

The On-Balance Issue

- The danger of “either/or” teaching.
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The power of “yet”

The Insightful Classroom

Regular Insights, Tips and Pointers for Australian Maths Teachers

The On-Balance Issue

Balancing your program between
explicit and problem-based approaches

>>> *The danger of “either / or” approaches in teaching*

In 1997 a landmark study in the UK set out to define effective teaching using student improvement data... The findings may come as a shock.

When I first started researching effective teaching I remember being horrified at the lack of student data that was used in educational research papers. Mostly, it seemed that researchers just came up with a theory, wrote the background for why it might work, gathered a few example quotes from a handful of kids and then published the papers... and nobody ever checked to see if the theory actually worked to improve results before pumping it out *en masse* in our classrooms. Seriously scary stuff! Then I came across a study by Mike Askew and his team¹ in the UK, who analysed quantitative data from over 2000 students and 90 teachers, and everything changed. They started off by looking for effective teachers, not according to a theory, but according to improvements in student results over 6 months.

In a nutshell, they found that what teachers believed about learning had a profound influence on how effective they were. Unsurprisingly, their beliefs dominated their actions, and that determined how effective they were! The study started by trying to find out what highly effective teachers had in common, so they classified all the participating teachers into three groups:

- ✗ **Discovery-oriented beliefs:** “Learning of mathematics happens when students are ready for it and discover it for themselves.” e.g.: *play-based maths, everything in a context, everything hands-on.*
- ✗ **Transmission-oriented beliefs:** “Learning of mathematics happens when teachers explain clearly and concisely and when students practice routines and procedures.” e.g.: *direct / explicit explanations.*
- ✓ **Connectionist-oriented beliefs:** “Learning of mathematics involves both valuing pupils' methods and the teaching of strategies, with an emphasis on establishing connections within mathematics.” e.g.: *both exploring and explaining rather than just one approach or the other.* >>> *Continued on page 4*

¹ Askew, M., Brown, M., Rhodes, V., Johnson, D., & William, D. (1997). *Effective teachers of numeracy. Final report.* London: King's College. Download the entire paper here: <http://musicmathsmagic.com/page2/files/EffectiveTeachersofNumeracy.pdf>

>>> Keeping life in balance when work seems to keep growing

*Have you had a long and tough term?
Let's talk about how to survive the stress.*

Sometimes the holidays just feel like breathing room before starting the next big push. Life can feel a lot like a pendulum swinging – you just get the balance between work and home right and then it all moves again.

If you're anything like me, you probably have a bit of trouble putting work down at the end of the day, or possibly find yourself awake at midnight suddenly fretting but not sure what about.

At the end of semester with marking and reporting piling up the pendulum tends to swing heavily in the work direction. It's important to balance that out and holidays are a great time to do that, however, relaxing alone is not going to help us survive the next term in better shape. We need to be able to put work down and stop worrying about all those jobs to do, confident that all will be handled when the time comes.

Dealing with the stress:

A couple of years ago a friend recommended the book, "Getting Things Done" by David Allen. It's written for busy people who have more complex jobs/lives than the average To Do list can handle. I've adapted his system into one that works pretty well for me. I'm now (mostly) able to put stuff down and actually have time with the kids that isn't spent with my head elsewhere.

How it works:

The system has an **inbox** for any unsorted random jobs (e.g. middle of the night thoughts), a **next actions** list (all the next actions that you need to take), a **today** list, a **projects** list (any job with multiple parts) and a **someday** list (next month or later).

Setting it up:

- **List it:** Write all current jobs that you can think of, not sorted in any way. This is your "**inbox**" of unfiltered thoughts.
- **Sort it:** rewrite your inbox list into "**next actions**" – actions that you need to take (e.g. "Find last month's pay advice", "Send email to Jan"). Major jobs can now be listed as "**projects**", but don't brainstorm them further just yet. For example, "Home jobs" can be its own project. These projects aren't necessarily permanent categories – you can add any extras whenever you need them. Any tasks that are not for this month are put in your "**someday**" list so that they stop bugging you.
- **Brainstorm it:** Brainstorm all of the Projects: write next actions that you need to take.
- **Order and prioritise it:** For each project, organise the jobs into the sequence that they need to be done. Decide which are going on your "today" list.
- **Track it:** you need a system for keeping all your lists organised. This can be set of hand-written lists in a single book with sections. 1-2 pages per project. Personally, I use an app called [Things](#) for my iPhone. It syncs with my reminders, so I can tell Siri "add reminder: phone Sam" and "Phone Sam" will turn up in my inbox so I can't forget!

Using the system:

Add any new thoughts to your inbox. Each day, sort the inbox to next actions, projects, today or someday. Each day, check your projects list and allocated jobs to today. Each week or month, check your someday list. Then breathe - you can't lose anything now.

We want to hear your stories too!

Why not share your own favourite teaching moment with fellow teachers on our [Facebook group, Maths Matters?](#) We'd love to hear your stories and share ideas together.

New YouTube channel: Why Maths? >>>

JCU Maths staff have put together a series of videos starring local people on why maths is important!

Check them out at [this link](#).

Our favourites:



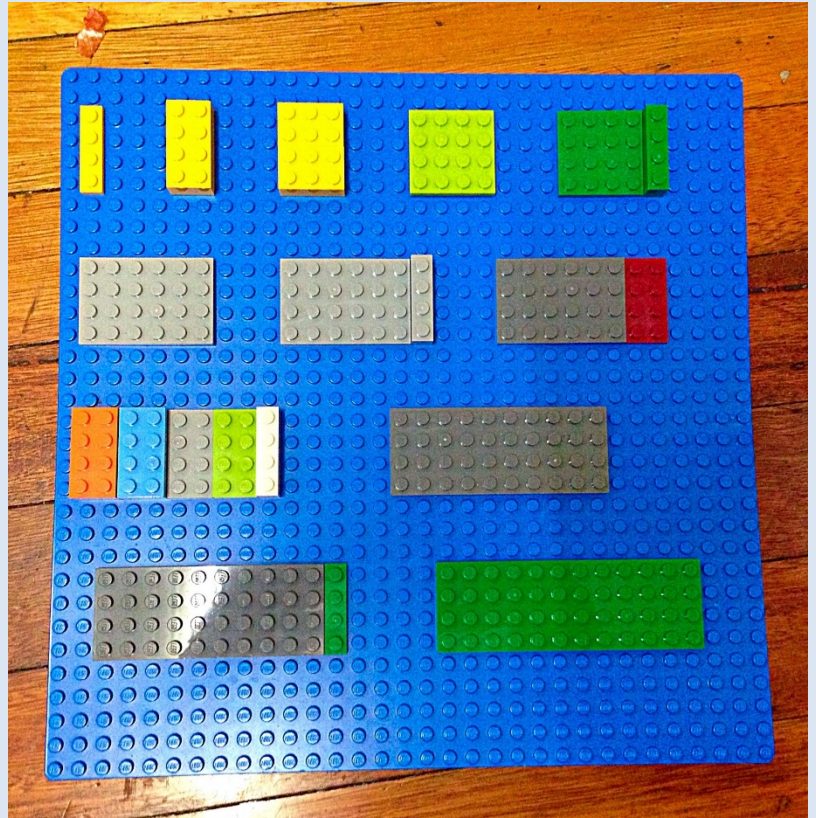
Paul Bowman from the NQ Cowboys



Renee Curry, vet from Tully

Fun ideas for >>> *Multiplication and Division Facts*

1. Lego mats are great for making arrays! This one shows the “fours”. Once you’ve built it, take a photo, print it out, and write the facts for each one beside it. And by the way: the factors are on the side, the number of dots in the middle is the multiple. Prime numbers can only make a single line, but Composite numbers can make more than one array.
2. Go on an array hunt in your classroom or as a homework task! Arrays are everywhere – from your window panes to the layout of the apps on your phone. Why not see how many you can find?
3. Take a photo of a really big array (e.g. the pattern covering a curtain), break it into manageable chunks, and work out how many dots there are altogether!



Teaching ideas >>> *Length for little kids*

Wanting some inspiration for next term? Here are a few ideas for teaching length to littlies – and they are all developmentally sequenced to make life easier!

Teaching length has the following steps:

1. Direct comparison
2. Indirect comparison
3. Using a unit to measure with no gaps or overlaps
4. Using a uniform unit to measure accurately
5. Using a standard uniform unit to measure accurately

Direct Comparison:

Placing two objects next to each other to see which is longer.

- Who has the longest pencil?
- Who is the tallest?

Indirect comparison:

Using a “go between” to compare the length of two objects that cannot be easily placed next to each other (e.g. using string to compare the width of a door to the width of a table).

- Is the table longer than the door?
- Is our classroom longer than the one next door?

Using units:

Using smaller objects to measure a larger object (e.g. stepping out the length of the classroom)

- How many steps long is our classroom?
- How many shoes long is our classroom?
- How many hands tall are you?

Using uniform units:

Determining that the same unit must be used repeatedly to measure (e.g. the same shoe, not one from each child), and that the unit must be appropriate for the size.

- Why do we have different answers for how long the classroom is? What can we do about it? How about we all use Jen’s shoe?
- Why does James have less hand prints than Amy when she is shorter? Maybe James has a bigger hand? Should we all be measured with Amy’s hand?

Using standard units:

Determining that the same unit of measure should be used everywhere to allow comparison.

- Measuring large and small lengths using centimetres or metres.

While very few teachers fit exactly into one type, *“it was clear that those **teachers with a strong connectionist orientation** were more likely to have classes that **made greater gains** over the two terms than those classes of teachers with strong discovery or transmission orientations”².*

What did the **highly effective teachers** do?

- Highly effective teachers used challenging problems for all students, not just the high-achievers. These were not simply word problems and specifically did NOT involve teaching strategies to simplify or code the problems to make them easier. The problems did involve the students working out maths that they had not yet been taught and requiring them to think hard about tricky maths.
- Highly effective teachers dealt with the underlying misunderstandings and misconceptions as they occurred, by helping students to think them through.

They did NOT go back to explain the method again, but helped the students to change their own minds. To read about what misconceptions are and how to fix them quickly and effectively by using questioning, [click here](#).

- Highly effective teachers used students’ methods as the basis for building connections to the more efficient, formal strategies. Only *then* did they practise the formal strategies to solidify the connections.

What does this mean for us?

It’s dangerous to think that either Discovery/Constructivist or Direct/Explicit approaches alone hold all the answers. If kids just explore randomly, they are unlikely to discover the underlying patterns and principles that make maths work. After all, we can’t expect them to recreate the entirety of the development of mathematical understanding throughout history by themselves. On the other hand, if we only ever tell kids what to think, when are they going to have to think for themselves and build new connections?

We need to stop being afraid to ask challenging problems:

- Instead of saying, “it’s ok to be wrong”, say, “Great! Now we know the question is hard enough to grow our brains.”
- Use challenging problems to introduce new topics.
- Use challenging problems for all kids, not just high-achievers. Challenging problems accelerate learning, so they are essential for kids of all abilities, not just high achievers.

We need to think of problem-solving as an experiment to find out what works and what doesn’t

- Be patient! Instead of leading students so quickly to the right answers, allow time for students to test out their own ideas and discover what doesn’t work.
- Once we have found an idea that does work, link it with formal explanations and strategies and make connections to what students already know.

We need to explain and practice once students have done the thinking:

- Instead of explaining at the start, explain towards the end. Practice skills to build fluency. Use these skills next time in a new way when solving another problem.

We need to focus on the connections instead of covering content:

- Focus on similarities, differences and relationships between big ideas rather than on trying to do everything.

Effective teachers both explore and explain – it is simply not an either/or situation.

² Quote from the **Paper presented at the British Educational Research Association Annual Conference in 1997** from the same study: <http://www.leeds.ac.uk/educol/documents/000000385.htm>

>>> This year in review

Quite a few of you have been asking when the next edition of *The Insightful Classroom* was coming. We thought we'd let you in on what we've been doing over the past year...

It's been a really fun year, with lots going on. Here's a quick rundown of what we've been up to:

Writing a whole new series of books

This year we've written a new series of books designed to help kids catch up quickly on concepts that they've missed. It's called *Interventions in Mathematics*, and has five books on fixing misconceptions in:

- Addition and Subtraction
- Place Value to 1000
- Multiplication and Division
- Fractions
- Decimals and Percent

What's more, they've already been nominated for an Educational Publishing Award. We've also been using them as part of larger-scale projects involving multiple schools and the student improvement data in PAT Maths has been incredibly exciting.

To check them out, [click here](#). You can also download the diagnostic tasks directly from this link which you can try out with your own kids.

Creating free online learning modules

We've been wanting to be able to help teachers who we can't get to for in-person professional development for quite a long time. This year we've managed it! We have created free online learning modules on Place Value that teachers can access for anywhere at any time. They are set up to email through certificates with the AITSL standards on them, so that you can use them for your professional registration body.

[Click here](#) to see them. EQ teachers, you need to access the modules from home due to firewall issues.

Webinar series

We've also been running a highly successful webinar series, with great feedback from all involved. We are starting a new series in August, so check out the side bar for details. >>>

Running Partnership projects

Some of our favourite projects from this past year have been working with South Australian schools in Partnership projects. Last year we were lucky to work with grade 3/4 teachers from the Holdfast Partnership. As part of the project we wanted to see how much impact we could have on kids' maths understanding with two days per week of intervention, so we used PAT Maths data to check that we were really making improvements. It was fantastic to celebrate with everyone involved when we saw these improvements from May to October:

PAT Maths stats from May:

- Only 16% of grade 3s met the benchmark
- Only 10% of grade 3s were 10 above the benchmark

After only 6 months...

- **56%** of grade 3s met the benchmark
- **22%** of grade 3s were 10 above the benchmark

For those of you who are into stats:

- Effect size = 0.69 in 6 months
- t Stat = 5.8 (yep – seriously!)
- $P < 99.999\%$

To check out the full report for yourself, [click here](#) to download a copy. If you are interested in a similar project for your partnership, email: tierney@kennedypress.com.au and set up time to chat about possibilities.

Numeracy
Plus

2016 Web Conference Series

New webinar series starts August 2016

We are starting a new webinar series this term, with a special focus on working together in partnership:

Topics for Teachers:

1. How and why problem-based teaching works
2. Developing Number Sense: Key number concepts F-3
3. Developing Multiplicative Thinking and Proportional Reasoning: Key number concepts 4-9
4. Rotation groups
5. Behaviour management
6. Assessing the proficiency strands
7. Assessing fluency with the achievement standard
8. Risk-taking, persistence and resilience
9. Problem solving and reasoning
10. Planning for next year

Bonus topics for Leaders:

11. Improving NAPLAN without compromising great teaching
12. Implementing change when it's hard

Mentoring for partnerships:

Schools working together in groups of five or more qualify for additional free mentoring sessions.

[Click here](#) to find out more or register your school.

A word to HOCs

The Power of “Yet”



Tierney Kennedy -
Education Consultant,
Author and Editor

I’m sure we’ve all heard of “the power of Yes”, but do you know about “the power of Yet”?

“I can’t do it!”
“No – you can’t do it Yet!”

I’m sure by now we’ve all heard of the brilliant work by Carol Dweck and Jo Boaler on the impact of having a growth mindset on achievement, but sometimes it can be tricky to help turn a class (or even just one student) around.

A brilliant teacher from Tassie introduced me to the idea of adding “Yet” to the end of phrases like the one shown above. It’s a powerful yet simple way of helping to change a child’s mindset from having a fixed mindset about their abilities (“I am born this way and can never change”) to having a growth mindset (“challenges grow my brain”).

Here are a whole bunch of other ideas that you can try to build resilience and persistence:

1. If you already know the answer, then it’s not hard enough.

This idea works to disrupt a child’s beliefs that getting the answer right is the most important thing. The most important thing in maths is to think HARD, and that means working at a question that you got wrong, not one that you got right.

2. Who has changed their mind already? Who has changed their mind a lot?

Try asking the kids in your class to raise their hands if they have “already changed their minds” about half way through your maths lesson. Celebrate this! Be excited that kids are thinking really hard. Normalise getting the answer wrong and then thinking it through.

In The Next Issue >>>

The Inspiration Issue

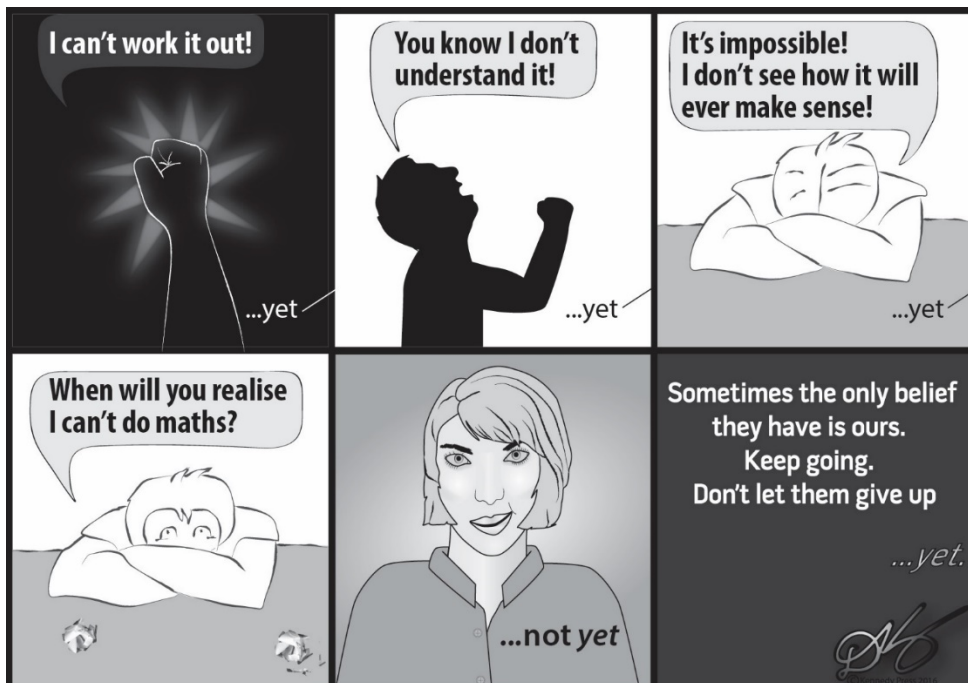
Your stories... stories of success, of struggle and of growth.

Principals and leaders: advice for whole-school growth.

3. Do you want a super-tricky one or just a bit tricky?

For a student who is struggling with motivation in maths, solving a problem that they perceive as tricky is very important for helping them to feel smarter. If we give them a question that they perceive is easy and they get it right, they don’t see this as an achievement. If they get it wrong, they feel stupid. On the other-hand if the question is tricky and they get it wrong then it is “to be expected” and no big deal, but if they get it right then they become really excited. Tricky questions are very important.

Tierney



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Facebook Group!

Maths Matters is a Facebook group designed especially for teachers. We offer tips as well as space to ask your real questions. Search for *Maths Matters* and “like” us.

Name:
 School:
 Address:
 Town: Postcode:
 State: Email (to receive invoice):
 Telephone:
 Order No (if applicable):
 Signature:

Order Form:


Fax: (07) 4422 0004

Email: admin@kennedypress.com.au

Mail: PO Box 1879, Townsville QLD 4810

ABN: 33 139 622 049



	Price (incl GST)	Number of items	Subtotal
Fixing Misconceptions in Addition and Subtraction	39.95		
Fixing Misconceptions in Place Value to 1000	39.95		
Fixing Misconceptions in Multiplication and Division	39.95		
Fixing Misconceptions in Fractions	39.95		
Fixing Misconceptions in Decimals and Percent	39.95		
Game set: all five games, with instructions for 25 games to play in rotation groups. Saves \$15.	74.95		
 Teaching Resource Pack: Contains a copy of the Teaching Resource Book, Thinking Journal and Blast book (if applicable) for one grade. Contact Kennedy Press for whole-school workbook offers and pricing.	99.95 per grade	Which grades? 1 - 2 - 3 - 4 - 5 - 6 - 7 -	
Book and Game Subtotal (Includes GST):			
Individual website subscription for one teacher for 12 months. <u>Email addresses of subscriber(s):</u>	249.95 All grades access	How many teachers?	
Professional Development Videos: Teaching Back to Front – two DVD set with 8 lessons	200.00		
Subtotal (Includes GST):			
Postage and Handling for books and games: 5% of book and games subtotal, minimum \$12			
Coupon code or other discount if applicable			
TOTAL			