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Maths and Reading

How many times have I heard teachers saying "we are assessing maths not reading". The teaching profession has failed to recognise that reading is an essential part of using mathematics in our everyday lives. Principals are now alarmed by the low pass rate in exam trials with year 10 students. They acknowledge the mathematics is at about the right level but the students are unable to access the maths because it is "buried" in words.

This is nothing new and researchers around the world have been saying this for years. For this newsletter I am referencing an article from the Journal of Mathematics Education June 2011 Vol 4 No 1 titled;

Maths Literacy: Are we able to put the mathematics we learn into everyday use?

(Bobby Ojose University of Redlands USA)

Maths literacy is the knowledge to know and apply basic mathematics in our everyday living. An important part of maths literacy is using, doing, and recognizing mathematics in a variety of situations. In dealing with issues that lend themselves to a mathematical treatment, the choice of mathematical methods and representations often depends on the situations in which the problems are presented. To effectively transfer their knowledge from one area of application to another, students need experience solving problems in many different situations and contexts.

The OECD publication, Measuring Students Knowledge and Skills (OECD 1999) lists the types of texts as part of reading literacy, which in part determines what constitutes mathematics literacy. The publication mentions as examples texts in various formats:

- Forms: tax forms, immigrations forms visa forms, application forms, questionnaires;
- Information sheets: timetables, pricelists, catalogues, programs
- Vouchers: tickets
- Certificates: diplomas, contracts etc
- Advertisements
- · Charts and graphs, iconic representations of data
- Diagrams
- Tables and matrices

Inorder to comprehend most of these types of text you need to bring knowledge of mathematical skills. Here is a list (Not exhaustive as knowledge is dynamic and technological advancement is forever changing)

Everyone should:

- be able to perform the basic operations of addition, subtraction, multiplication and division with whole numbers, fractions and decimals.
- know concepts such as ratios, percentages, roots, square roots, absolute values, reciprocals and exponents.
- should know the metric measures of length, area, volume, mass, time and temperature and how to convert between the measures,
- understand simple linear equations, plotting graphs of linear equation, slopes,
- know operations with positive and negative integers
- know the concept of proportional reasoning.
- should know the various area and circumference formulae for circles, squares, rectangles and
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triangles.

- be familiar with cartesian co-ordinate system in two and three dimensions,
- be able to convert size on a scale model or map to actual dimensional size.
- be able to do basic construction using a compass and straight edge.
- should be familiar with three dimensional shapes in terms of finding volumes and surface areas of shapes like cone, pyramid, prism, cylinder and sphere
- be able to find the measure of central tendancies when given a set of values
- be able to graph and interpret data as a histogram, pie chart, bar graph and line graph
- know probabilities based on theory and probabilities based on experiment
- compare risk factors in different situations

All of this list falls within levels 1 - 4 of the New Zealand curriculum and many of our students have the mathematical knowledge so why are they still mathematically illiterate?

This will come down to pedagogical practice and a focus on the competencies required for mathematical Literacy:

Right from year 0 we need to be considering:

Mathematical communication: expressing oneself in a variety of ways - oral, written, pictures, diagrams; understanding someone else's work.

Representations: Decoding, encoding, translating, distinguishing between, and interpreting different forms of representations of mathematical objects and situations as well as understanding the relationship among different representations. *(Materials are not because young students are kinesthetic learners)*

Symbols: Building an understanding of using symbolic, formal, and technical language and operations **Problem posing and solving:** Posing, formulating, defining and solving problems in a variety of ways **Thinking and reasoning:** Posing questions characteristic of mathematics, knowing the kind of answers that mathematics offers, distinguishing among different kinds of statements; understanding and handling the extent and limits of mathematical concepts.

Mathematical Argumentation: Knowing what proofs are; knowing how proofs differ from other forms of mathematical reasoning, creating and expressing mathematical arguments

Tools and technology: Using aids and tools, including technology when appropriate.

Unless we get back to actually teaching mathematics and not relying on computer programmes or apps for students to teach themselves, we will not solve the problem of mathematical illiteracy.

I sincerely hope the common practice model that will underpin our new curriculum "refresh" will place an emphasis on these competencies as well as a sequence for developing the knowledge and skills.

A sequence for knowledge and skills across the curriculum is relatively easy for mathematics as it is a fairly hierarchical subject. It is important to make connections between topic areas as seldom does a mathematical topic exist in isolation in the real world. Any sequence of work must provide the opportunity for explicit teaching, practice, application, discovery, and transfer.

No one resource will provide everything that should be included in your mathematics programme but having a clear sequence will ensure continuity and progression.

A good resource provides opportunities for explicit teaching, practice, application, discovery and transfer built into the design. Along with a focus on appropriate reading levels to develop reading comprehension including the building of mathematical specific vocabulary.

The Figure it Out series is a greatly under used resource (because it is not user friendly) that will really focus teachers and students on the need to develop mathematical literacy.

Maths Aotearoa + Wilkie Way + Figure it Out + NZMaths = A great maths curriculum to support the teaching and learning of mathematics in New Zealand schools.

Resources for Wilkie Way Members Subscriptions purchased at the online store at www.wilkieway.co.nz Individual \$45 - paid via paypal NZ School paid via invoice - complete form at online store Up to 100 students \$150+GST 101 - 300 students \$250 + GST 300+ students \$350 +GST Non NZ School \$400 - paid via paypal



Level 4a Answer booklets

- 1. Addition & Subtraction
- 2. Multiplication & Division
- 3. Fractions Decimals & Percentages
- 4. Decimal Addition & Subtraction
- 5. Base 10 Number System
- 6. Equations & Expressions

Level 4b 5 new workbooks:

- 7. Multiples & Factors
- 8. Fractions, Decimals & Percentages
- 9. Decimal Operations
- 10. Proportions & Ratios
- 11. Solving Linear Equations







October Featured Resource



- 78 practice workbooks available from the Wilkie Way members area
- Level 2 4 referenced to supporting Figure it Out activities
- Mini projects in levels 2 4 textbooks for application and transfer of knowledge and skills in contexts relevant to students (also useful for assessment)
- Level 1 has 200 activity cards designed to be used in both explicit teaching and play based situations.

To find out more about Maths Aotearoa go to edify.co.nz

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Problems with Books



Jack read 2 books every school day for a week. His sister Meg read 5 books every school day for a week.

How many books did Jack read?

How many books did Meg read?

How many more books did Meg read than Jack?

There are 185 books in the class library. If 19 children borrow 1 book each and 9 children borrow 2 books each, how many books are left in the class library?



Fran read 4 books with 252 pages in each book. Sara read exactly the same number of pages but she read 6 books.

If each of her books had the same number of pages, how many pages were in each of Sara's books?



There were 2035 book in the school library. There were twice as many non-fiction books as fiction books and 589 less comic books than fiction books. How many fiction books, non fiction books and comic books were in the school library?

