

Why an adaptive education system would improve school outcomes

Royal Children's Hospital Grand Rounds, 23 May 2018

Peter Goss, School Education Program Director

 @peter_goss

What on earth is happening in our schools?

True Leaders 2017: Nobel laureate Elizabeth Blackburn, Salk Institute

Boss Oct 12 2017 at 9:00 PM Updated Oct 12 2017 at 9:00 PM



Eddie Woo named 'among world's top 10 teachers'



VS

Australia's 'tolerance of failure' behind declining PISA results, says test co-ordinator

Education basics have been replaced by trendy fads

Inequality in Australian schools costs the country \$20 billion: report

Our brightest kids are being left to fend for themselves

Three overarching challenges

- 1. Improve the teaching of the core academic subjects
 - 2. Prepare young people better for a changing world
 - 3. Reduce the wide and growing gaps between educational haves and have nots
- Continuous improvement**
+
innovation
- No easy solutions**

A story from the classroom

A Sea of Data Writing

Cluster 5

- ~ I can use words my teacher shows me
- ~ I can write 4 or 5 sentences
- ~ I can use describing words
- ~ I can write letters that are all the same size
- ~ I can re-read to check my writing makes sense

Cluster 6


- ~ I can use headings and paragraphs
- ~ I can re-read my writing to correct it myself
- ~ I can use some punctuation correctly
- ~ I can write sequenced ideas
- ~ I can write longer texts

Cluster 7

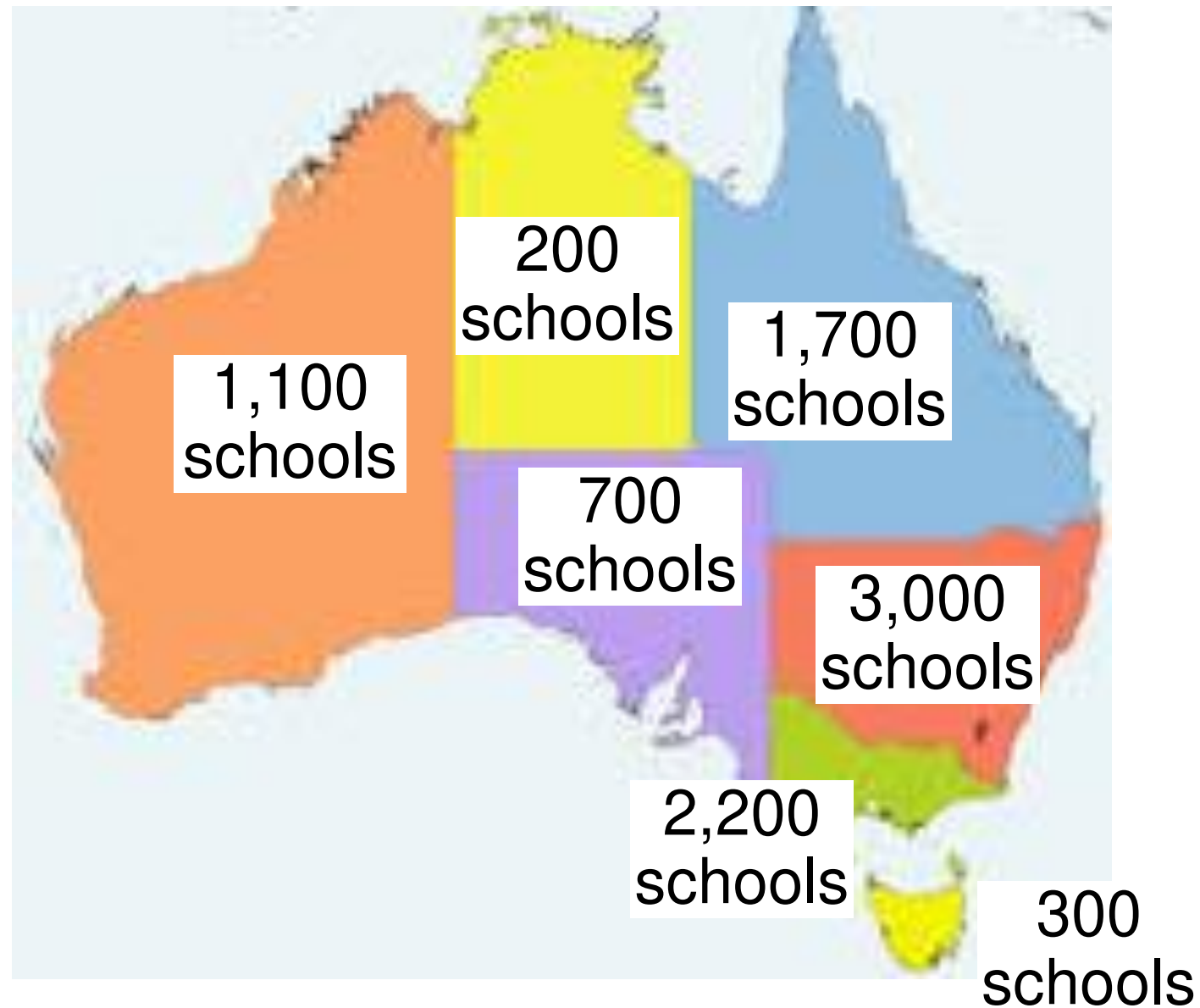
- ~ I can plan before I write
- ~ I can explain who I am writing for and why
- ~ I can write with accurate spelling
- ~ I can use capital letters for names and places
- ~ I can use a variety of verbs
- ~ I can write informative texts

Cluster 8

- ~ I can write 1 full page
- ~ I can publish my work
- ~ I can edit my work
- ~ I can give an opinion in my writing
- ~ I can write using speech marks, commas and apostrophes
- ~ I can check that my sentences make sense



But how do we do this at scale?



Compare the pair

Healthcare	School education
1,300 hospitals <ul style="list-style-type: none">- 700 public- 630 private	9,400 schools <ul style="list-style-type: none">- 6,700 government- 2,700 non-government
70,000 medical practitioners <ul style="list-style-type: none">- 43,000 GP's- 25,000 specialists	30,000+ school leaders <ul style="list-style-type: none">- 9,400 principals- 20,000+ deputy principals etc
257,000 nurses <ul style="list-style-type: none">- 1,250 nurse practitioners	280,000 teachers <ul style="list-style-type: none">- ~300-400 highly accomplished
120,000 allied health professionals	100,000 other staff in schools

Compare the pair

Healthcare

22 million Australians

**11 GP visits per year,
say 20 minutes per visit**

**Total patient time:
~ 1,000 person-years**

School education

3.8 million students

**1,000 hours of school
(6 hours x 5 days x 40 weeks)**

**Total student time:
~ 600,000 person-years**

Yet we want learning to be personalised.

How are we doing today?

Why an adaptive system would be better

Towards an Adaptive Education System

The usual messages...

Money spent ... up

Students completing Year 12 ... up

PISA results ... down

NAPLAN results ... flat

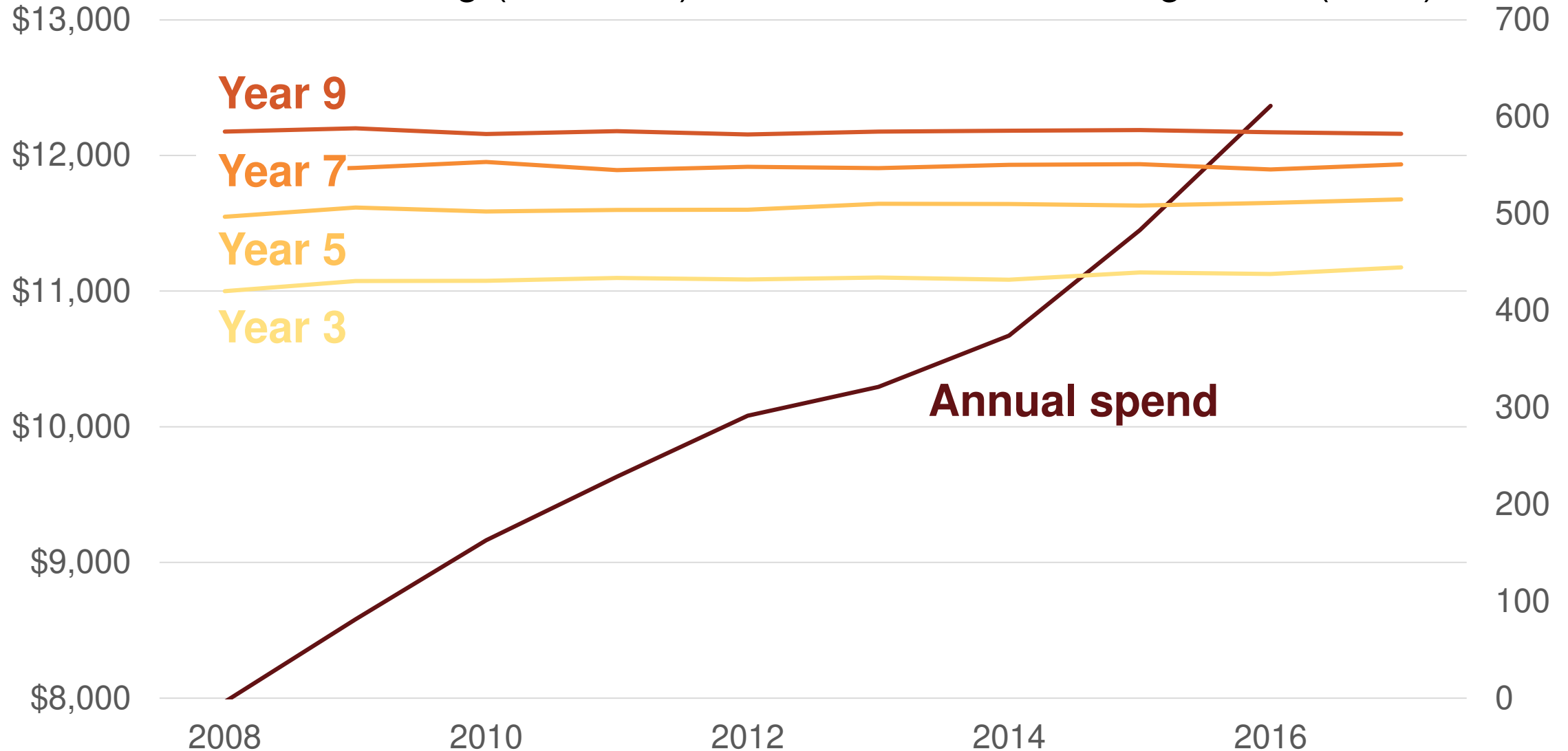
Impact of socio-economic disadvantage ... little change

Indigenous student results ... appalling

Lies, damn lies or statistics?

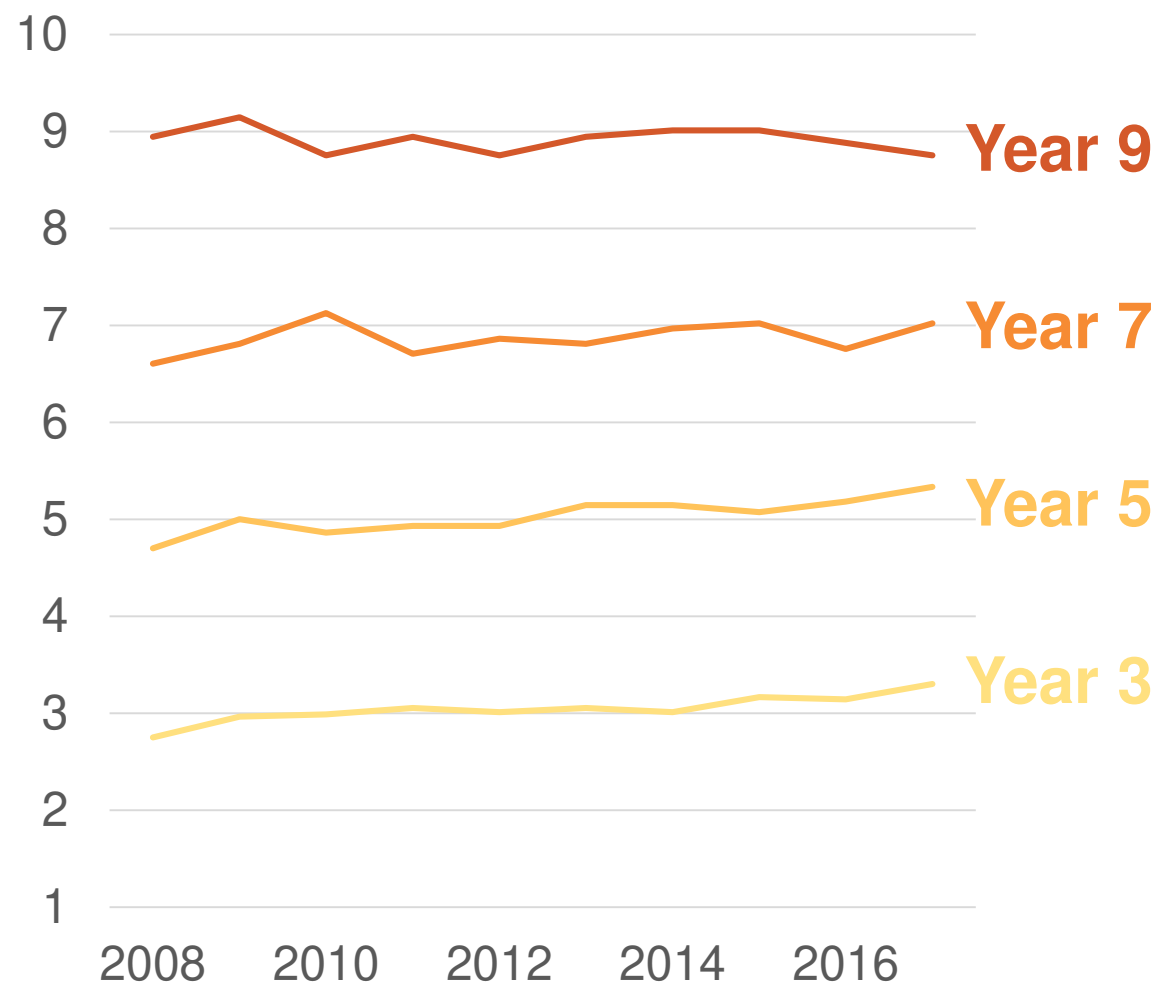
How the story is often told...

Victorian school funding (LHS, \$m) versus NAPLAN reading score (RHS)

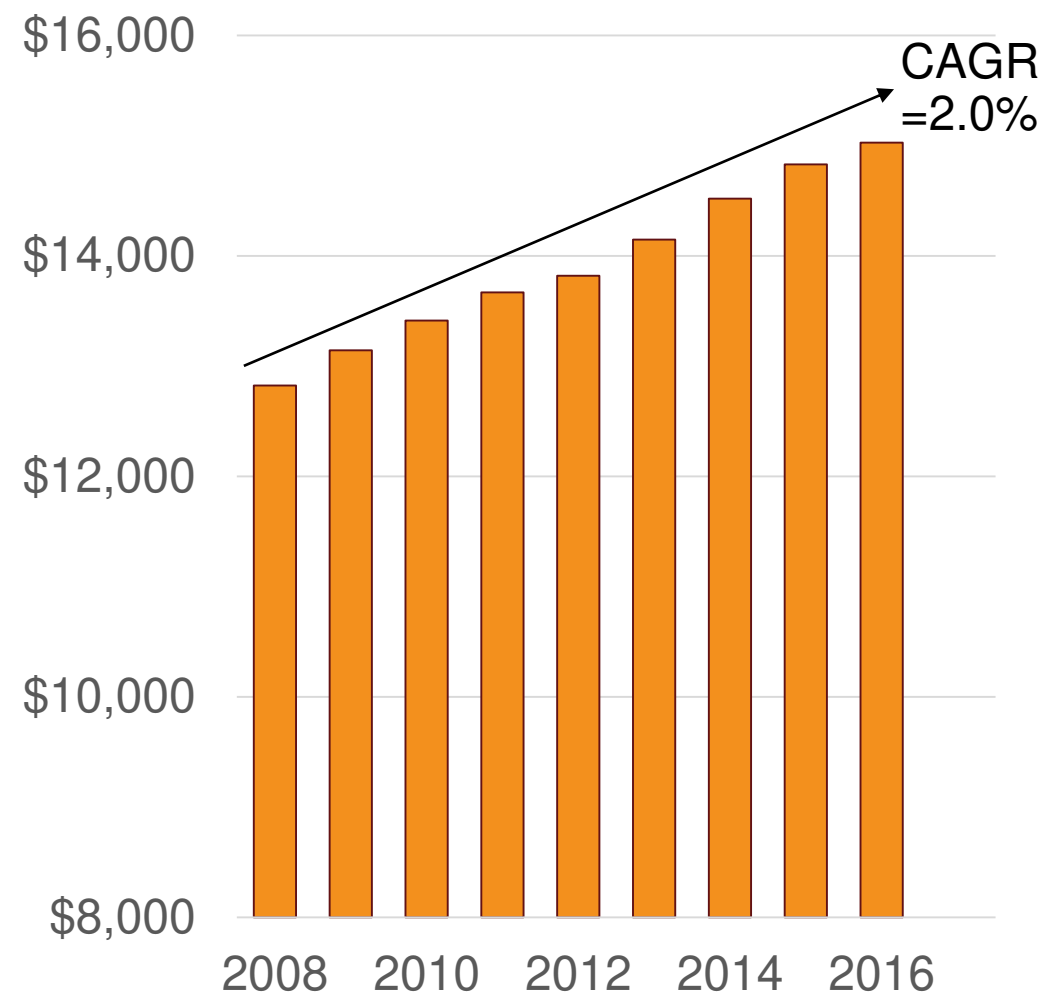


... versus a less manipulative presentation

Victorian NAPLAN reading results
Equivalent Years of Learning

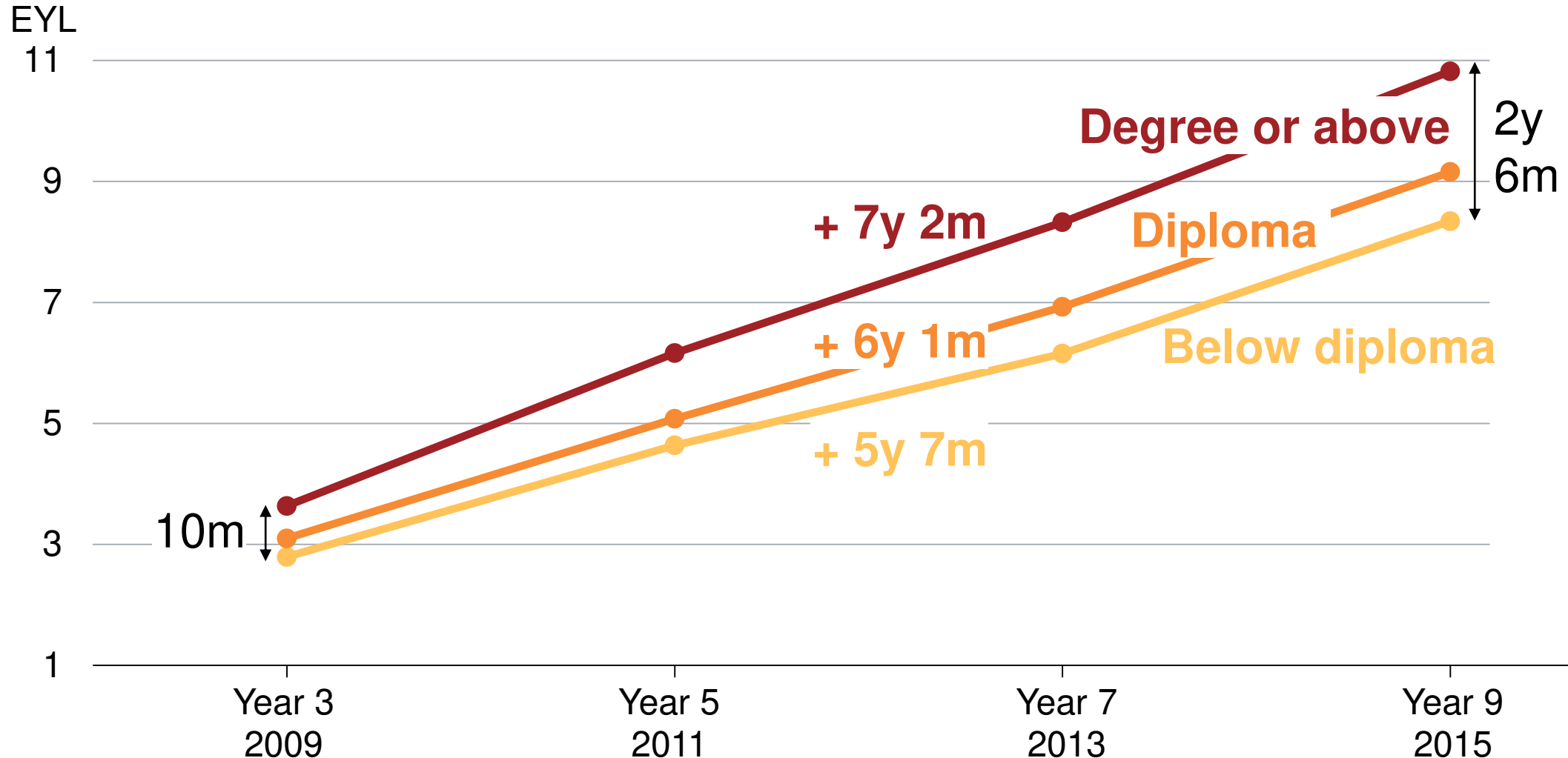


Victorian school education funding
\$ per student



Parental education really matters

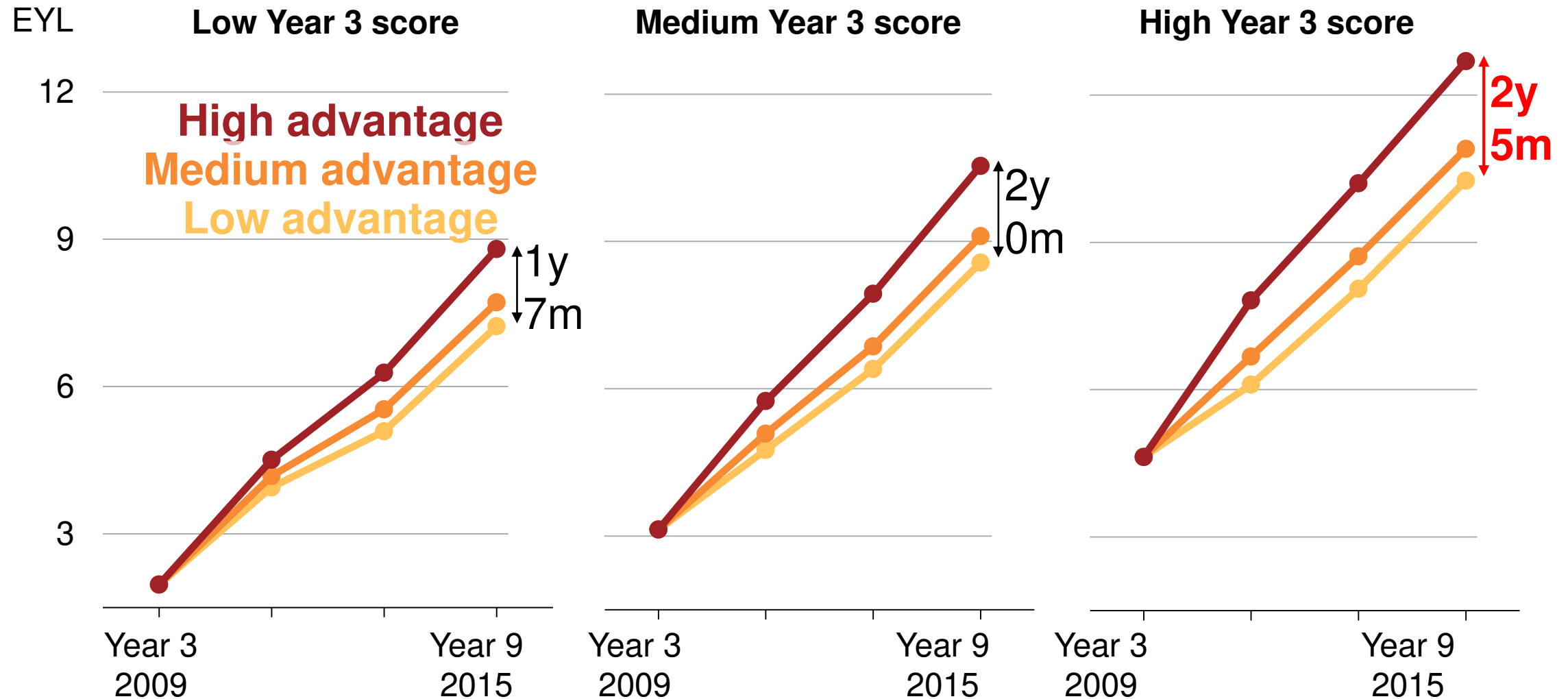
Progress of student cohorts by parental education



Notes. Data is for numeracy, median of all Victorian students, 2009-15 cohort. EYL: Equivalent Year Level
Highest level of parental education is a proxy for socio-economic status.
Source: Widening gaps, Grattan Institute, Figure 10

Bright kids in poor schools lose the most

Average progress by level of school advantage

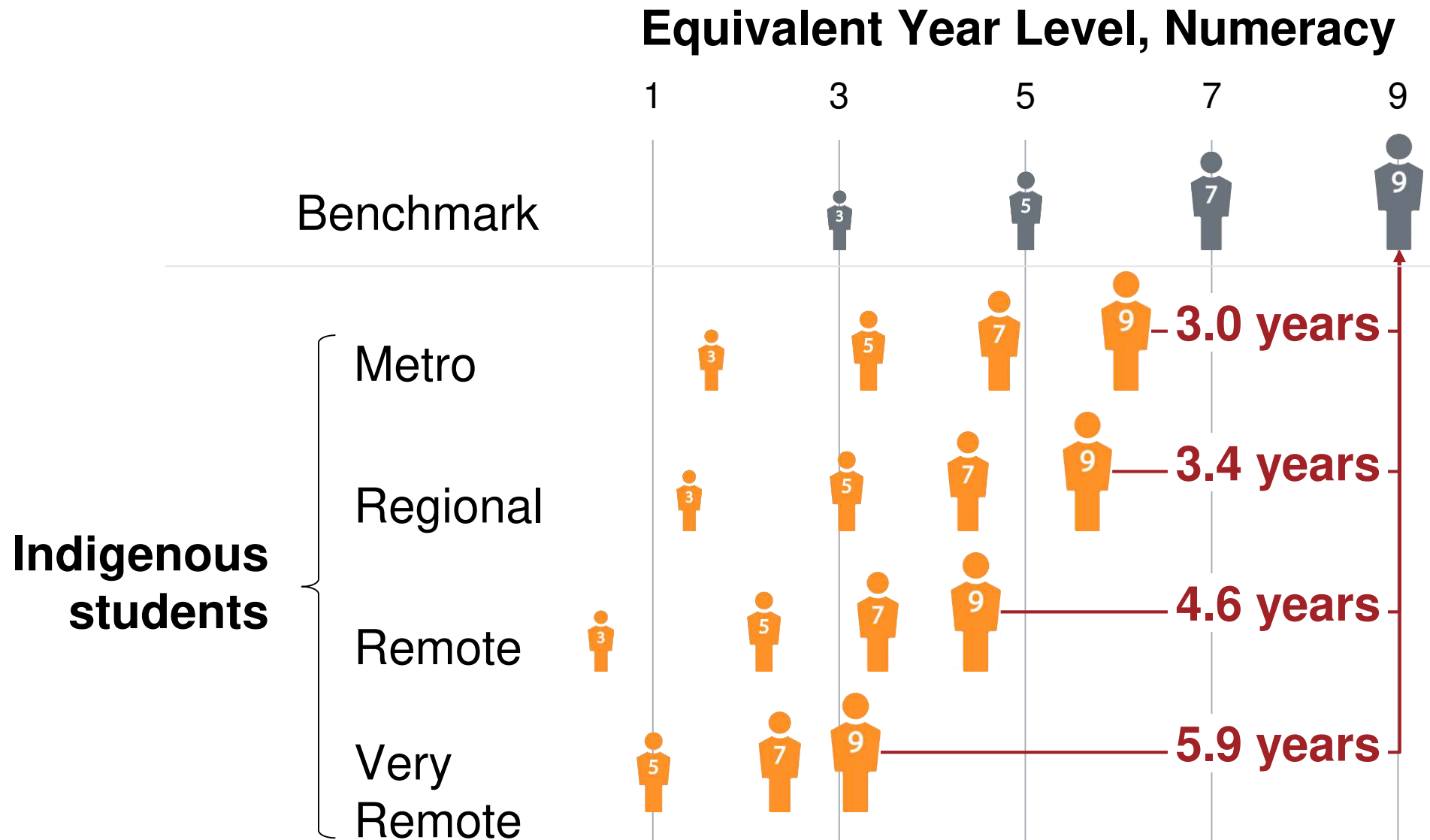


Notes. Data is for numeracy, all Victorian students, 2009-15 cohort, by school ICSEA (bottom quartile, middle two quartiles, top quartile).

Low, medium and high achievers are students who scored at the 20th, 50th and 80th percentile in Year 3. EYL: Equivalent Year Level.

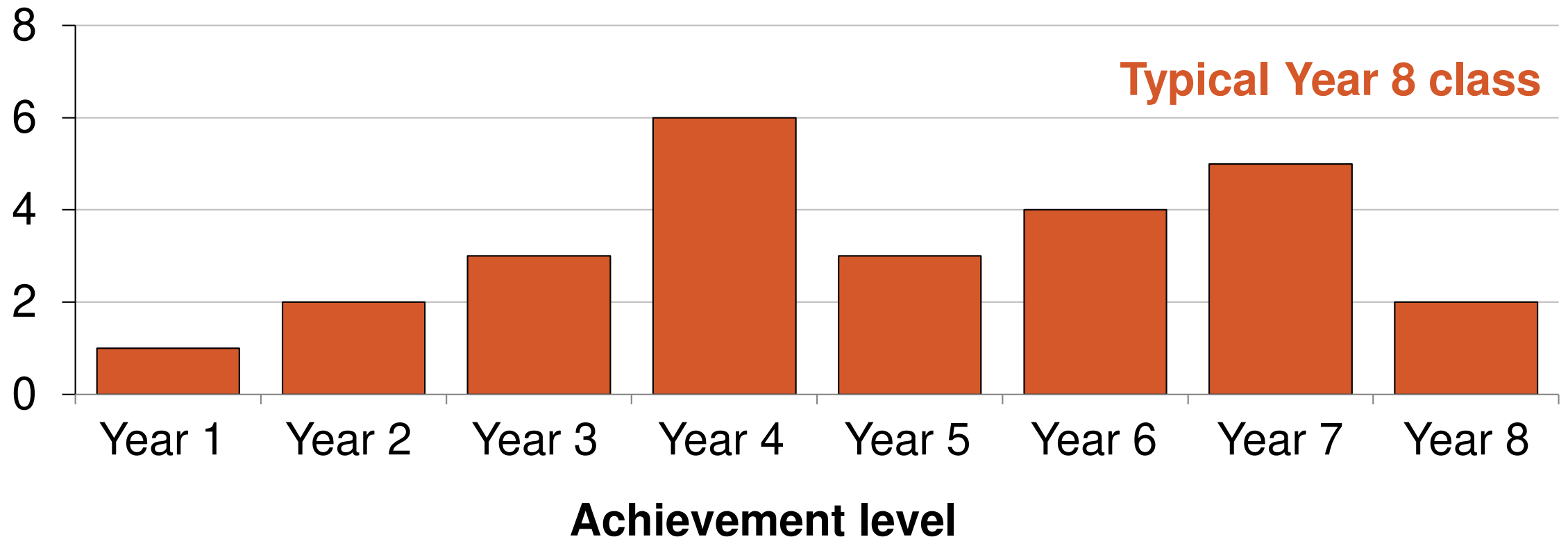
Source: Widening gaps, Grattan Institute, Figure 14

Indigenous gaps are genuinely huge



Gaps are also huge within each class

Number of students



Three axioms:

- Success comes from maximising **progress**
- By definition, more progress lifts **achievement**
- **Targeted teaching** is essential

One goal:

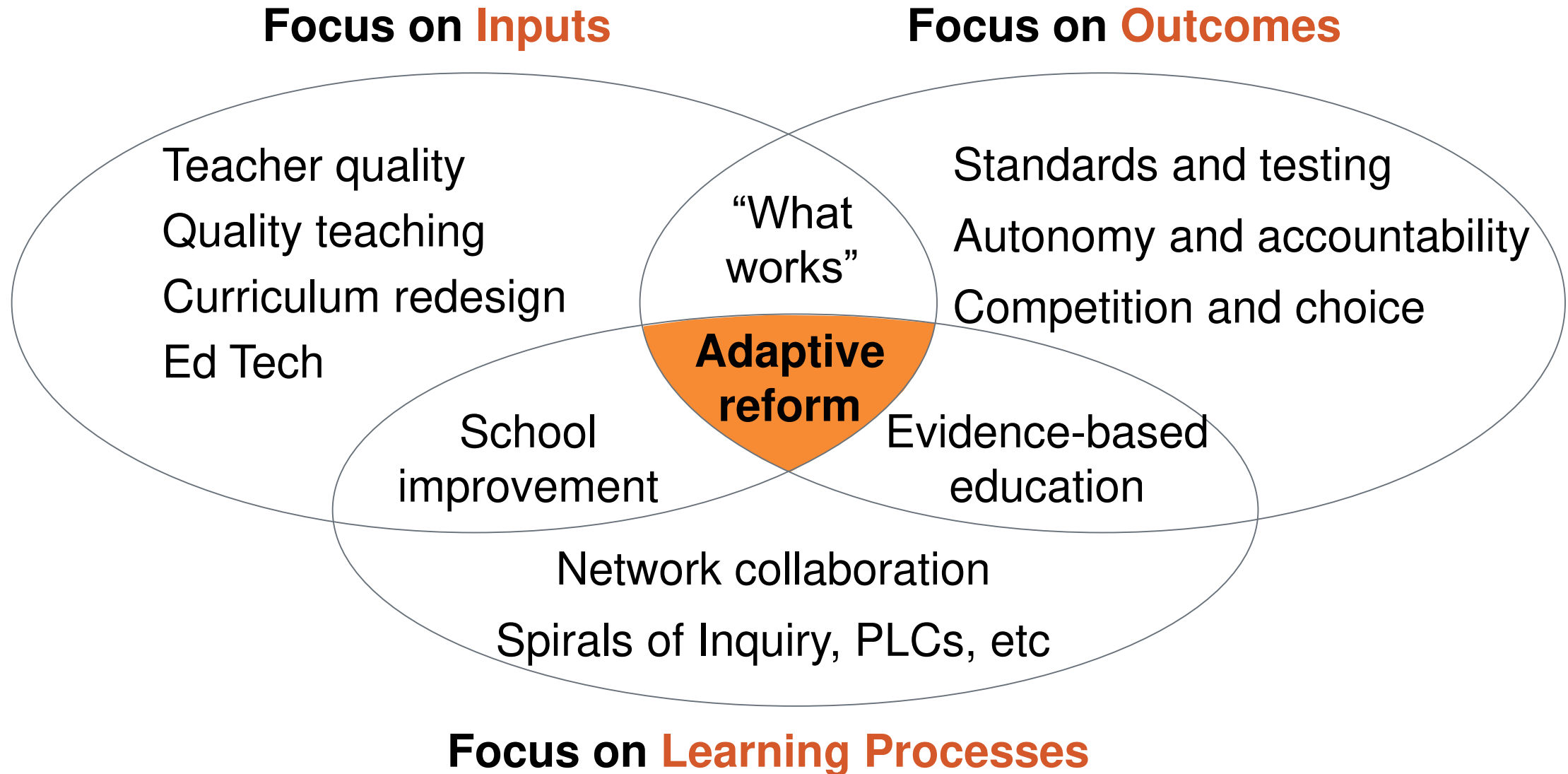
**At least one year's
learning each year
for every student**

How are we doing today?

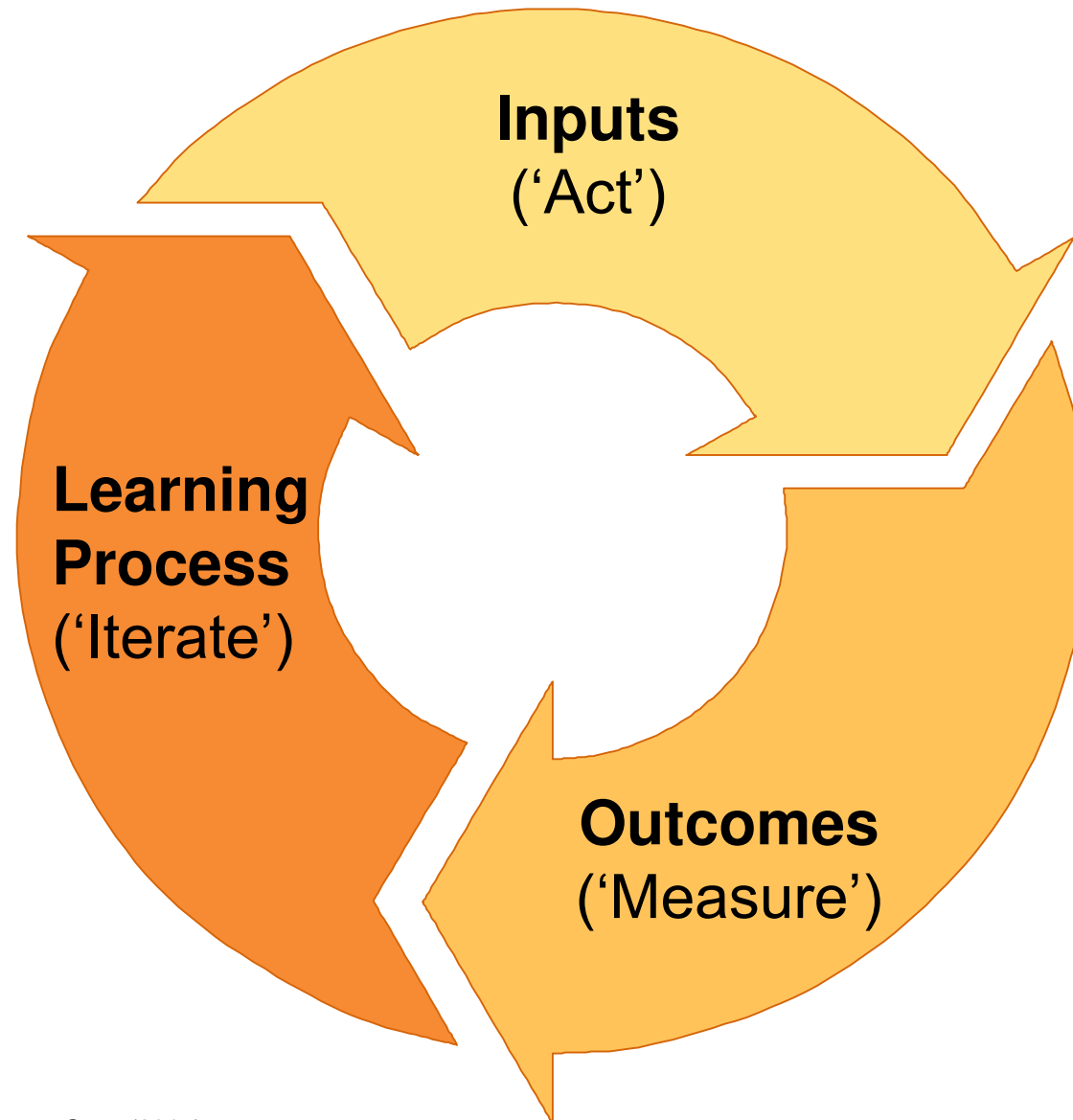
Why an adaptive system would be better

Towards an Adaptive Education System

Three main schools of thought

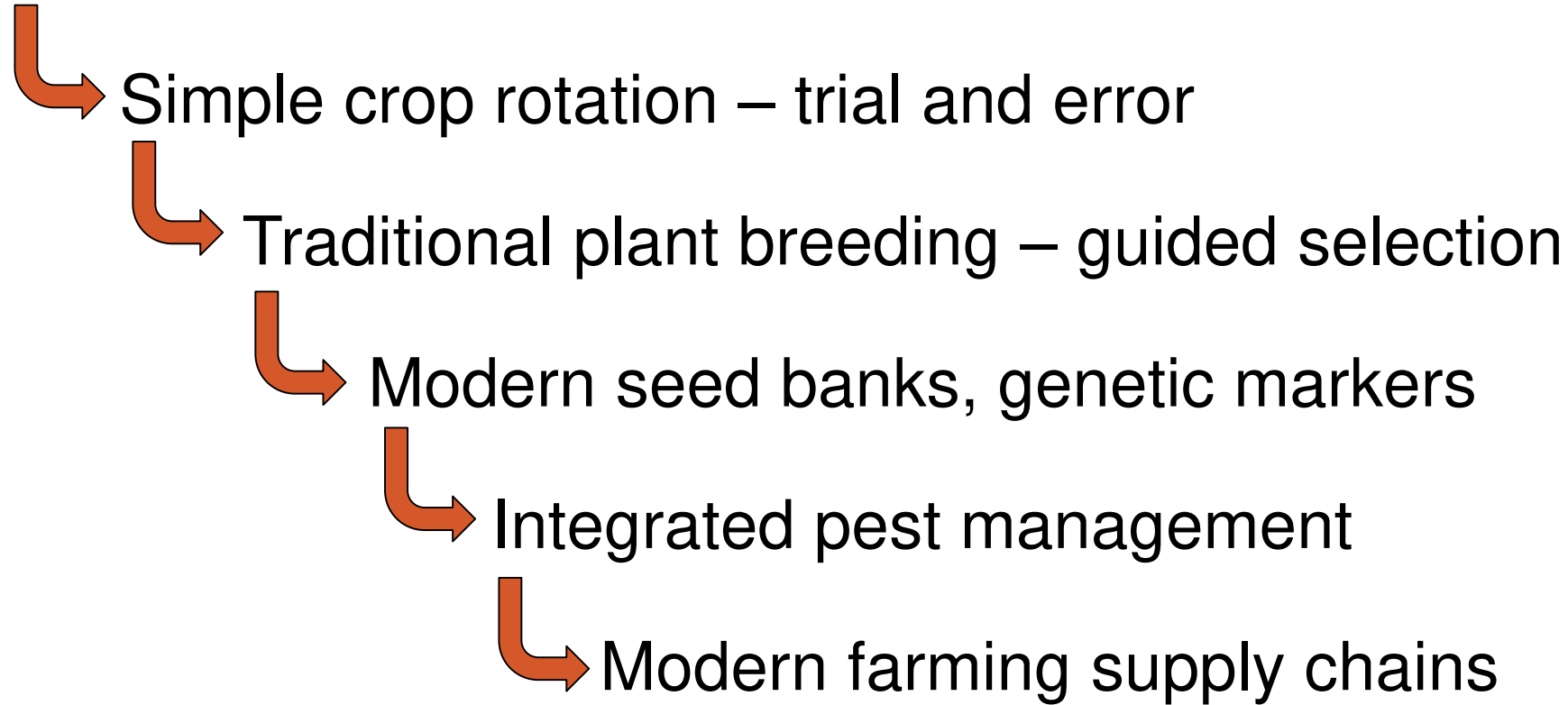


Adaptive reform incorporates all three steps



What does it mean to be an adaptive system?

Pre-adaptive farming – natural selection



**Increasingly deliberate selection in
an increasingly integrated way;
information outweighs infrastructure**

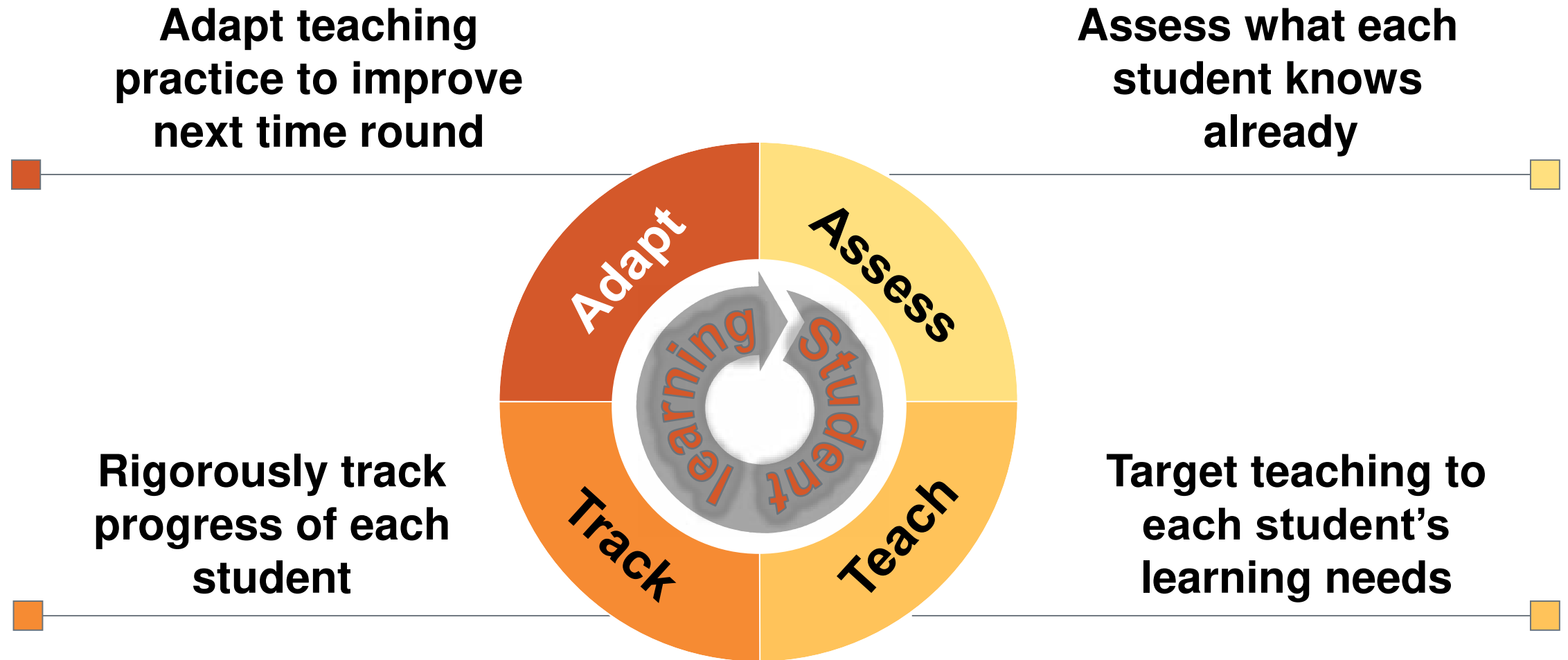
Improvement by design, not by chance

How are we doing today?


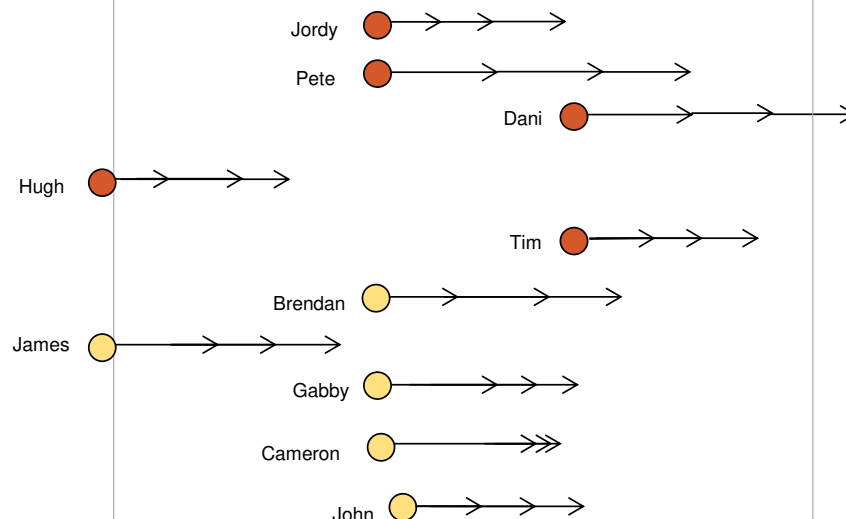
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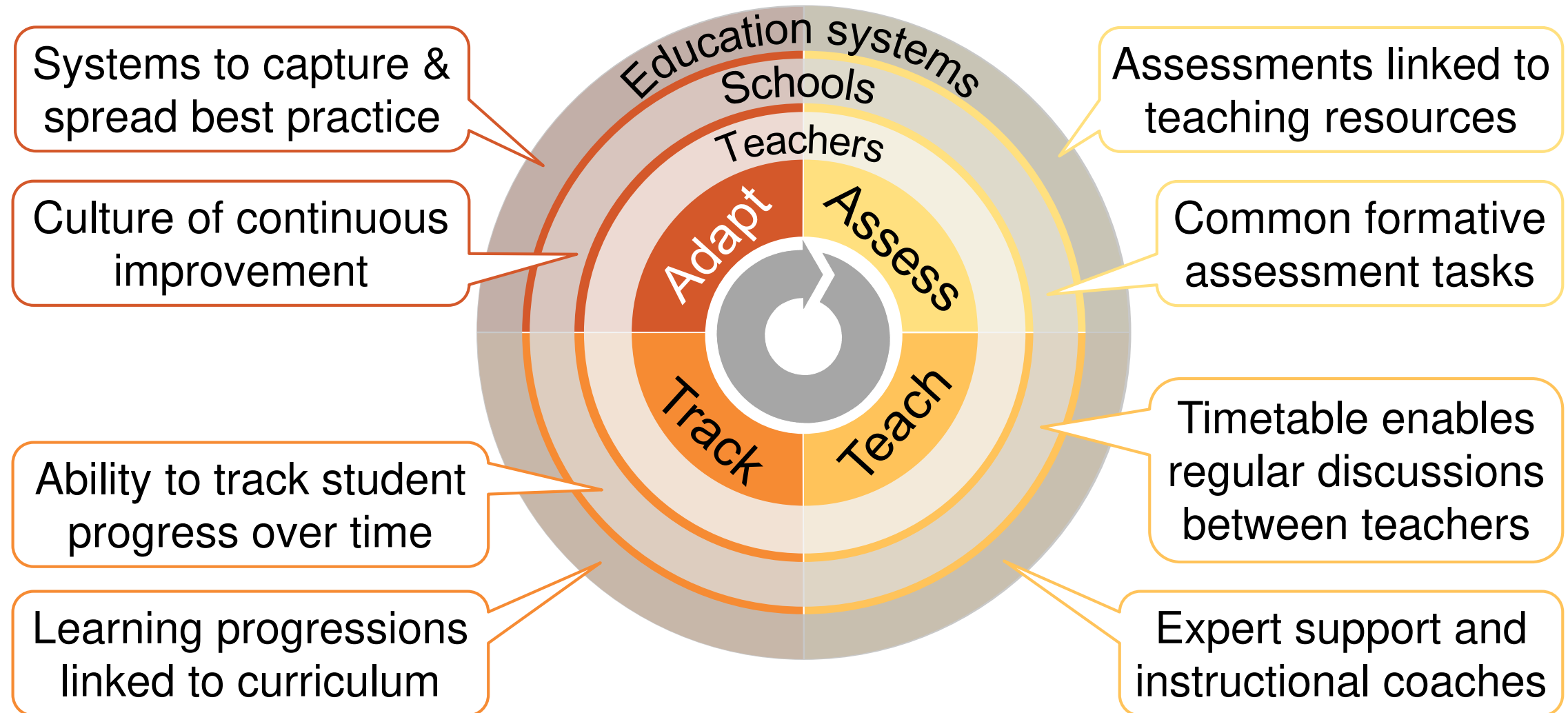
Start with the student: Targeted teaching



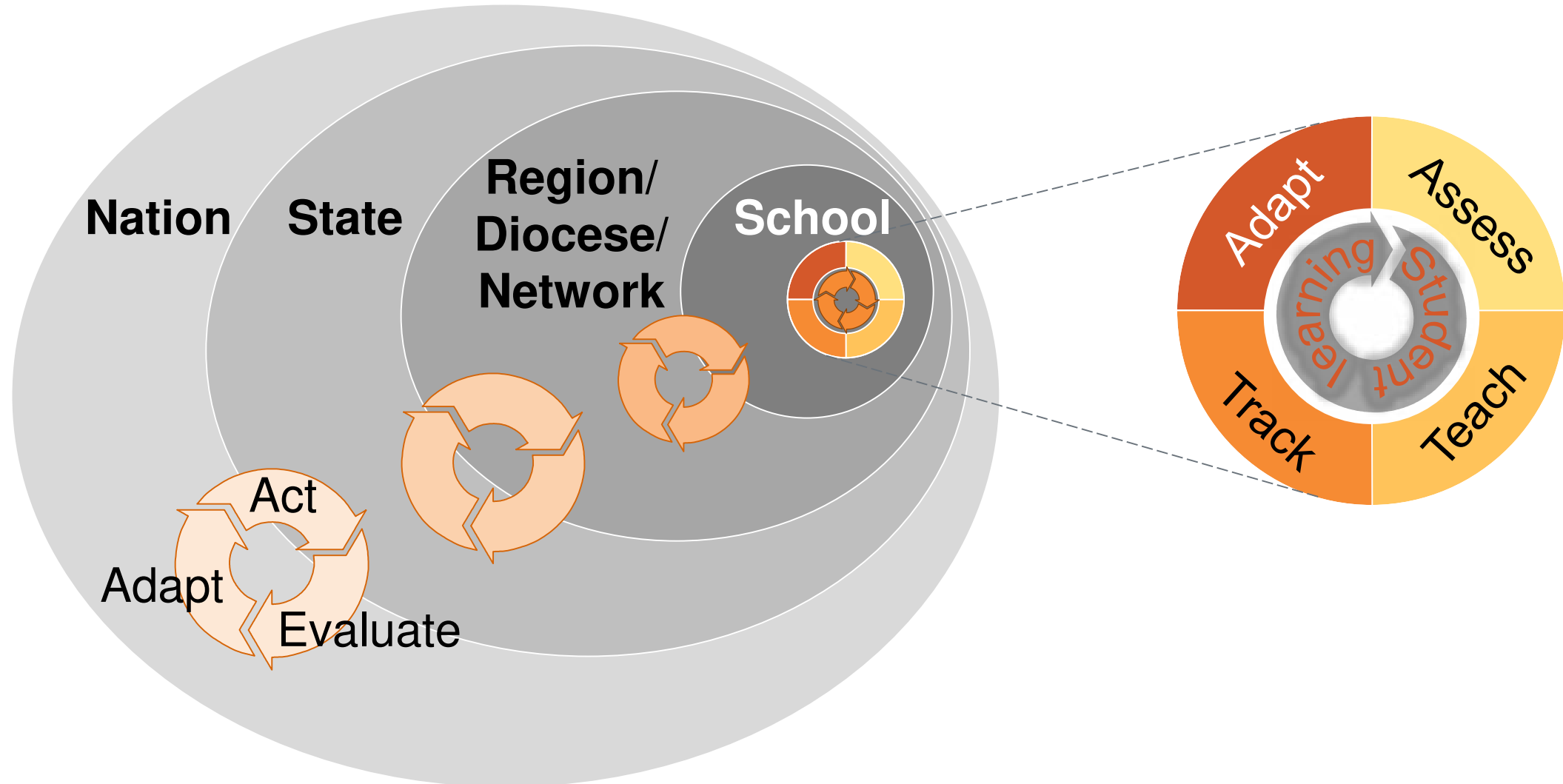
Bright Vale – use of NSW Literacy Continuum

 Education & Communities		Prior to school				End of prep		End of Year 1
Reading Involves recognising words automatically, reading in a phrased and fluent way and navigating texts to create meaning. "Texts" include oral, aural, written, visual, electronic and multimodal texts.		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
		Recognises own name Engages in shared reading of familiar texts with repeated language patterns Spends time looking at books and other print material Tells a story based on pictures or names pictures Attempts to read words in the environment	Reads one or two words in environmental print/texts Reads some words in a sentence correctly. Holds a book the right way up Differentiates between writing and pictures Points to words using one-to-one correspondence when 'reading'	Reads one or more sentences correctly in environmental print/texts Reads one or more sentences correctly in a simple book Uses context to predict meaning in texts and supplement decoding attempts Reads words using known letter/sound relationships	Reads all or most of a more challenging story book Maintains fluency when reading texts with varied and irregular text and image placement Pauses or hesitates when meaning is disrupted when reading Reads aloud with increasingly appropriate pitch, intonation and fluency	Reads texts with varied sentence patterns and several lines of text per page. Demonstrates increased fluency by recognising and decoding words automatically when reading familiar texts. Recognises when meaning is disrupted and attempts to self-correct when reading. Reads fluently and accurately with attention to punctuation.	Understands that pathways for reading literary and factual, print and screen texts can be navigated in different ways. Self-corrects when meaning is disrupted, e.g. by pausing, repeating words and phrases, rereading and reading on. Reads aloud with fluency and phrasing, adjusting pace, volume, pitch and pronunciation to enhance meaning and expression (RR level 16–18).	Understands text features such as illustrations, diagrams, tables, maps and graphs to enhance meaning Automatically integrates a range of information, e.g. meaning, grammar and letter/sound relationships to read in a phrased and fluent way. Knows that literary, factual and screen texts need to be 'read' in differing ways. Responds to punctuation and adjusts expression to enhance meaning when reading aloud.
<div> <div></div> Class 1S <div></div> Class 1A </div>		 <p> Jordy (Class 1S) reaches Cluster 4. Pete (Class 1S) reaches Cluster 5. Dani (Class 1S) reaches Cluster 6. Hugh (Class 1S) reaches Cluster 2. Tim (Class 1S) reaches Cluster 4. Brendan (Class 1A) reaches Cluster 4. James (Class 1A) reaches Cluster 3. Gabby (Class 1A) reaches Cluster 4. Cameron (Class 1A) reaches Cluster 4. John (Class 1A) reaches Cluster 4. </p>						

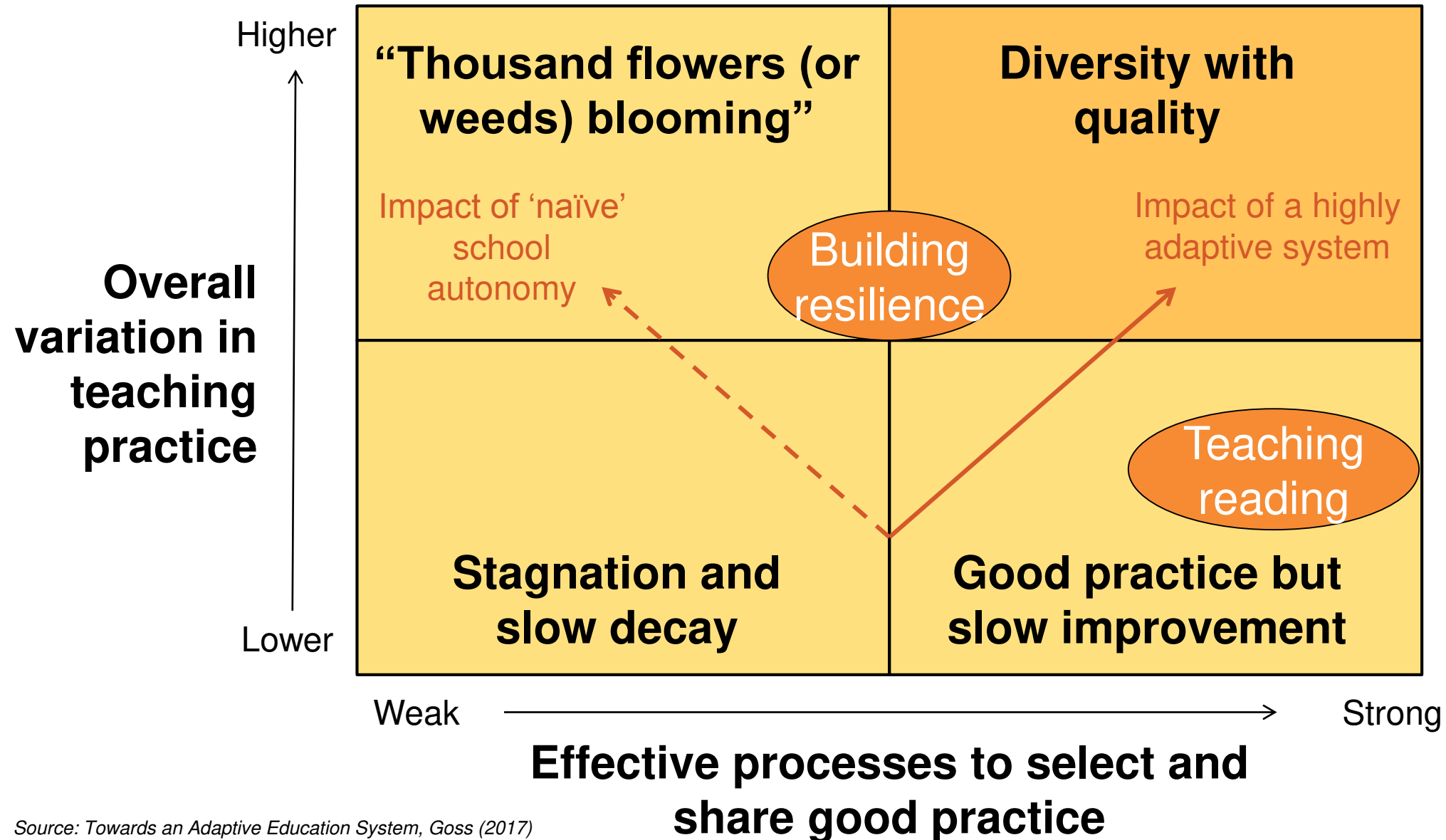
School-level learning needs system support



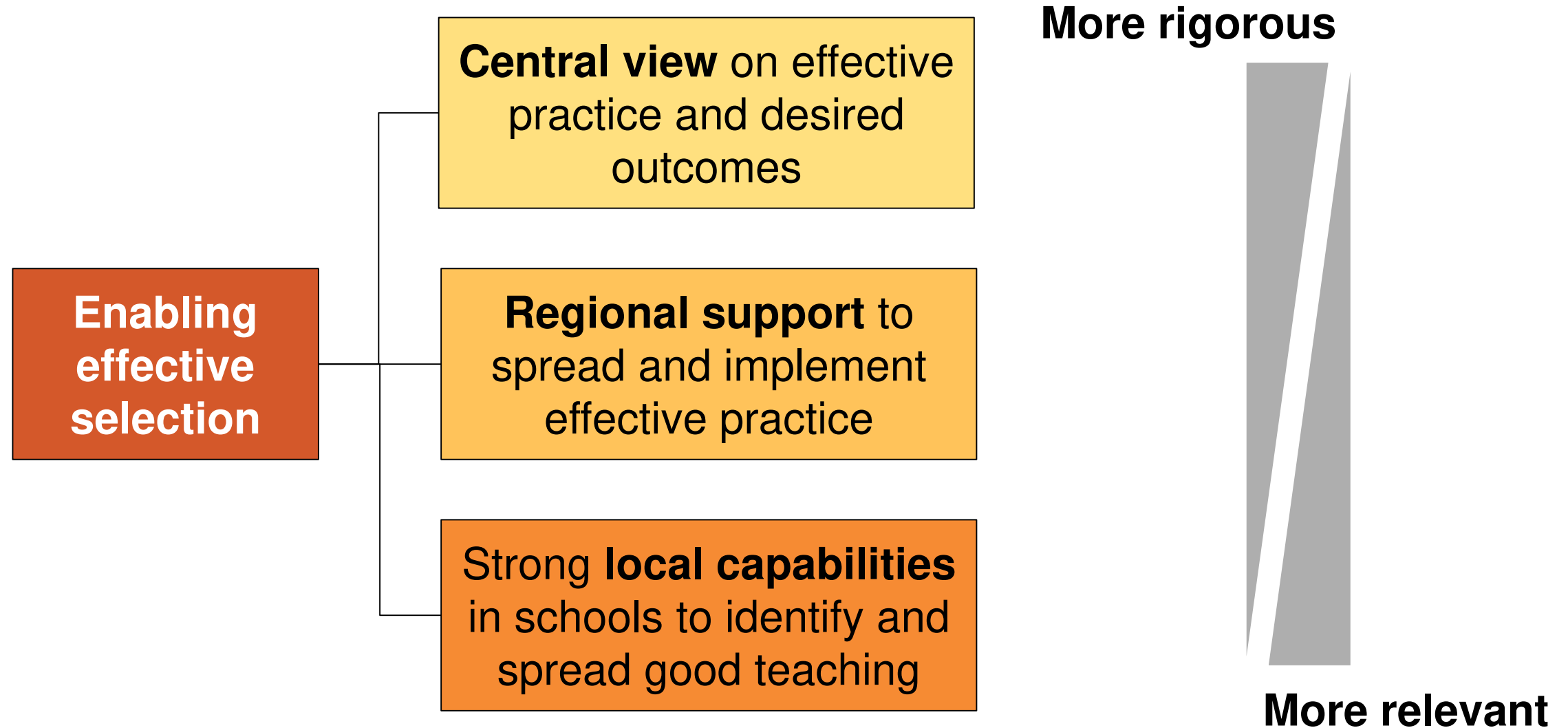
System learning needs nested feedback loops



Selection is the critical step



Three levels of capability needed



Five 'guide-posts' for future reform

- 1. Better data in the hands of teachers: trusted, timely, practical**
- 2. Invest in the most expert teachers**
- 3. Optimise practice in core areas...**
- 4. ... and innovate more systematically for a changing world**
- 5. Focus more on system design**