THE UNIVERSITY OF MELBOURNE

GRADUATE SCHOOLS

MELBOURNE GRADUATE SCHOOL OF EDUCATION

Shaping minds, shaping the world

MAV-MEG 2019

Critical thinking with school data: Looking back to look forwards

Presenter

A/Prof Robyn Pierce, *University of Melbourne*

Data Piñata

Data Sources

Diagnostics
NAPLAN
PAT Maths
Relative growth reports
Recording student achievement
Teachers' records
SMART
Mathletics
Student interviews
Numeracy
Literacy
School Reports
State Data
Student Reports
ACARA reports
My Schools
Well being
Reporting software

Who wants to know?

Department of Education
Staff
Students
Current Parents
Parent support groups
School Council
Board of Directors
The Press
Alumni
Parents for Potential enrolments

Informed by research

Australian Research Council –Linkage Project

Statistical literacy in the education workplace:

Barriers and enablers for school personnel making data-driven decisions

University of Melbourne

A/Professor Robyn Pierce, Mr Roger Wander

Professor Ian Gordon , Ms Sue Helme

University of Tasmania

A/Professor Helen Chick, Professor Emerita Jane Watson

VCAA

Mr Michael Dalton, Dr Magdalena Les

DEECD

Ms Sue Buckley

Attitudes - Agree or Strongly Agree

System Report on Student Achievement are:

- useful for identifying topics in the curriculum that need attention in our school. 82%
- useful to inform whole school planning. 80% .
- helpful for grouping students according to ability. 67%
- helpful for planning my lessons. 58%
- telling me things about my students that I had not realised. 55%

Perceived difficulties

% Agree or Strongly Agree

- I don't feel I can adequately interpret the SRSA I receive at our school. 15%
- SRSA take too long to interpret. 29%
- The amount of data presented in the SRSA I see is overwhelming. 33%

Data: not just numbers

(Pierce & Chick)

Local context

Add your own photos - same people on different days – creating a different impression

Snap shots at a moment in time

Professional context

- The curriculum
- Content knowledge
- Knowledge of common misconceptions
- Mathematics Pedagogical knowledge

Now for the graphs and numbers

Read the values

Check the scale, read the values

Compare the values

No lonely numbers (Hans Rosling)

Analyse the data

Frame useful questions

– analyse for a purpose

Purposes:

Reporting – to students , parents, school council…

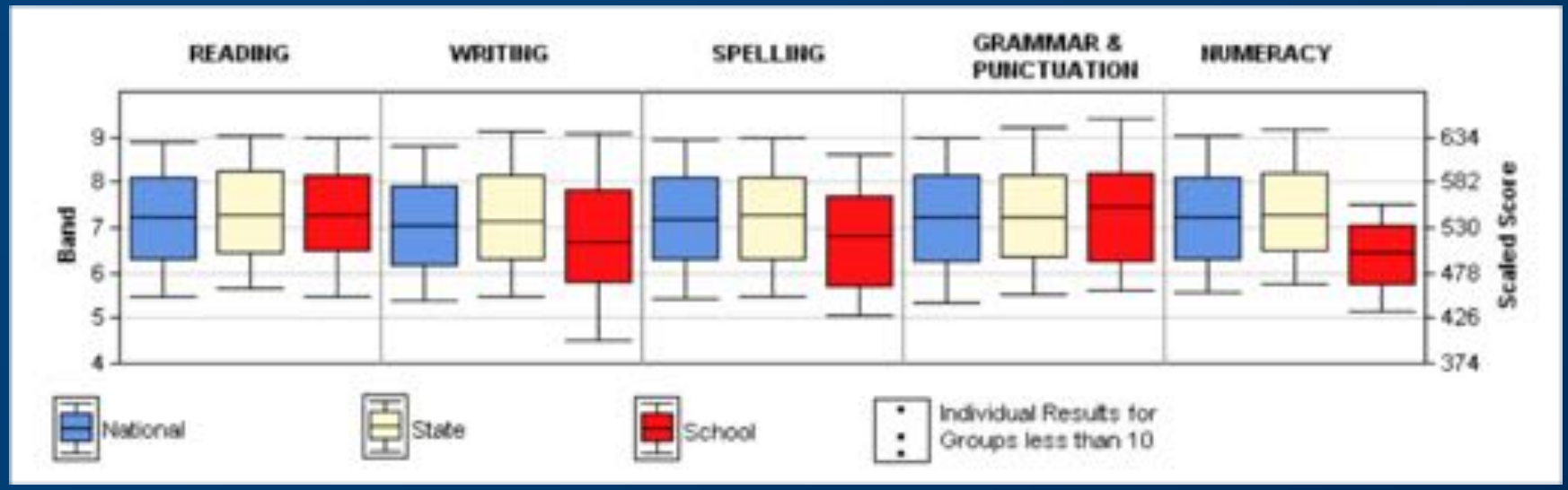
System data

Inform teaching

System data from assessment of learning: a little

Good questions: assessment for learning: a lot

MAKING SENSE OF DATA



Reports : **looking back to look forward**

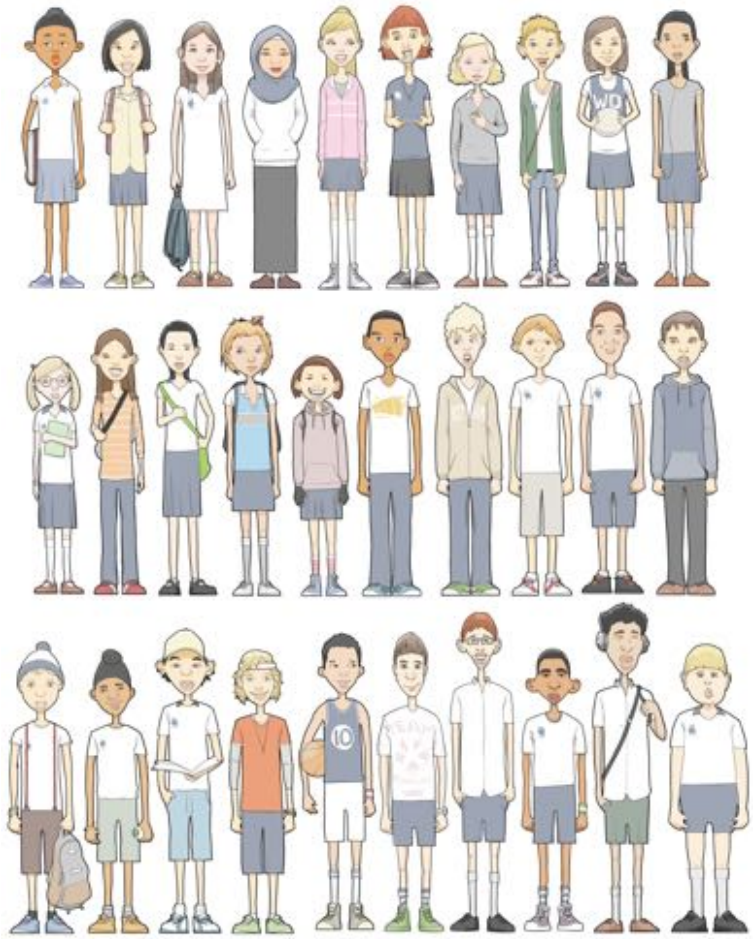
This is James

James is in Year 7 at Example College

James' NAPLAN results

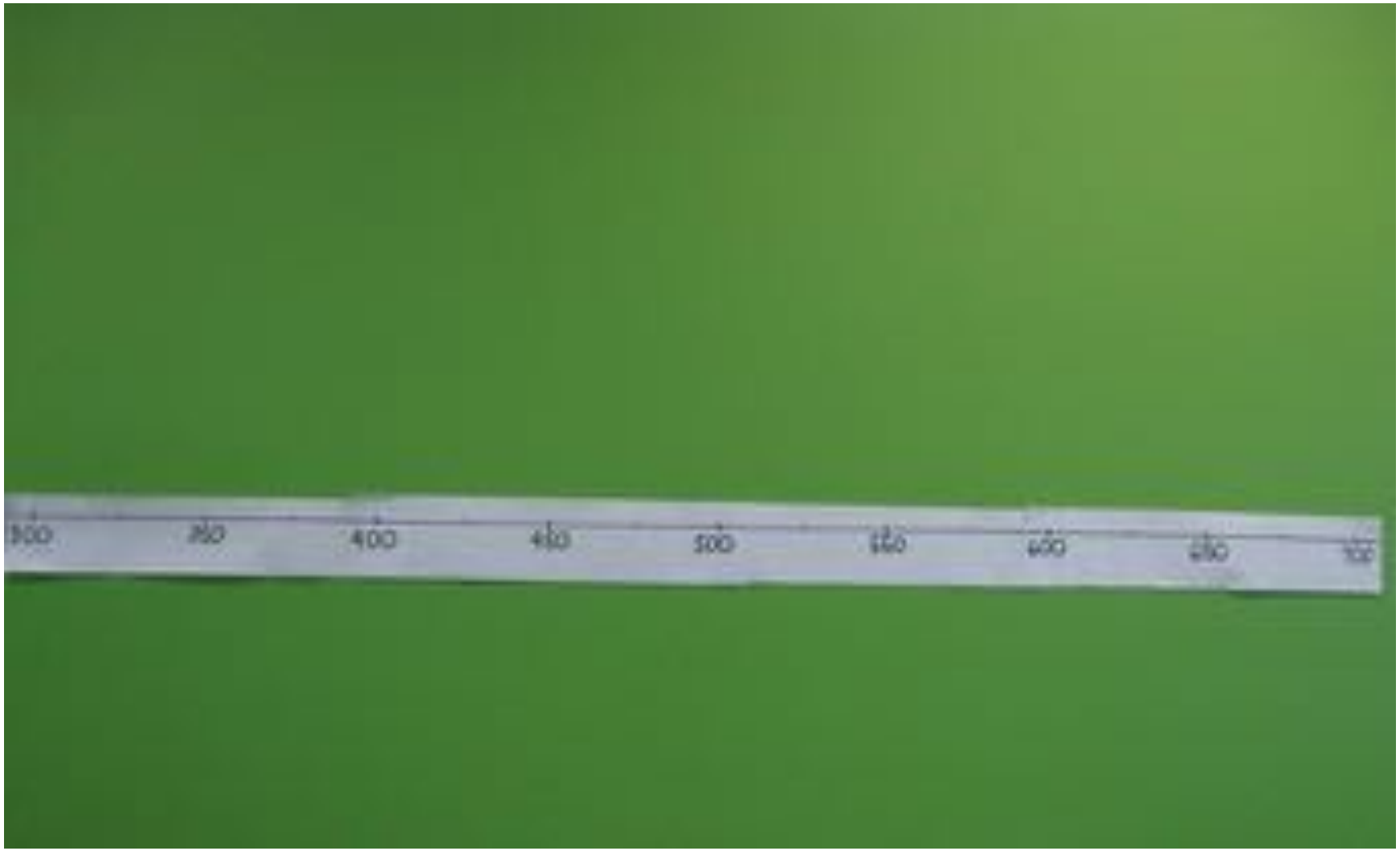
Reading:	523
Writing:	582
Spelling:	595
Grammar & Punctuation:	557
Numeracy:	541

Here is James with the other Example College Year 7 students

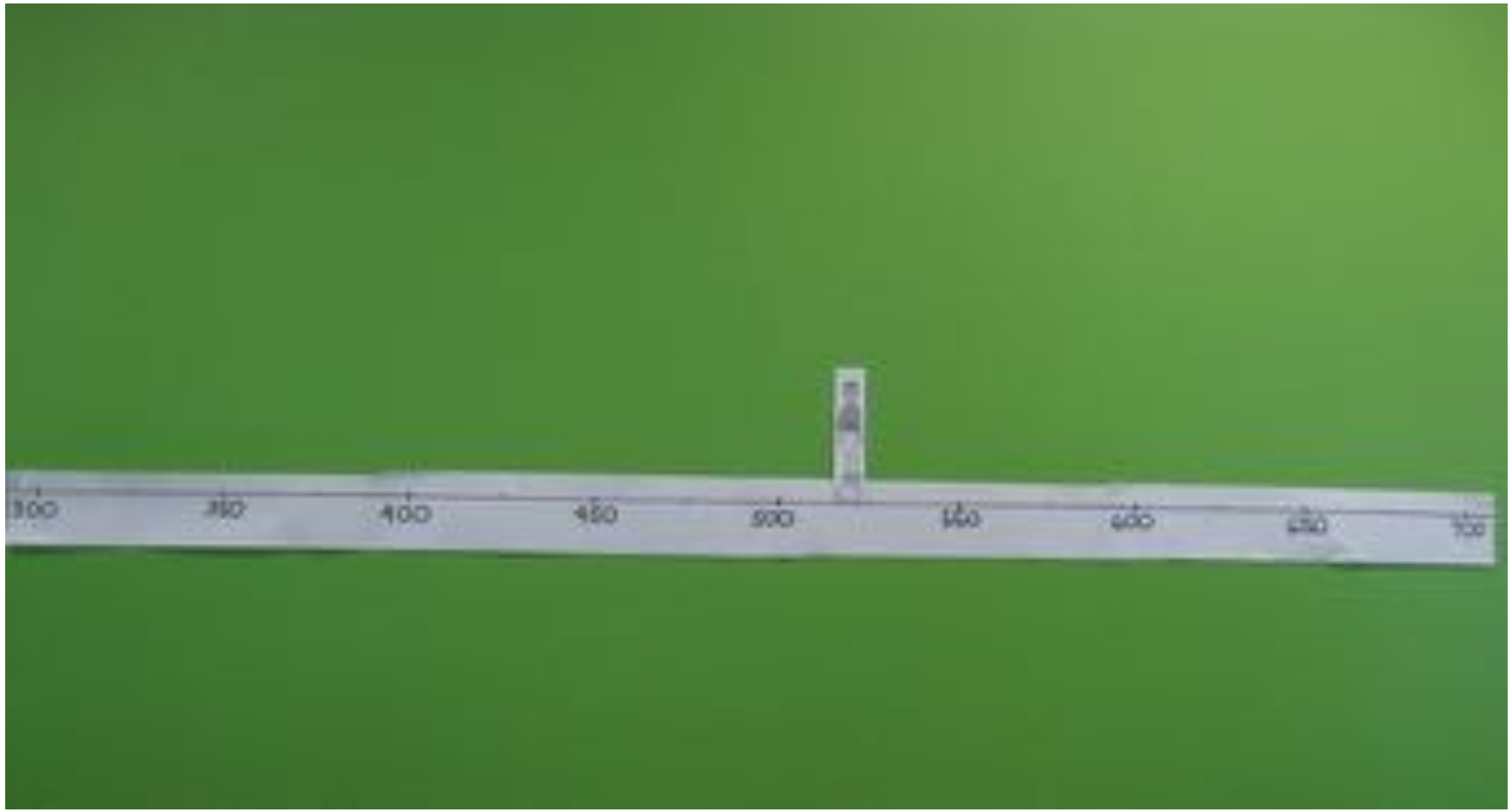


bendqw@gmail.com

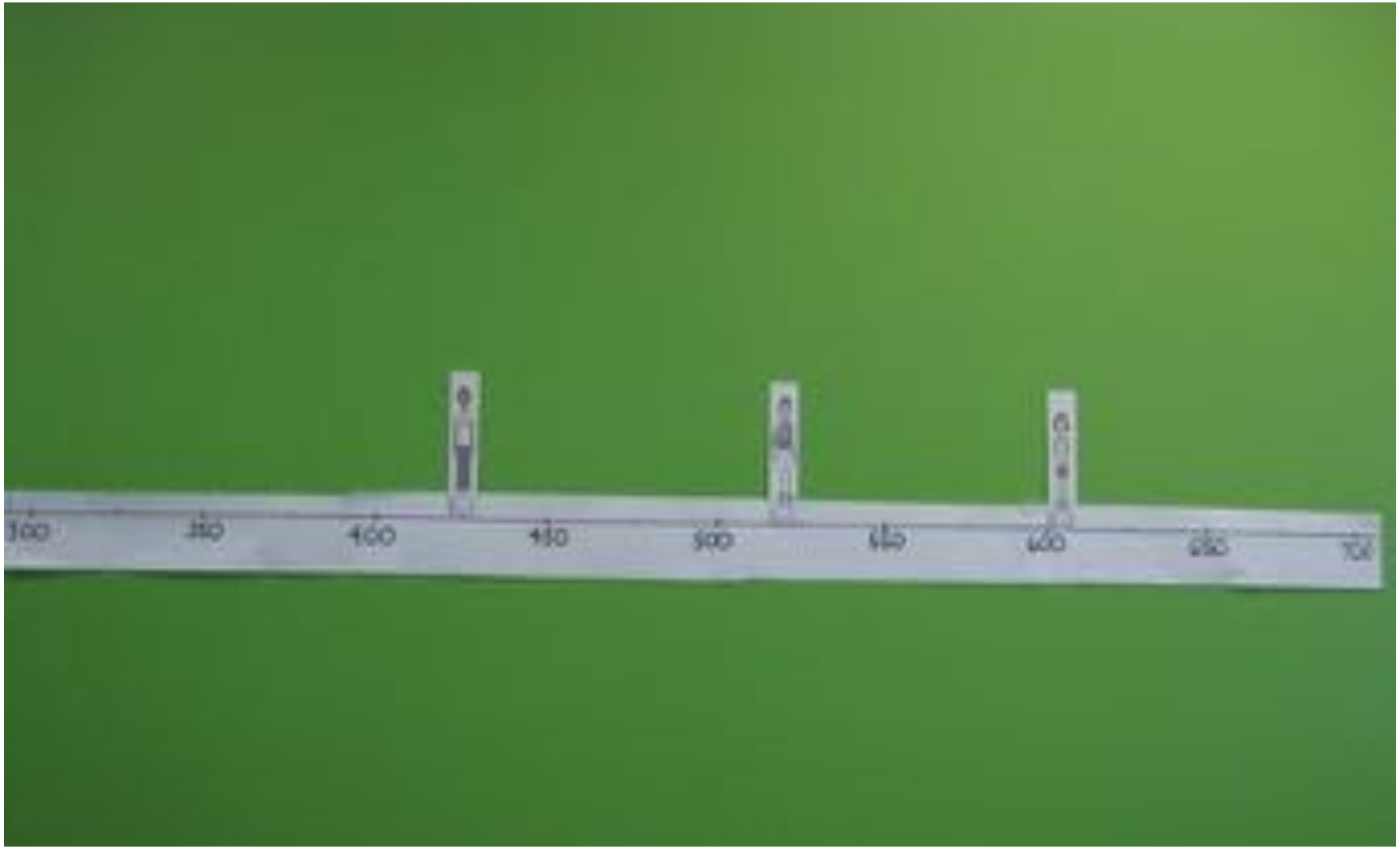
Look at the distribution for the class members' results: The number line scale



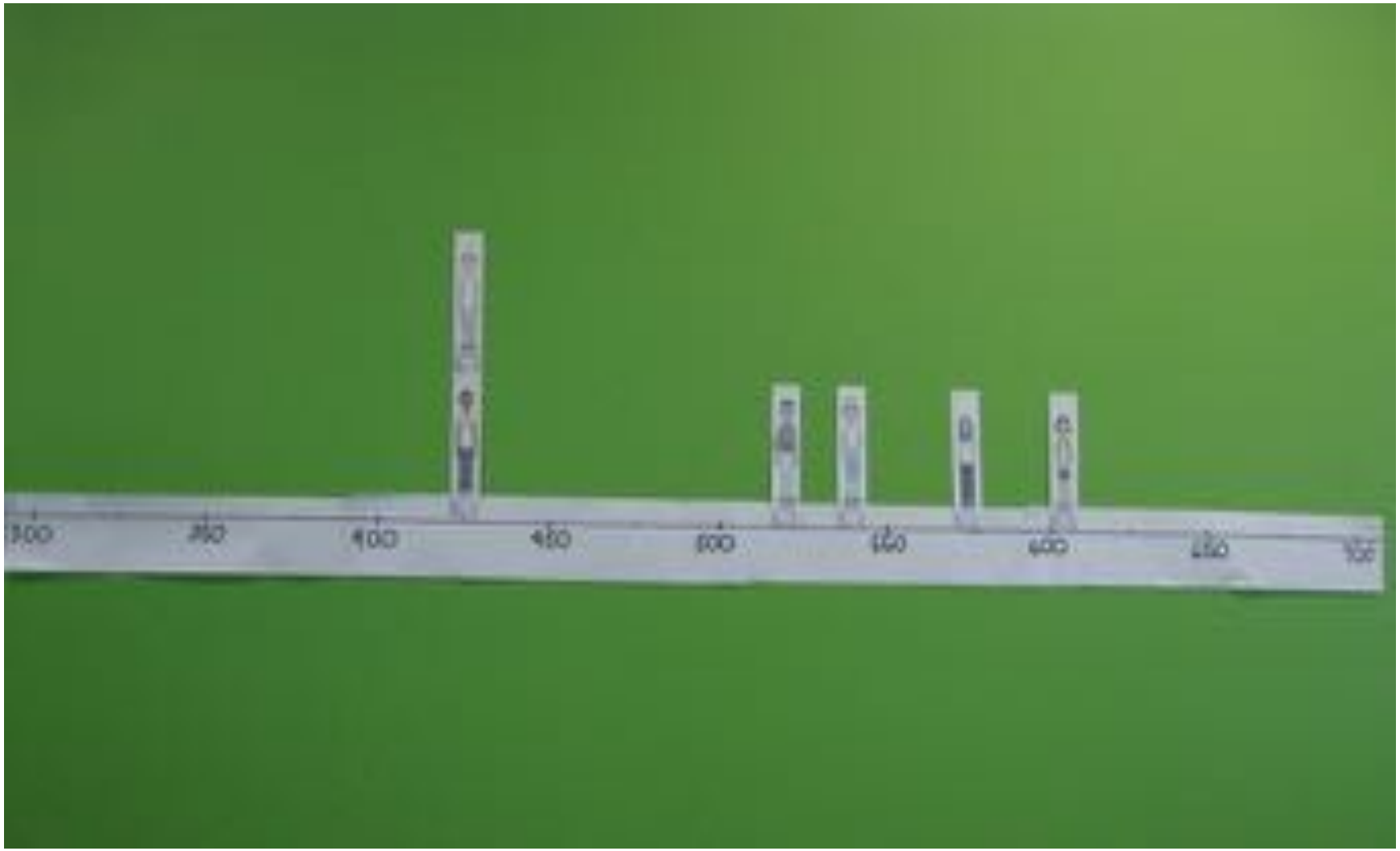
Here's James
a lonely number



James and two others

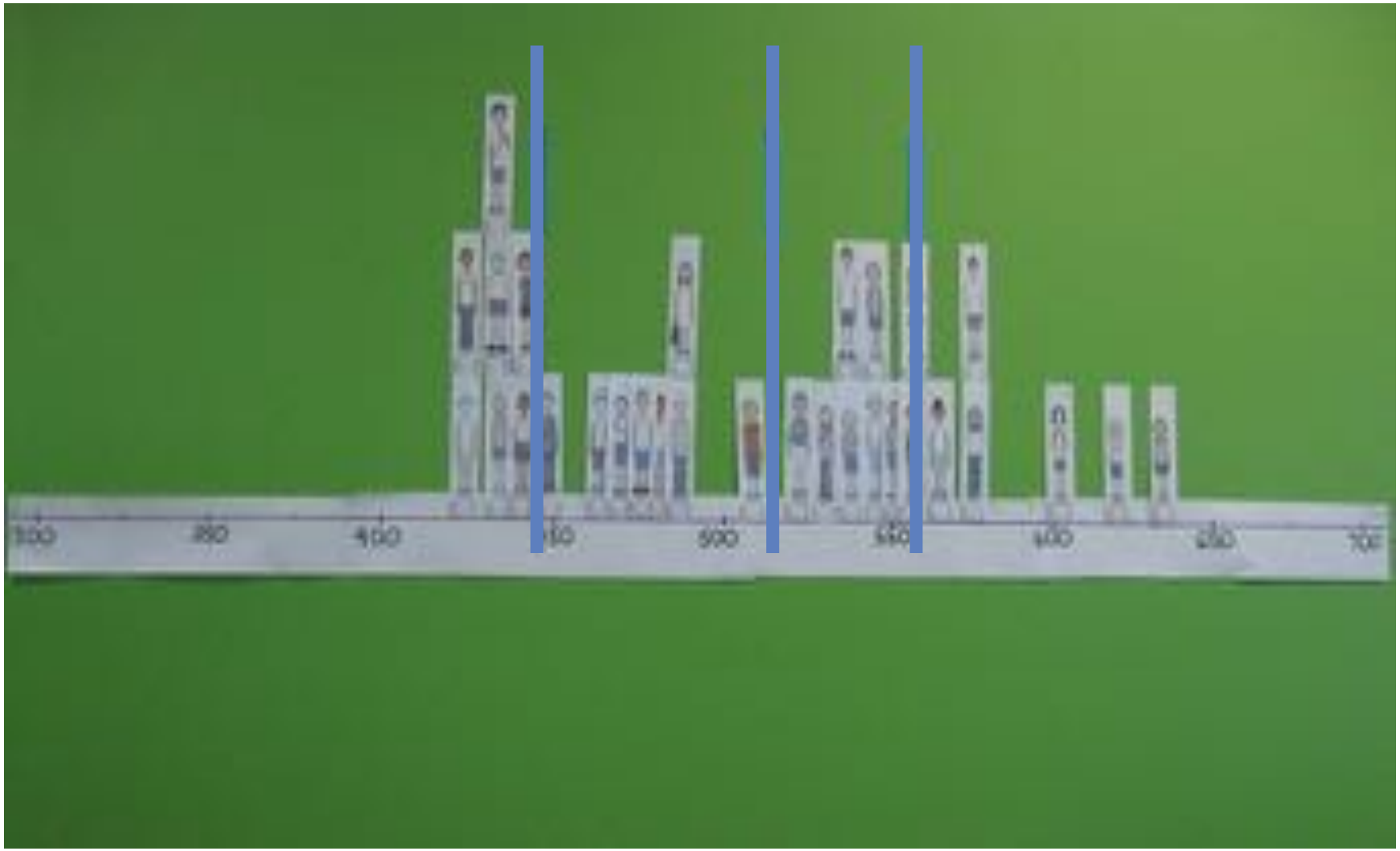


More students placed against their results



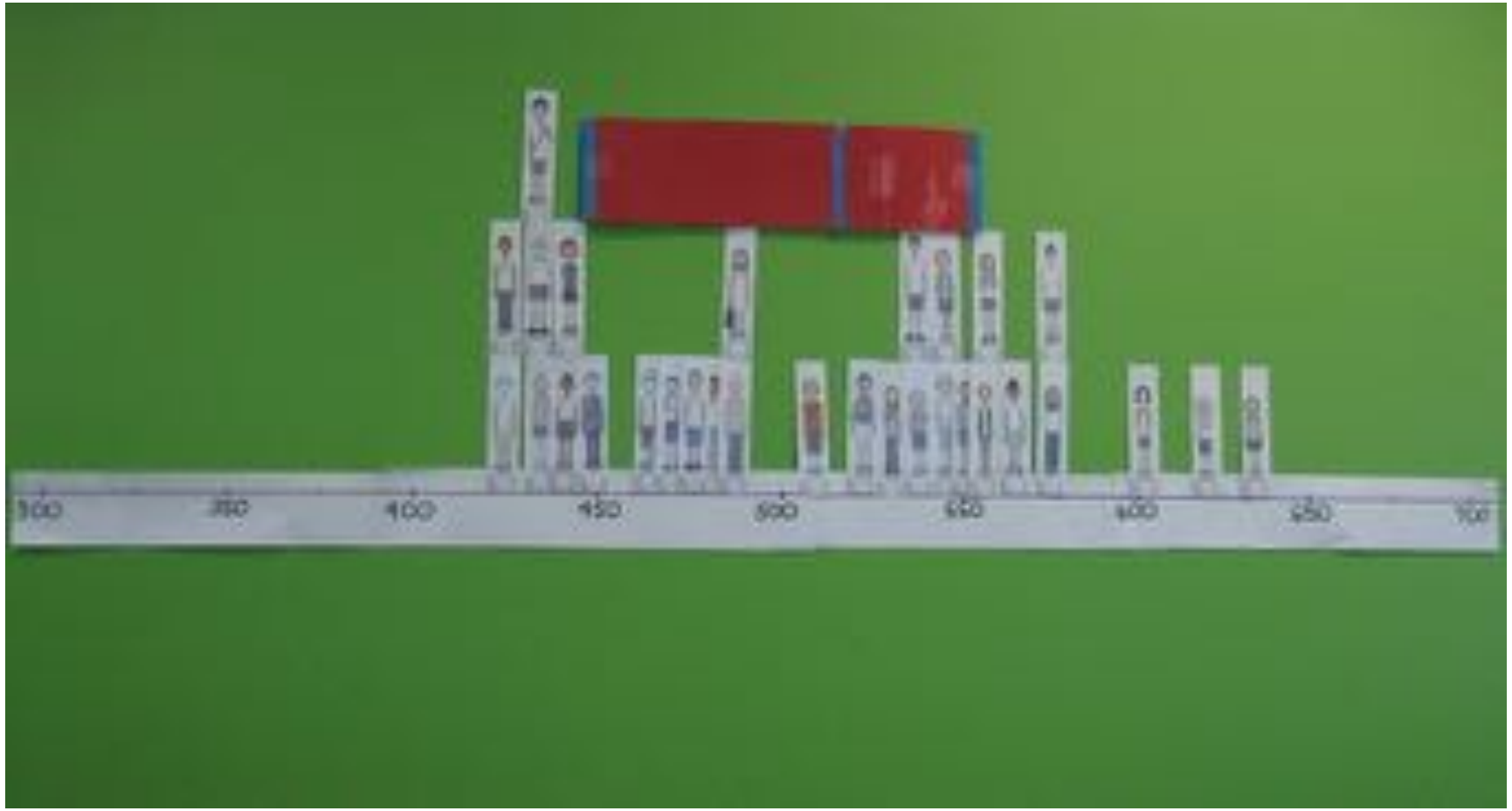
The whole class:
What do we know about James?
What do we know about the class?

Building a box-and-whisker plot (1)



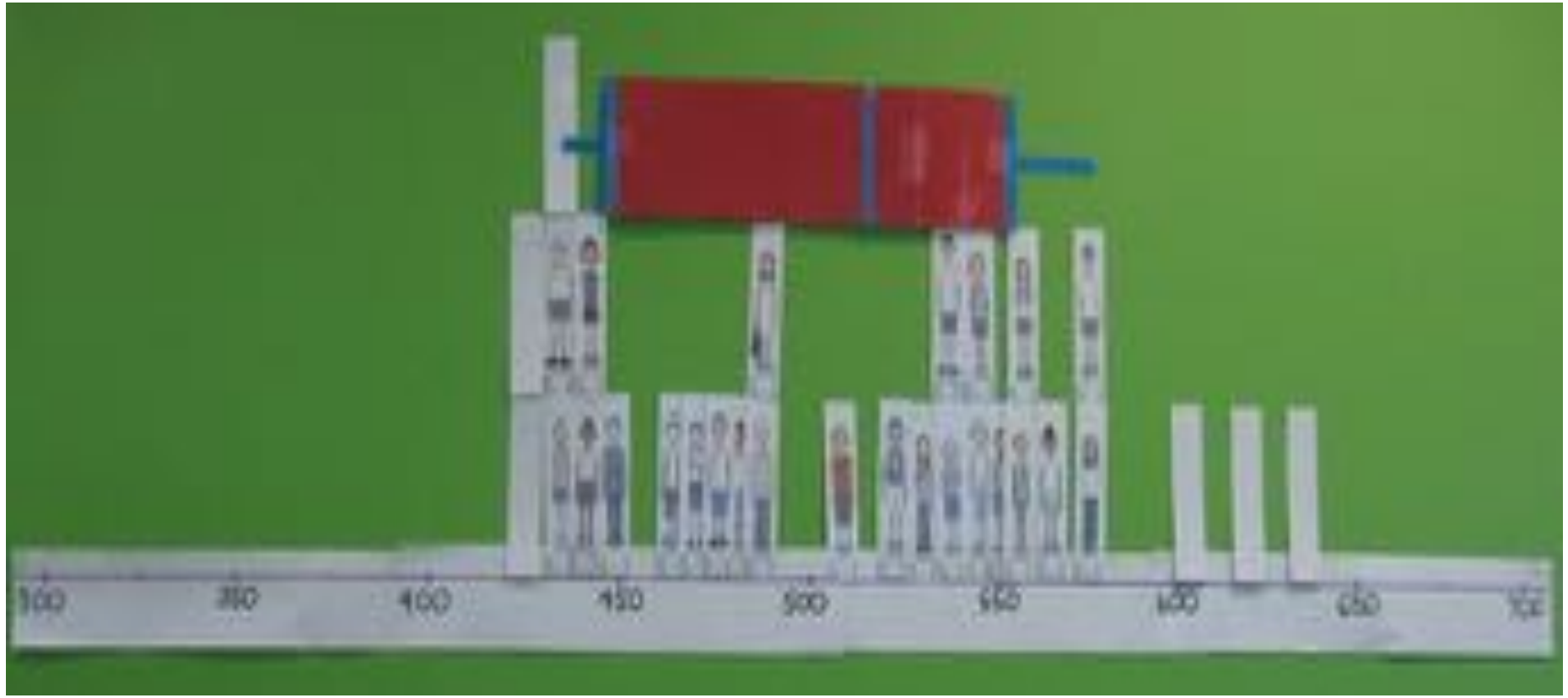
Divide the class into 4 quarters

Building a box-and-whisker plot (2)



Insert a “box” over the middle 50% ie half of the class

Building a box-and-whisker plot (3)

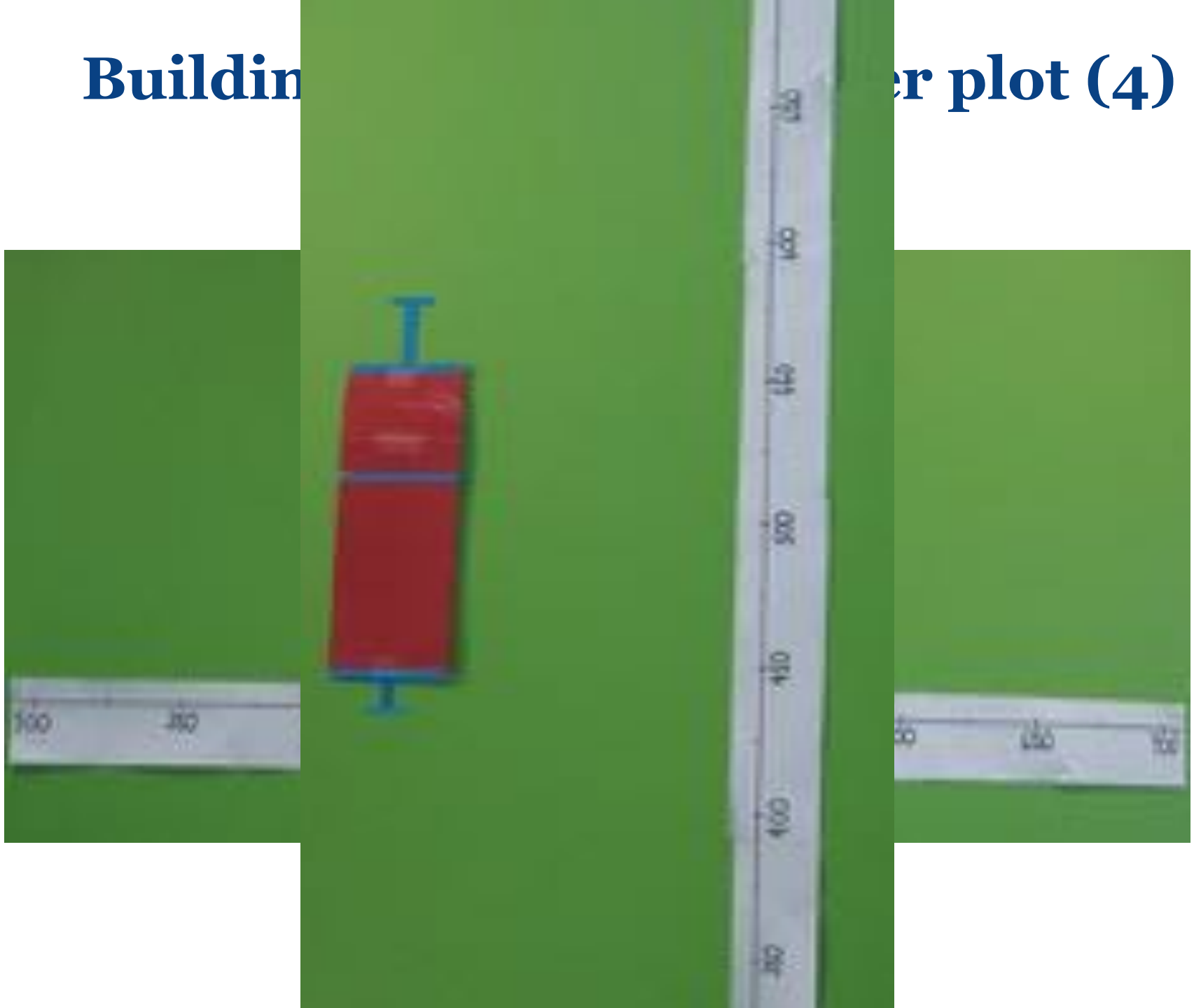


For the plots sent from the Victorian NAPLAN team:

Turn over, remove the students who top and bottom 10% of students

Place “whiskers” to the highest and lowest remaining students

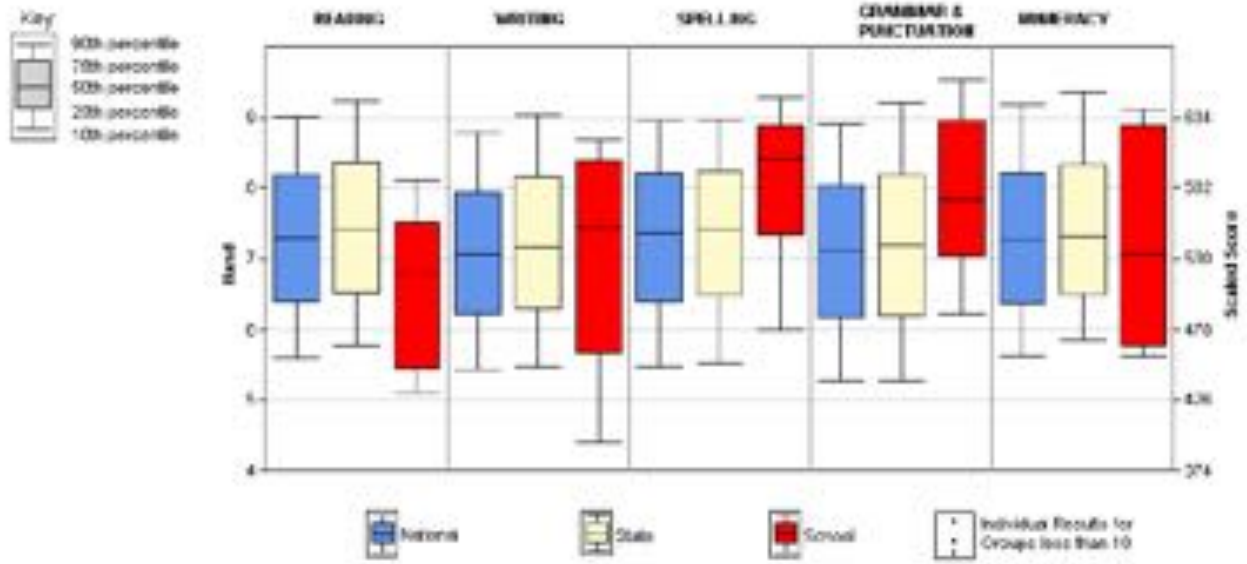
Buildin er plot (4)



Date: 05/05/2011
Time: 9:48:44 AM

EXAMPLE COLLEGE
National Assessment Program - Literacy and Numeracy Tests 2010

School Summary Report
Year 7 - Gender: All, LBOTE: All, ATSI: All

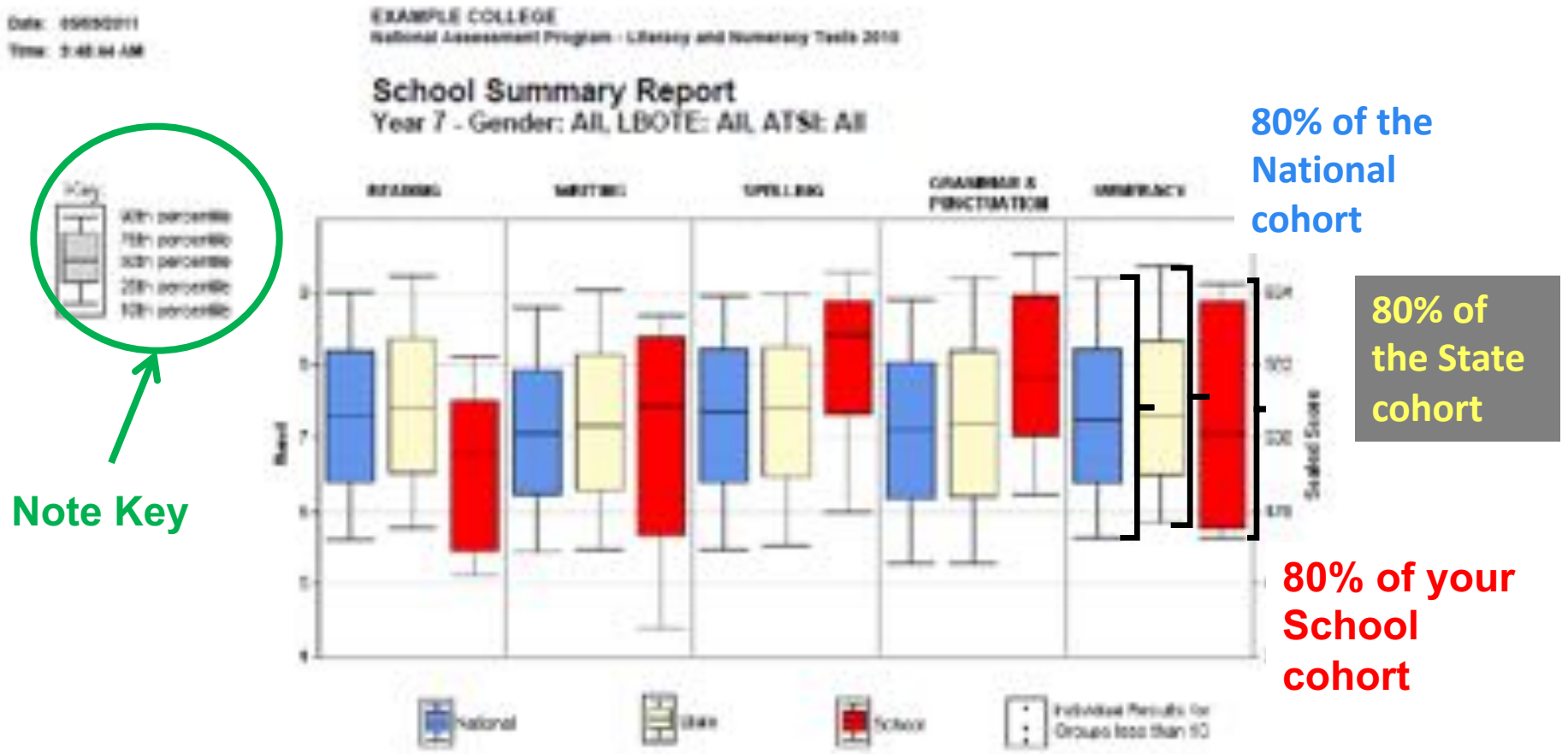


		Students	10th	25th	50th	75th	90th	Median	Mean	se(mean)
READING	National	260,374	457.7	498.8	545.4	592.6	634.8	545.3	546.0	
	State	61,822	468.4	508.6	552.5	601.2	644.1	551.8	554.4	
	School	30	431.9	460.0	520.0	557.3	588.0	520.0	510.9	11.3
WRITING	National	260,830	448.1	489.4	533.1	579.8	623.0	533.1	533.8	
	State	61,588	451.1	493.0	539.1	590.4	636.3	538.5	541.4	
	School	30	396.0	461.1	553.2	602.3	618.3	553.2	527.5	16.1
SPELLING	National	260,396	460.5	498.6	546.5	593.6	632.1	546.4	544.7	
	State	60,952	453.1	502.9	552.1	599.0	632.9	549.3	547.2	
	School	30	477.3	547.4	603.1	627.7	648.9	603.0	580.2	12.7
GRAMMAR & PUNCTUATION	National	260,399	442.6	486.2	535.8	584.6	629.1	536.8	536.1	
	State	60,952	440.7	488.5	540.2	592.3	644.2	537.3	541.2	
	School	30	495.4	532.6	572.9	631.6	661.8	577.6	575.6	11.8
NUMERACY	National	259,573	458.8	497.7	543.1	593.7	643.4	543.2	547.8	
	State	61,530	469.8	503.9	546.5	596.8	652.8	546.3	555.8	
	School	30	458.7	486.0	533.1	627.9	642.6	533.1	542.4	14.0

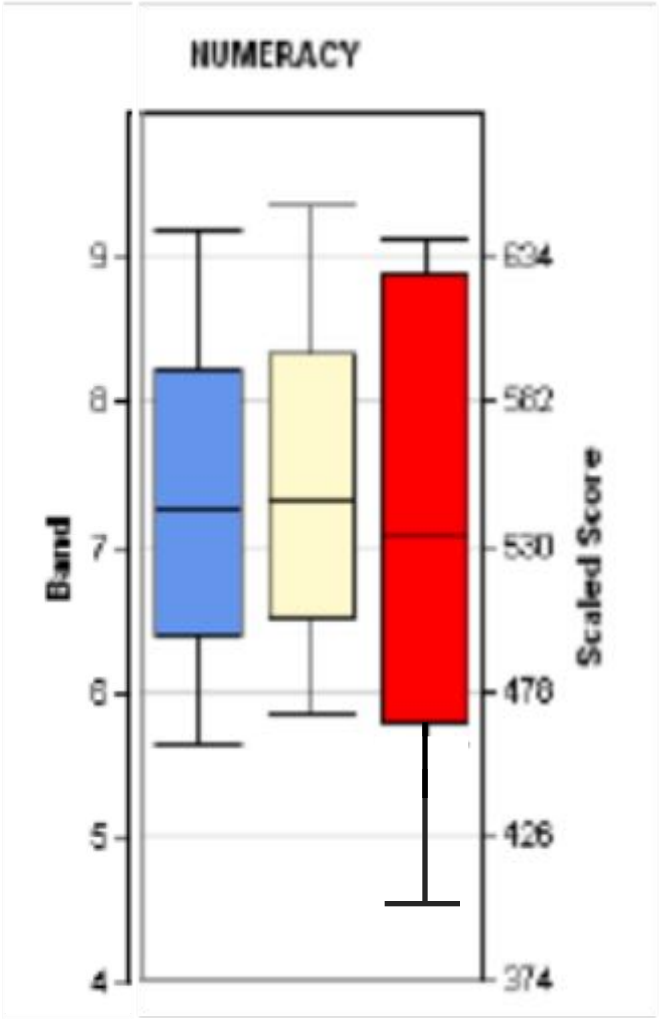
THIS TABLE DISPLAYS SCALED SCORES
The percentiles displayed in the table are interpolated values.

THIS REPORT USES THE NATIONAL ASSESSMENT PROGRAM SCALE

Box-and-whisker plots do not show top and bottom 10% of cohort results



Box-and-whisker graphs break the cohort into fixed percentages



Same proportion of students, represented by each whisker

Pay attention to the big picture:

Compare with the State, compare with Similar Schools

Compare with the past 5 years

Pay attention to success:

Expect variation:

Your local knowledge is important

Don’t spend time on small differences

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Shaping minds, shaping the world

Are we meeting the learning needs of all of our students?

Relative Growth/Gain

Why was it needed?

- Progress on the NAPLAN scale is not linear.
- The rate of growth diminishes as students progress along the NAPLAN scale.
- This occurrence is observed in various assessments programs around the world. It is understood that students achieve larger educational milestones lower on the assessment scale more easily compared to more subtle milestones further along the assessment scale.

What is Relative Growth?

- **Students performance is compared to similar ability students.**
- **NAPLAN definition:**

  A Student performance in the current year is compared to all students in Victoria who had the same score two years prior.

  E.g. A Year 5 student in 2019 is compared to those students who had the same score in Year 3 in 2017.

In 2014 there were 60,000 students in Year 7 Reading

Of these students 1,000 had a scale score for Reading of 380 in Year 5 in 2012 (2 years Prior)

To determine the level of relative Growth for this subset of students …

Relative growth

Year 5 students on same score

Year 7

low

25%

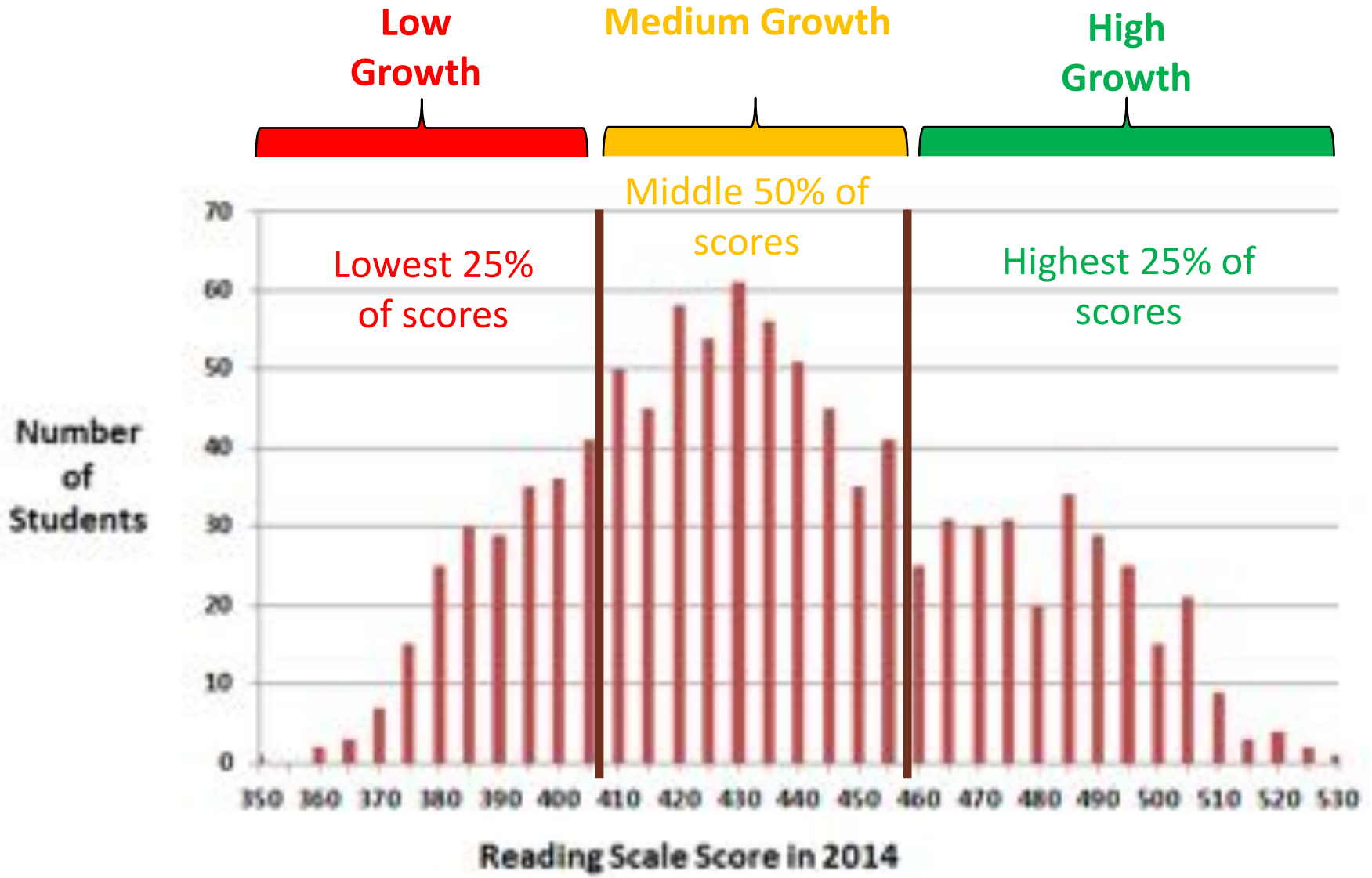
medium

middle 50%

high

25%

2014 Reading Scale Scores in Year 7 for students that had a Year 5 reading score in 2012 of 380.



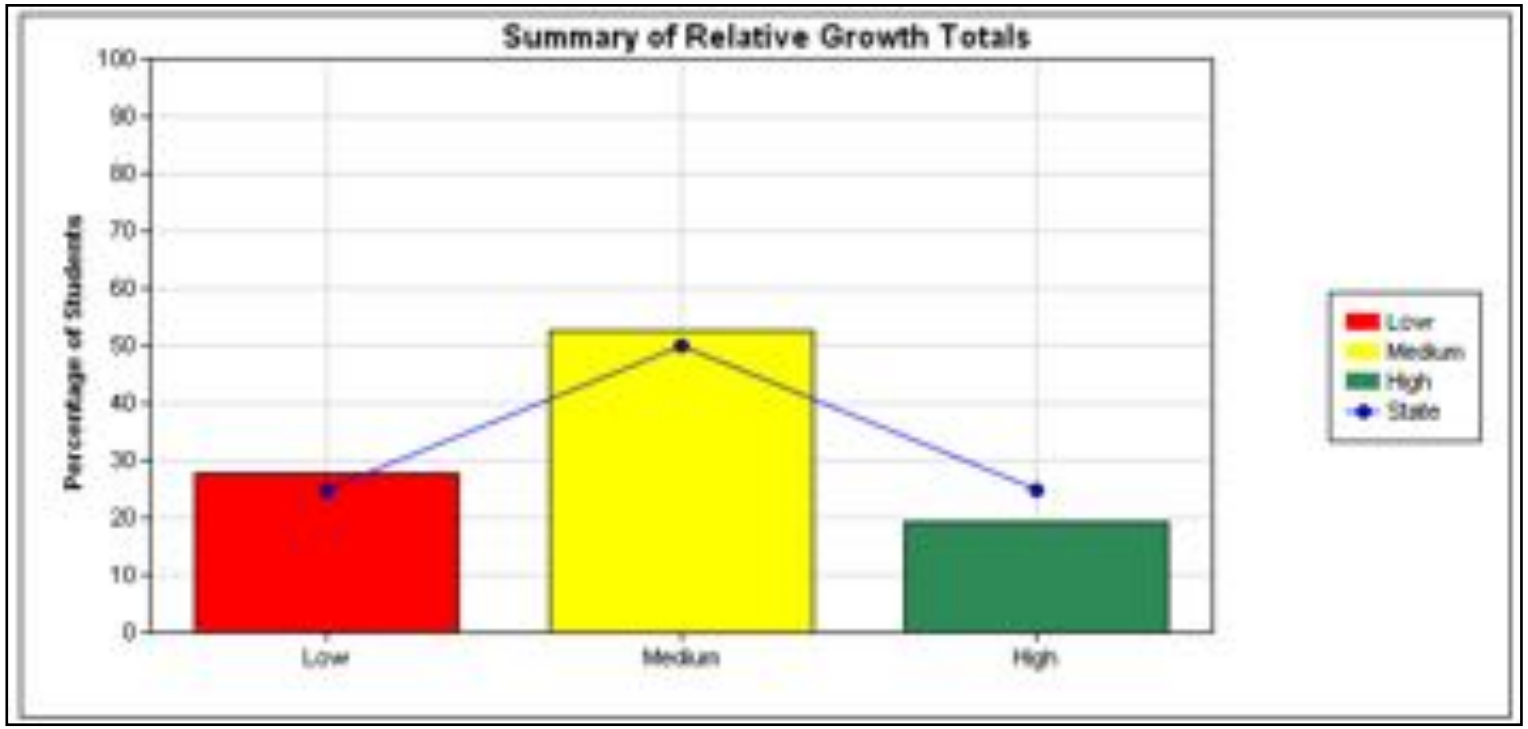
Relative Growth in the NAPLAN Data Service

Tabular report

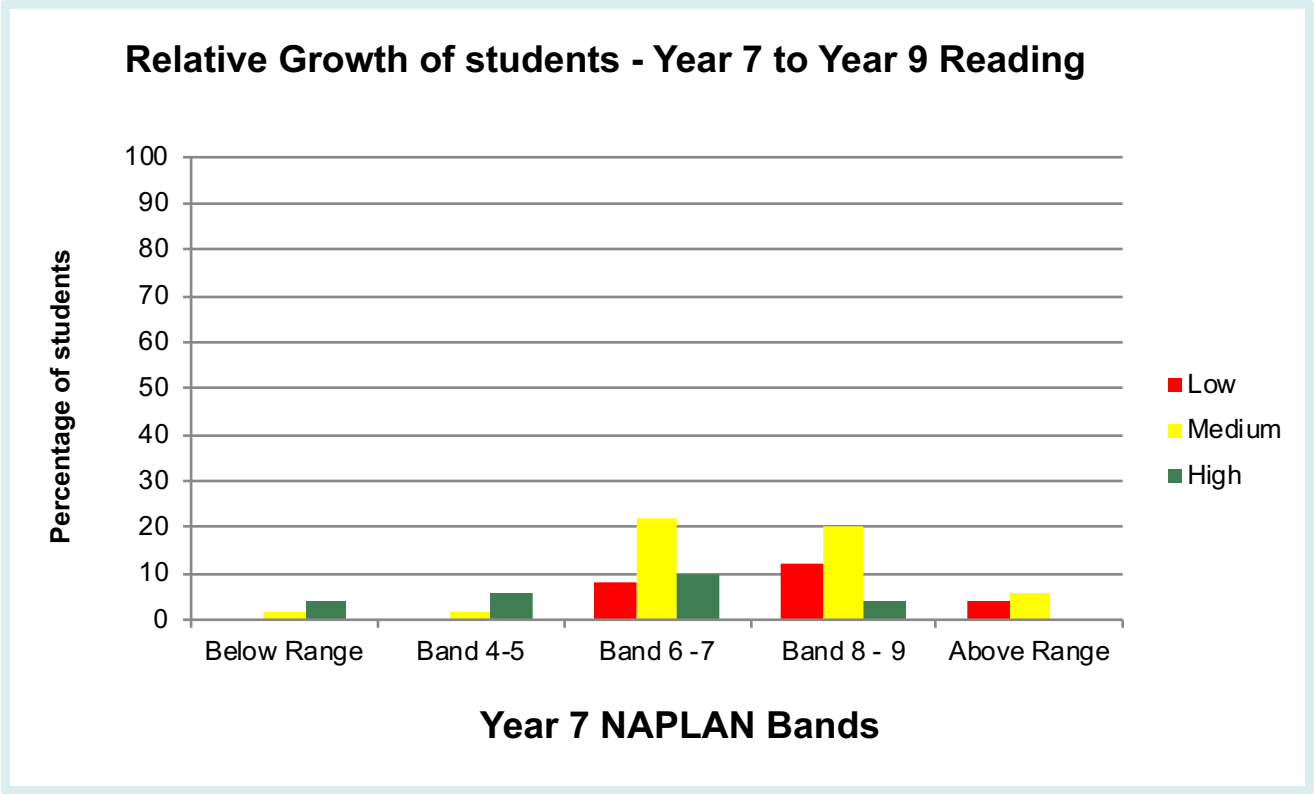
Student Name	YR 7 Student Scores (2 years prior)		Relative growth for YR 7 to YR 9	Year 9 Student Scores (current year)	
	Scaled Score	Band		Scaled Score	Band
Black, Betty	365	<4	Medium	489	6
Grey, Graham	404	4	High	503	6
Green, George	466	5	Medium	530	7
Lemon, Lily	487	6	Low	503	6
Brown, Brittany	560	7	Low	564	7
Tan, Tracy	662	9	Medium	681	9
Silver, Sam	707	>9	High	714	10
White, Willy	NA	NA	--	616	8

Relative Growth in the NAPLAN Data Service

Graphical summary report



Graphical summary report - detail



	Below Range (Yr 7)			Band 4 - 5 (Yr 7)			Band 6 - 7 (Yr 7)			Band 8 -9 (Yr 7)			Above Range (Yr 7)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
School %	0	2	4	0	2	6	8	22	10	12	20	4	4	6	0
No of students	0	4	8	0	4	12	16	44	20	24	40	8	8	12	0

Example … comparing growth statistics

	Year 5 NAPLAN results								
NAPLAN Band	**<3**	**3**	**4**	**5**	**6**	**7**	**8**	**>8**	**Mean**
School A	0	0	2	5	3	5	4	6	**570**
	-	-	**8%**	**20%**	**12%**	**20%**	**16%**	**24%**	
School B	1	5	7	8	3	1	0	0	**423**
	4%	**20%**	**28%**	**32%**	**12%**	**4%**	**-**	**-**	

	NAPLAN Mean Scaled Scores		
	Year 3 (2 years prior)	**Year 5 (current year)**	**Difference**
School A	468.4	569.9	**101.5**
School B	309.8	423.4	**113.6**
State	431.8	504.5	**72.7**

Example …
comparing *Relative Growth* patterns

School A

Year 3 Student Scores		Relative Growth for YR-3 to YR-5	Year 5 Student Scores	
Scaled Score	Band		Scaled Score	Band
346	3	Medium	467	5
346	3	Medium	477	5
356	3	Low	416	4
367	3	Medium	467	5
367	3	Low	405	4
377	4	Low	426	5
398	4	Medium	509	6
408	4	Low	447	5
440	5	Medium	520	6
464	5	Medium	544	7
477	5	Medium	544	7
477	5	Medium	544	7
491	6	High	716	>8
491	6	High	603	8
491	6	Medium	544	7
506	6	High	800	>8
506	6	High	716	>8
524	6	Medium	557	7
524	6	High	622	8
544	>6	Medium	603	8
544	>6	High	716	>8
544	>6	Medium	571	7
544	>6	High	645	>8
571	>6	High	716	>8
608	>6	High	800	>8

School A: HIGH relative growth has been achieved only by the higher ability students.

School B

Year 3 Student Scores		Relative Growth for YR-3 to YR-5	Year 5 Student Scores	
Scaled Score	Band		Scaled Score	Band
157	1	Medium	360	3
181	1	High	416	4
236	1	Medium	372	3
236	1	High	426	5
250	1	Medium	372	3
264	1	Medium	384	4
264	1	Low	320	<3
277	2	High	447	5
[illegible]	[illegible]	Medium	384	4
[illegible]	[illegible]	Medium	436	5
[illegible]	[illegible]	Low	334	3
[illegible]	[illegible]	Medium	395	4
[illegible]	[illegible]	High	457	5
313	2	High	544	7
313	2	Medium	544	7
324	3	Medium	544	7
324	3	High	716	>8
346	3	High	716	>8
346	3	Low	360	3
356	3	Medium	477	5
387	4	Medium	457	5
408	4	High	520	6
419	4	High	532	7
419	4	Low	395	4
452	5	Medium	498	6

School B: HIGH relative growth is evident from a range of Year 3 starting points

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Identifying strengths and weaknesses by topic

Item analysis

Look at the actual items on the Test item

MCD

Non-Calc

2 This pole measures the depth of water in a river.

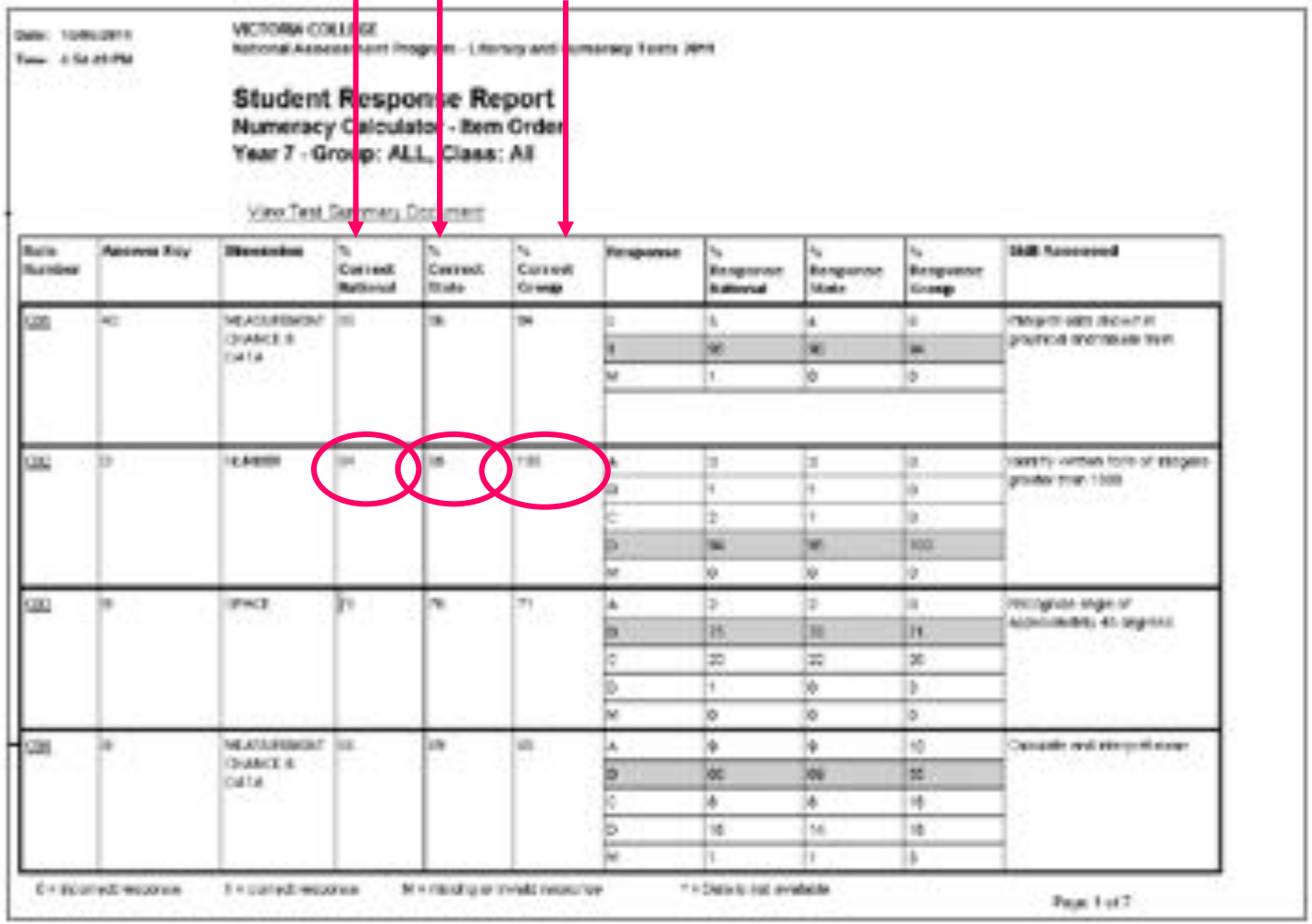
Approximately how deep is the river?

15 centimetres ○ 1.05 metres ○ 1.5 metres ○ 15 metres ○

% Correct National

% Correct State

% Correct Group (selected)



Student Response Report
Numeracy Calculator - Item Order
Year 7 - Group: ALL, Class: All

View Test Summary Document

±5% : 'Similar' or 'Different'?

Number Correct	Number Incorrect	% Correct
9	1	90
		85
8	2	80

10 students sat the test

Number Correct	Number Incorrect	% Correct
18	2	90
17	3	85
16	4	80

20 students sat the test

400 students sat the test

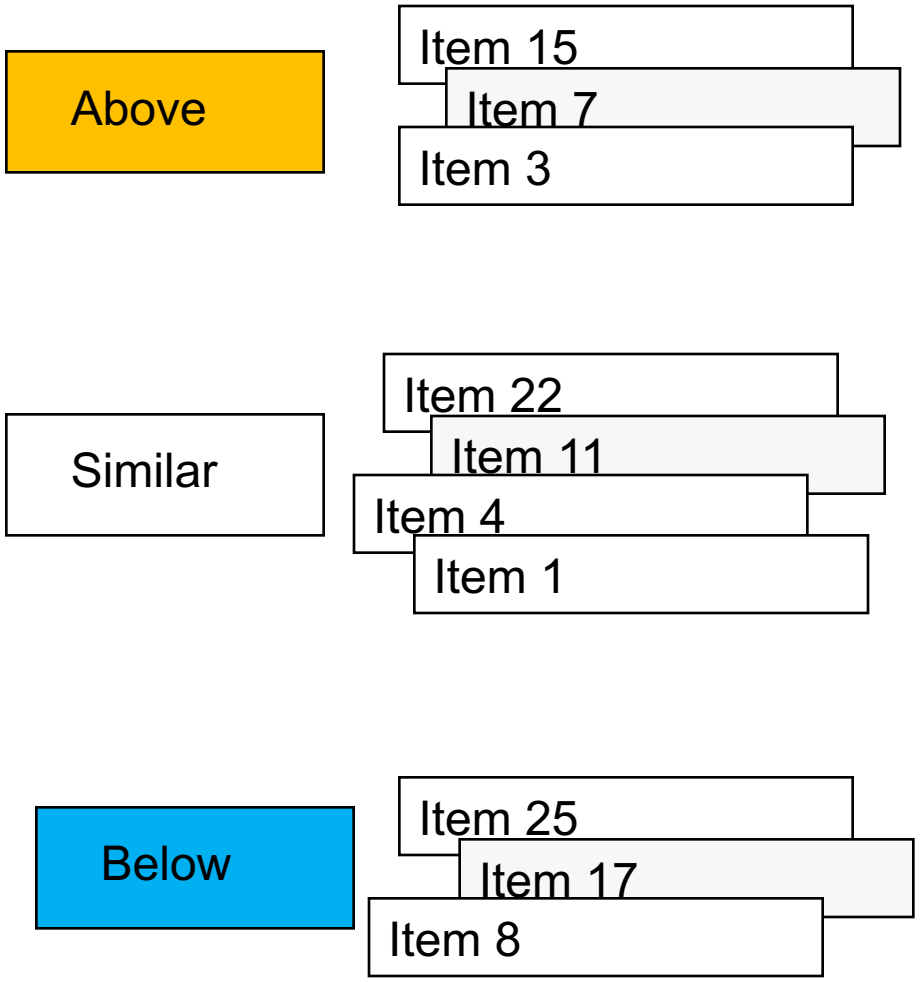
Number Correct	Number Incorrect	% Correct
360	40	90
340	60	85
320	80	80

Numeracy

What can we learn from looking at:

a) Items where the *% correct* was very different to the state

b) Items where a large proportion of students chose a *(wrong) distracter*



Are there any obvious commonalities in those items that scored above or below the State? Are they in the same topic area?

Tutorials can be found at

http://usingassessmentdata.vcaa.vic.edu.au/naplan/index.aspx

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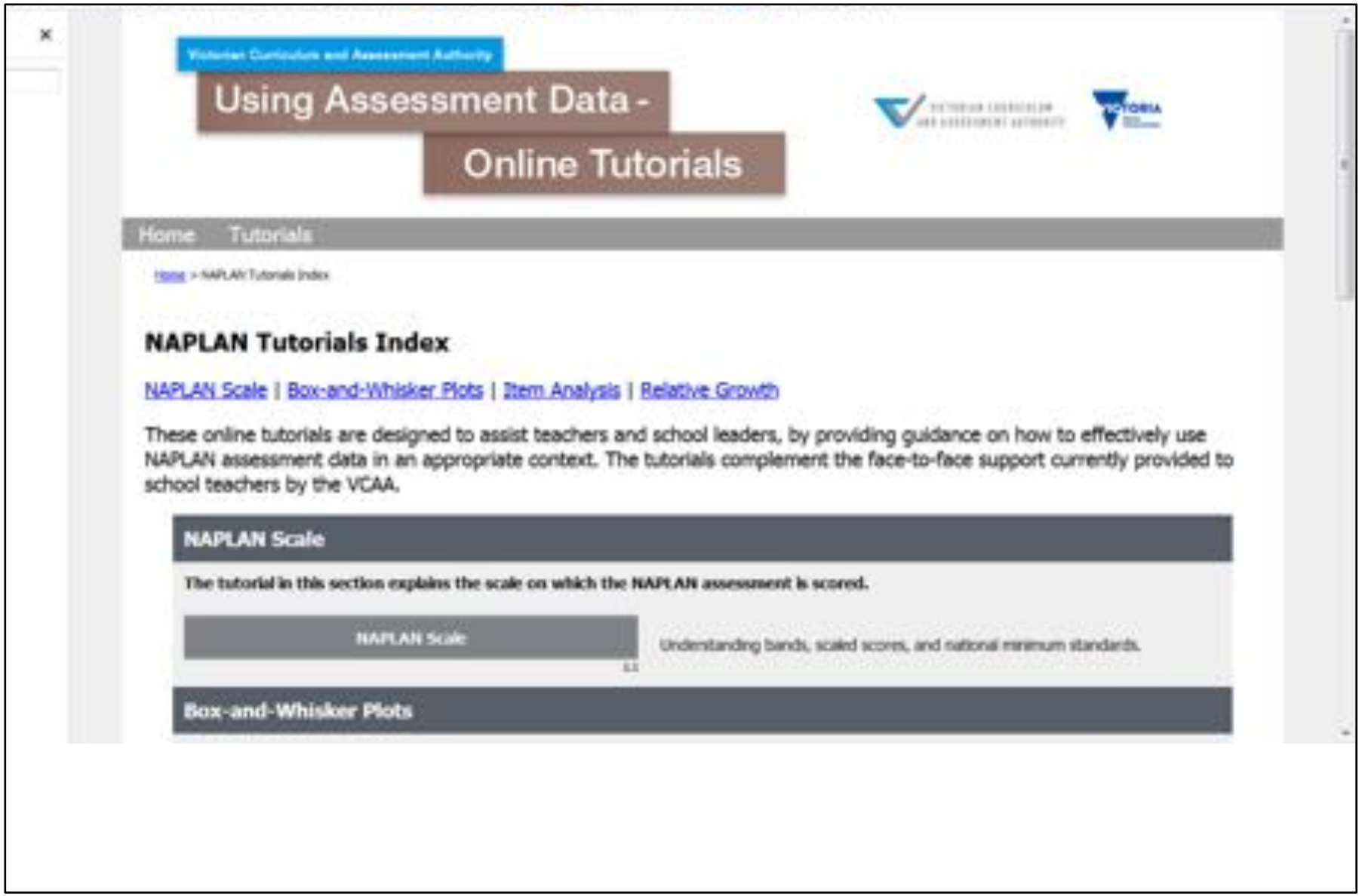
Victorian Curriculum and Assessment Authority
Using Assessment Data -
Online Tutorials
Home
Tutorials
Home > NAPLAN Tutorials Index
NAPLAN Tutorials Index
NAPLAN Scale | Box-and-Whisker Plots | Item Analysis | Relative Growth
These online tutorials are designed to assist teachers and school leaders, by providing guidance on how to effectively use NAPLAN assessment data in an appropriate context. The tutorials complement the face-to-face support currently provided to school teachers by the VCAA.
NAPLAN Scale
The tutorial in this section explains the scale on which the NAPLAN assessment is scored.
NAPLAN Scale
Understanding bands, scaled scores, and national minimum standards.
Box-and-Whisker Plots

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Thank you

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