



The Wilkie Way

Newsletter July 2019

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Thinking about Maths PLD 2020

Over halfway through 2019 and I am already planning for 2020 as I will be out of the country from December through to the beginning of February.

If you are considering Mathematics Professional Learning for your school next year then please get in touch with me now. I have a list of schools from 2018 whom I will be making contact with in the next few weeks. I work on a first come first served basis with roll over schools having first option. As I have a few schools coming to the end of their PLD this year there are some spaces for next year.

I can deliver centrolling funded PLD as an accredited facilitator (ACC N0. 654). I will also have completed MOE training for facilitators in using the curriculum progress tools for curriculum design.

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Maths and The Arts

Traditional school maths with endless practicing of calculating. The standard written algorithms are procedures that have been taught for endless years since the introduction of the base ten algorithmic number system (About 2000 years).

In making maths modern - mental strategies were the new way of solving - these quickly became more procedures for students to memorise (or not).

Why does school maths have such an unhealthy fixation with procedural knowledge? The era of human computers has passed, so many of the arbitrary skills promoted by school maths are also archaic - long multiplication and long division, adding and subtracting fractions to name just a few.

We are presented with acronyms STEM and now STEAM which implies Maths is separate to Science, Technology and Engineering and now Art too.

While it is relatively easy to dismiss the stupidity of thinking mathematics is unrelated to science, technology and engineering let us now consider Mathematics and the Arts.

Bertrand Russell (Nobel Laureate, Philosopher, Mathematician) once said:
"Mathematics, rightly viewed, possess not only truth, but supreme beauty - a beauty cold and austere...sublimely pure, and capable of stern perfection such as only the greatest art can show."

GH Hardy Another famous mathematician in the earlier part of the 20th century known for being a harden purist advocating for rigour and abstraction, ultimately declared that: "I am interested in mathematics only as a creative art."

If mathematics is an art form, what are mathematicians. Hardy called them "makers of patterns". The late Maryam Mirzakhani, the only female recipient of the Fields Medal (the highest accolade in mathematics) was often mistaken by her daughter for an artist.

To mathematicians, school maths is something of a desecration of their subject. There is no doubt the rise of numeracy has crowded out more conventional arts subjects but it has also concealed the true nature of mathematics.

Paul Lockhart (American school maths teacher and research mathematician) wrote in his book A Mathematicians Lament - "No society would ever reduce such a beautiful and meaningful art form to something so mindless and trivial." Even where calculation has its place, the mathematician seeks rich representations that illuminate the procedures they call upon.

Do you see times tables as just a matter of memorising number facts (learn them by rote) or do you spend time exploring the myriad of patterns within a multiplication table and between the multiplication tables.

We spend alot of time talking about 21st century education - I see modern learning environments, I see school maths curriculums as completing workbooks. I see students working on laptops and maths apps but the mathematics I see them doing is still archaic, procedural and not the kind of mathematics our students need.

The kind of mathematics that our students need, that our world is increasingly dependent on, is much more aligned to its artistic tenent. I think this is why STEM has become STEAM. Skills like curiosity, persistence and resilience are not divorced from mathematics, they are the very traits that mathematicians through the ages have brought to their problems.

As with any art, there is a subjective element to deciding what should go into a mathematics curriculum, or how to assess these broader skills. However that is no excuse for persisting with an outdated brand of the subject that brings joy to so few and value to fewer still.

The history of mathematics is entwined with the history of technology. Humans have precedent for updating their ways of doing mathematics based on the tools available to them. (OK the complete change from using Roman numerals to the base 10 system took about 200 years). With the technologies now available at our fingertips, we can put calculation in its rightful place as the footnote to mathematical thinking power.

Calculation is simply the price we once paid to do mathematics.

When maths anxiety is a real issue for many people, and so many others show an indifference to a subject that promises such immense power and beauty, the price to continue with a fixation on procedural calculation as the backbone to school mathematics is too high.

Samantha, a year 5 student once said to me: " I love doing sums (calculations) because you don't have to think."
How true - once a procedure is memorised no thinking is required.

While the content is the curriculum, how you choose to teach it to your students is dependent on your own creative flair and knowledge of the subject matter.

My own daughter's advice to Primary school teachers given 5 years ago was
"Calculate less, estimate more"

Mathematics will never be replaced by the Arts.
Mathematics is an art, and it is time we embraced it as one.

Answer to last months challenge:

Can you remember 1978?

This was a very special year for playing with numbers
When you add 19 and 78 you get the two middle digits 97
When is the next very special year for playing with numbers?

I don't think we will be around for the next one in 2307 $23 + 7 = 30$



The Wilkie Way Teacher Challenge



Procedure or trick?

Multiplying a two digit number by 11

$$26 \times 11$$

$$84 \times 11$$

1. Separate the two digits

$$2 \quad 6$$

$$8 \quad 4$$

2. Add them together

$$2 + 6 = 8$$

$$8 + 4 = 12$$

3. Put the sum between the two digits

$$286$$

$$924$$

(carry the 1 to the 8)

Does this always work - check using a calculator

Why does this work?



New resources for Wilkie Way members
School subscription just \$275 p.a
contact charlotte@ncwilkinsons.com to subscribe by invoice
Individual subscription \$30 via paypal at www.thewilkieway.co.nz



**The Wilkie Way
Maths Gym**

Multiplication & Division

Name _____

Class _____



- Coaching Session
- Warm Up
- Workout
- Cool Down

Session Six
Doubling x2 x4 x8

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I have been working on completing the **Multiplication and Division Maths Gym booklets**. This is a series of lessons and practice activities aimed at learning support for older students who have not understood multiplication and division. (Moving students from Multiplicative thinking set 3 to set 4 of the learning progressions) They are designed as A coaching session (teaching), Warm Up (Guided practice), Work Out (Independent Practice) and Cool Down (Homework/follow up activity or game)

Currently on the site:

- Session 1: Understanding arrays
- Session 2: Two times table
- Session 3: Ten times table
- Session 4: Five times table
- Session 5: Exploring division

Agility Course One: Activities for practicing recall of $x 2$ $x 5$ and $x 10$
Session 6: Doubling $x 2$ $x 4$ $x 8$
Session 7: Three times table

Professional Learning and Learning Progressions

This page is looking a little different - hopefully making it easier to find what you are looking for.

I have updated all the Wilkie Way progressions to align them with the Learning progressions Framework.

- Addition & Subtraction
- Multiplication & Division
- Fractions
- Place Value Teaching Points
- Geometry
- Measurement

I have combined the addition and subtraction progressions with the multiplication and division progressions and the fractions progressions to create **Number Operation progressions by Curriculum level**. This should help you to deliver a balanced number programme ensuring progress in all aspects of number as concepts are interrelated.

- Number Operations Level 1 - Early Level 2 (Guide: Years 1 - 3)
- Number Operations Level 2 - Early Level 3 (Guide: Years 4 - 5)
- Number operations Level 3 (Guide: Years 5 - 7)
- Number Operations Upper Level 3 - Level 4 (Guide: Years 7 - 8)

This is another way of looking at the progressions combining all the learning progressions associated with the Number & Algebra strand of the curriculum (Additive thinking, Multiplicative thinking, Using symbols & expressions, Patterns and relationships.)