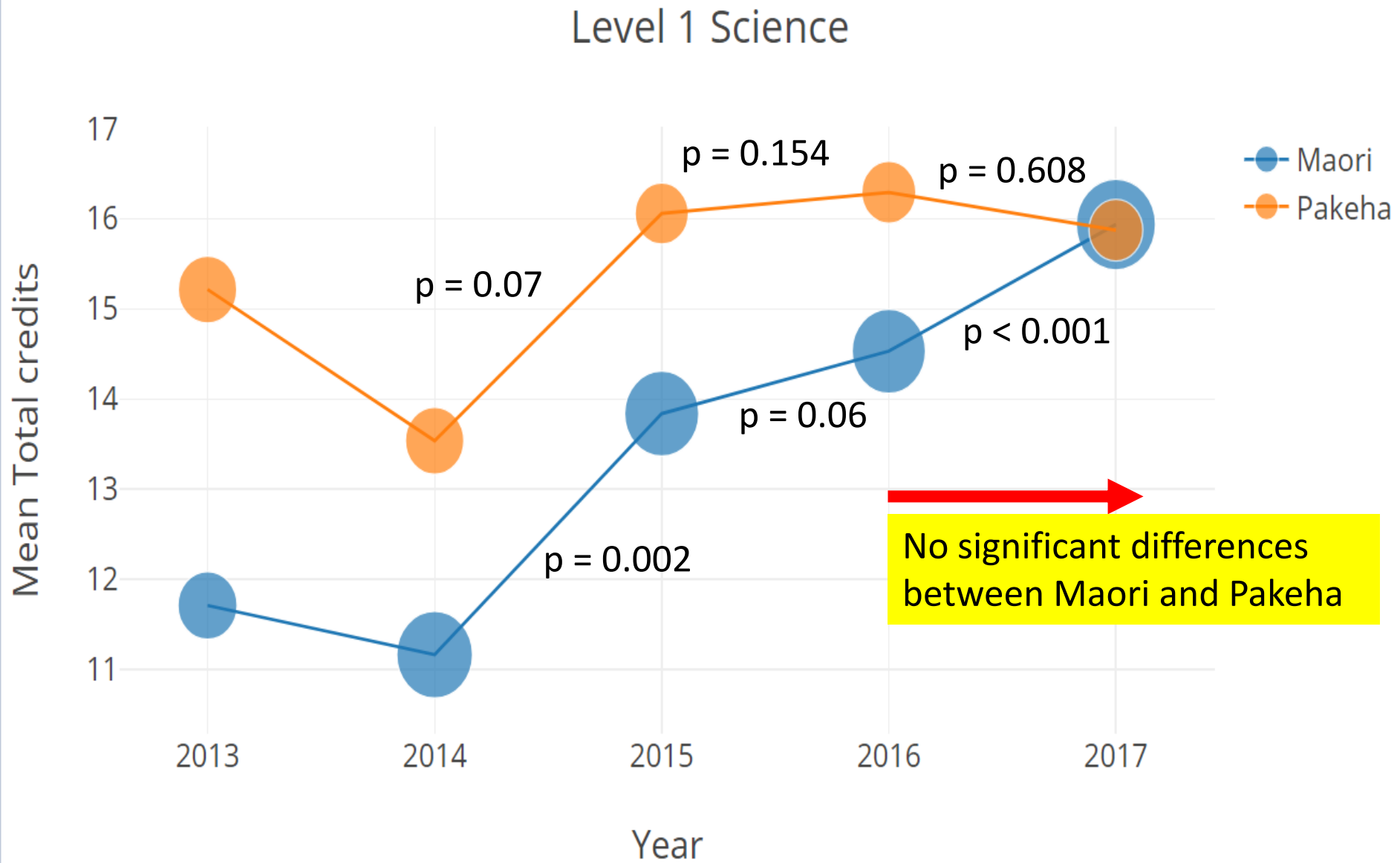


# New focus: meeting needs and aspirations of students

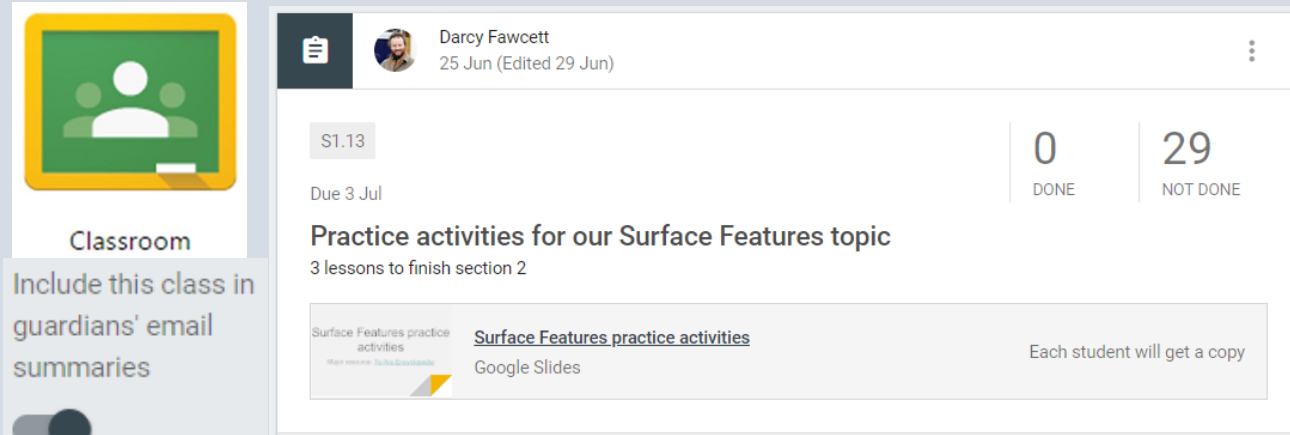


- 'academic' and 'general education' strands
- 2 x L1PY & 1 x L1BI merged to produce 2 x L1SIA; L1SIB made a repeat of 10SIA.
- All students and whanau interviewed by Careers; science option approved by me
- If 'at risk of disaster', I meet with whanau to gather support for 'the challenge'

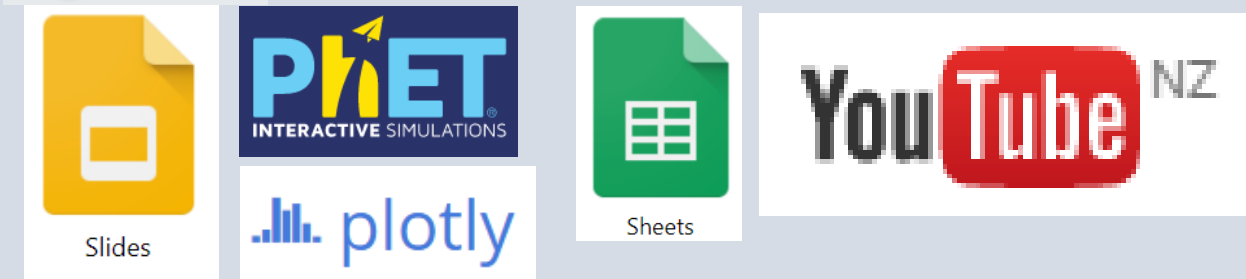
- Jan 2015
  - L1SIC prioritised
    - GT, DE, SU
  - e-learning
- Jan 2016
  - L1SIC prioritised
    - 2 x GT, SU
    - Google slides
  - All 'academic' standards focused on L2
- Jan 2017
  - L1SIC prioritised
    - 2 x GT, FW, SU
  - L1SIA int/ext swap



# L1SIC: internals only.



The screenshot shows a Google Classroom interface. At the top left is a 'Classroom' icon with a toggle switch for 'Include this class in guardians' email summaries'. The main content area shows an assignment by Darcy Fawcett, dated 25 Jun (Edited 29 Jun). The assignment is for 'S1.13' and is due on '3 Jul'. It has 0 'DONE' and 29 'NOT DONE' submissions. The title is 'Practice activities for our Surface Features topic' with a subtitle '3 lessons to finish section 2'. A resource titled 'Surface Features practice activities' (Google Slides) is attached, with a note that 'Each student will get a copy'.



- IRE vs IRF (Wells 1999)
- Te Kotahitanga (Bishop 2006)
- **Relevant contexts**
  - S1.13 Surface features – Tolaga Bay flooding,
  - S1.12 Biological impact – Arrival of Maori and Pakeha

- Formative practice (Williams & Leahy 2010)
  - Clarify learning intentions, Engineer discussions that elicit evidence, feedback, **ENCOURAGE OWN WRITING**, Tuakana/teina (students as resources for each other), **students as owners of their learning**
    - 7 x 4 cr standards – opportunity to fail then succeed!



# Example activity and assessment from S1.13 Surface features

## Weathering

Definition: the action of the weather conditions in altering the color, texture, composition, or form of exposed objects; specifically : the physical disintegration and chemical decomposition of earth materials at or near the earth's surface. Example: Cooks cove was formed from the ocean and rain coming in contact with it heaps of times causing damage to the rocks



Assessment: Investigate the formation of the Coastal Ranges and Flats of Poverty Bay/Tūranganui-a-Kiwa



Preparation: Explore the science domain online and write our own interactive notes

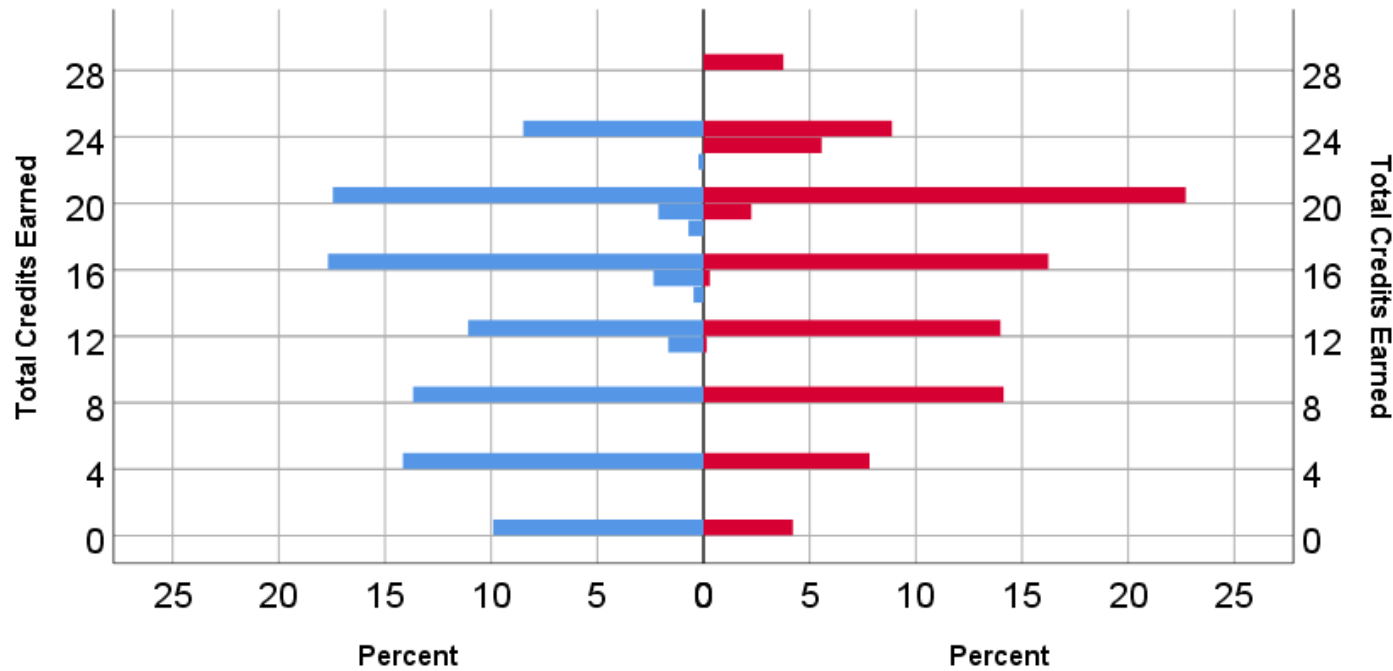
# The combined initiative cohort earns significantly more credits than traditional methods!

Population Pyramid Frequency Total Credits Earned by Combined Cohort (2013-2014 vs 2015 - 2017)

Combined Cohort (2013-2014 vs 2015 - 2017)

2013, 2014

2015-2017



Cohort	N	Median cr	
2013-2014	424	12	
2015-2017	655	16	
Test	U	p	r
Mann-Whitney	169,814	<.001	.174

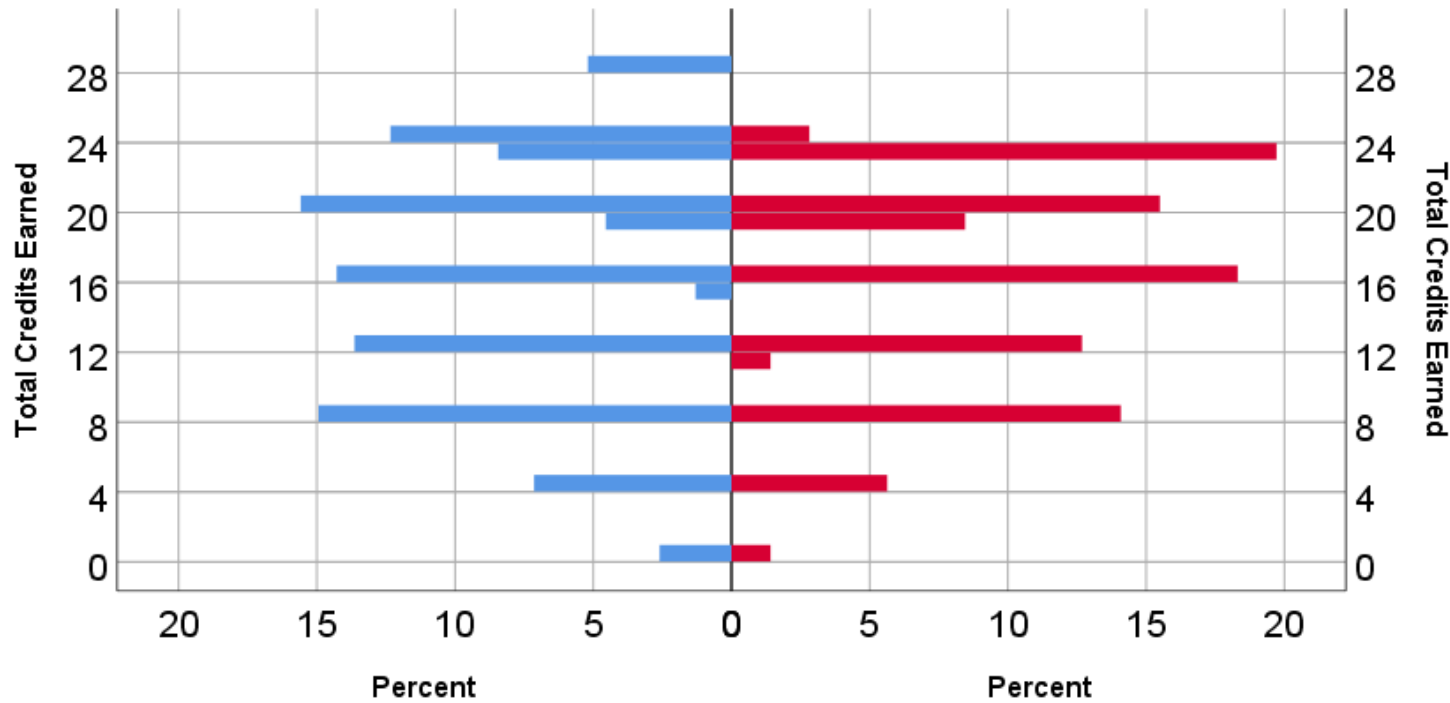
# In 2017 Maori and Pakeha earn the same total credits!

Population Pyramid 2017 Total Credits Earned by Maori & Pakeha

Maori & Pakeha

Maori

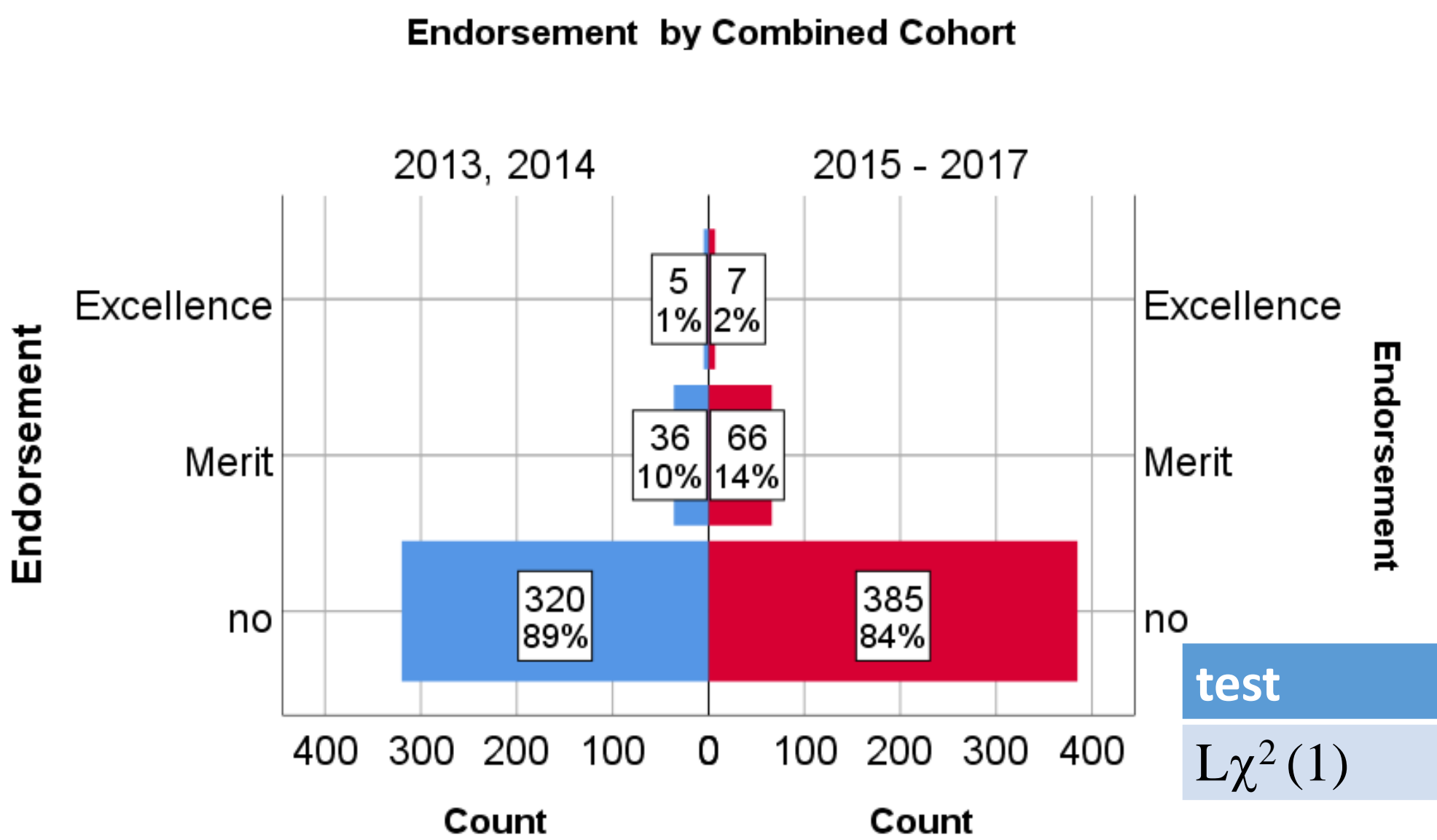
Pakeha



2017	N	md <sub>cr</sub>	mn <sub>cr</sub>
Maori	154	16	15.9
Pakeha	71	16	15.9
Test	U	p	r
Mann-Whitney	5,317	.738	



We have also *notably* lifted the rate of endorsements!  
 (10SIA, L1SIA, L1SIB)

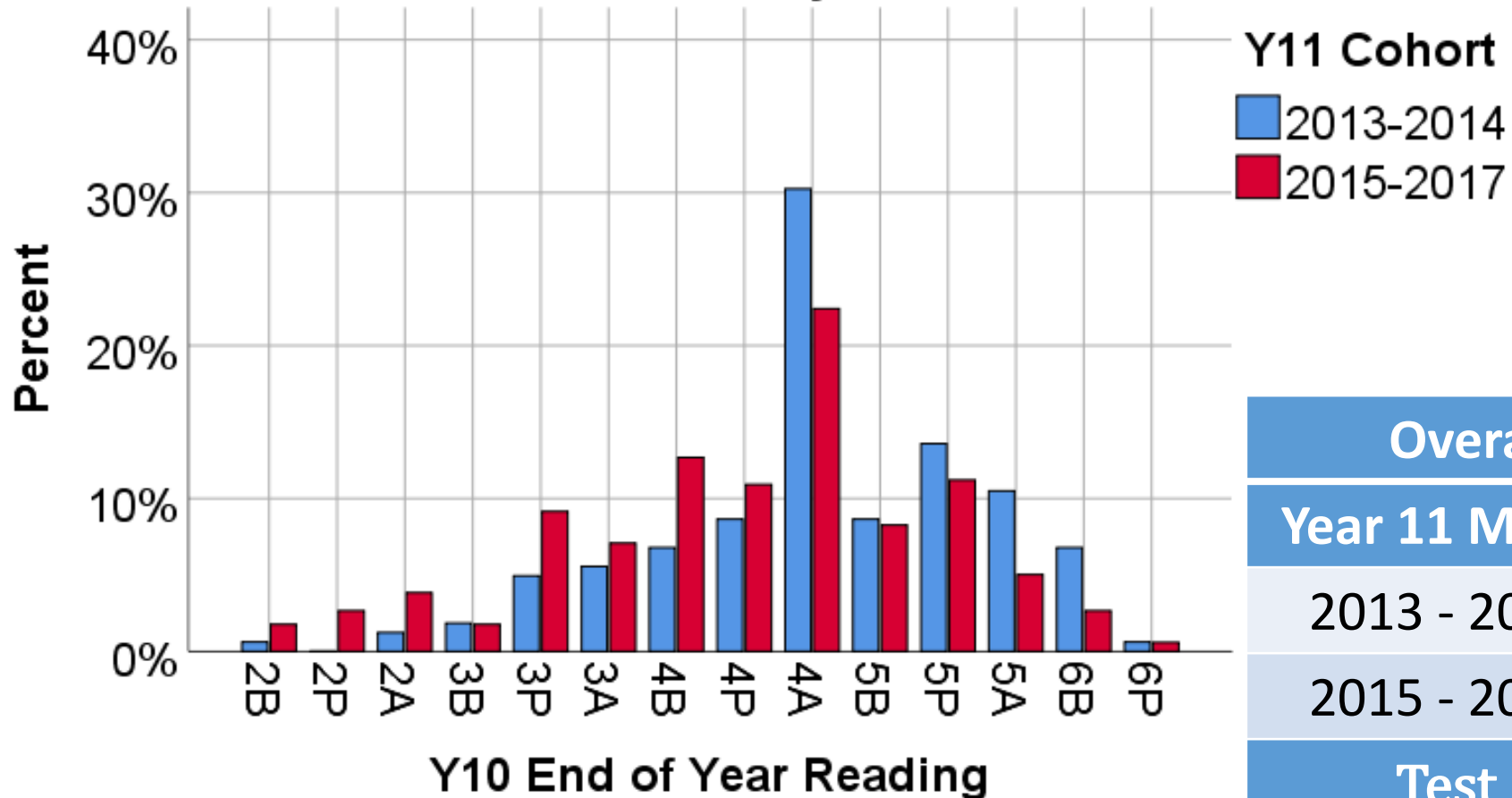


test	value	p
$L\chi^2(1)$	2.822	.093

Unfortunately, all while the reading ability of Maori has reduced!

End of Year 10 Reading Level by Year 11 Science Cohort

Ethnicity: Maori

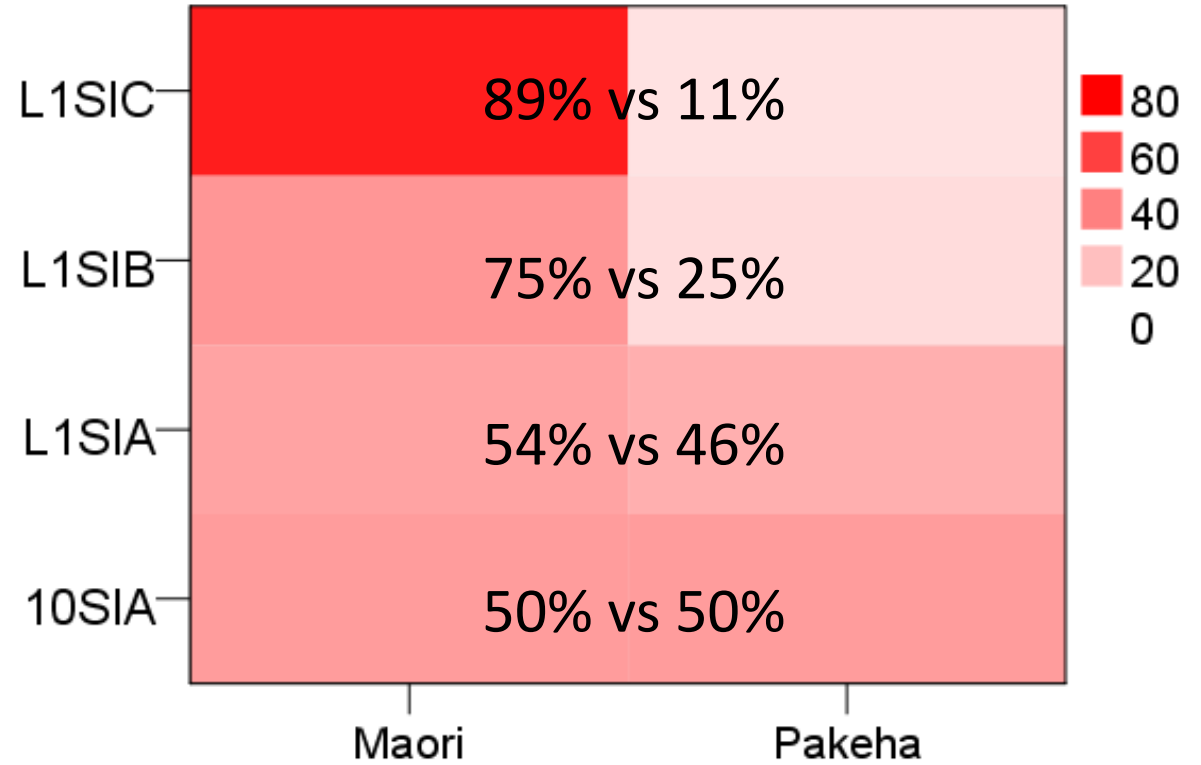
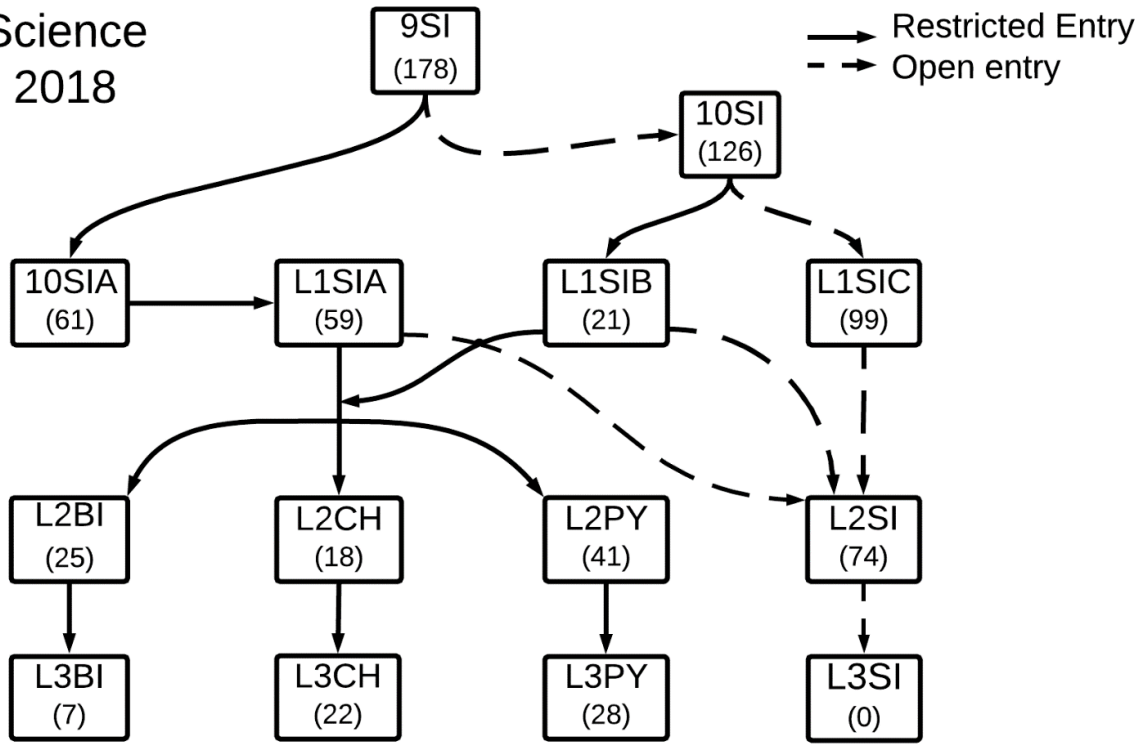


4A/5B = 155

Overall e-asTTle Reading Score

Year 11 Maori	n	median	Level
2013 - 2014	290	1563	5B
2015 - 2017	530	1530	4A
Test	U	p	r
Mann-Whitney	61,099	<0.001	0.170

Science  
2018



Equity vs equality? GBHS is 65% Maori

# Summary

- Pay attention to what's significant!
  - Use evidence to inform, evaluate and attenuate practice
  - Enhance student performance on high stakes assessment and close performance gap between Maori and Pakeha

# Next steps

- It worked! Enhancing teacher epistemology and hence student achievement through collaborative inquiry and quantitative analysis.
  - Bright Spots Award and Across Community Teacher