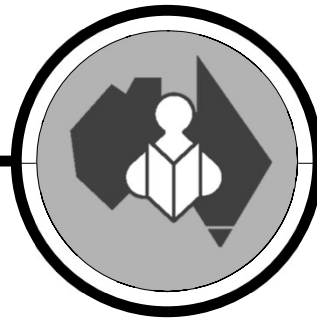


Learning Difficulties Australia

Learning Difficulties Australia is an association of teachers and other professionals dedicated to assisting students with learning difficulties through effective teaching practices based on scientific research.



www.ldaustralia.org



enquiries@ldaustralia.org



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[@LD_Australia](https://twitter.com/LD_Australia)

David Evans

Doctor of Philosophy (Uni of Oregon)
Master of Arts (Special Education)
Graduate Diploma in Special Education
Bachelor of Education (Primary)

Professor of Special and Inclusive Education
Sydney School of Education and Social Work
University of Sydney

Adjunct Professor, Universitas Pendidikan Sultan Idris, Malaysia

Bio: Originally a primary trained teacher, I have worked throughout my career to address the provision of inclusive educational environments that support all learners to receive a robust and dignified education in their local neighbourhood.

I have a particular interest in numeracy, and the instructional design features we can apply to ensure all learners are numerate.



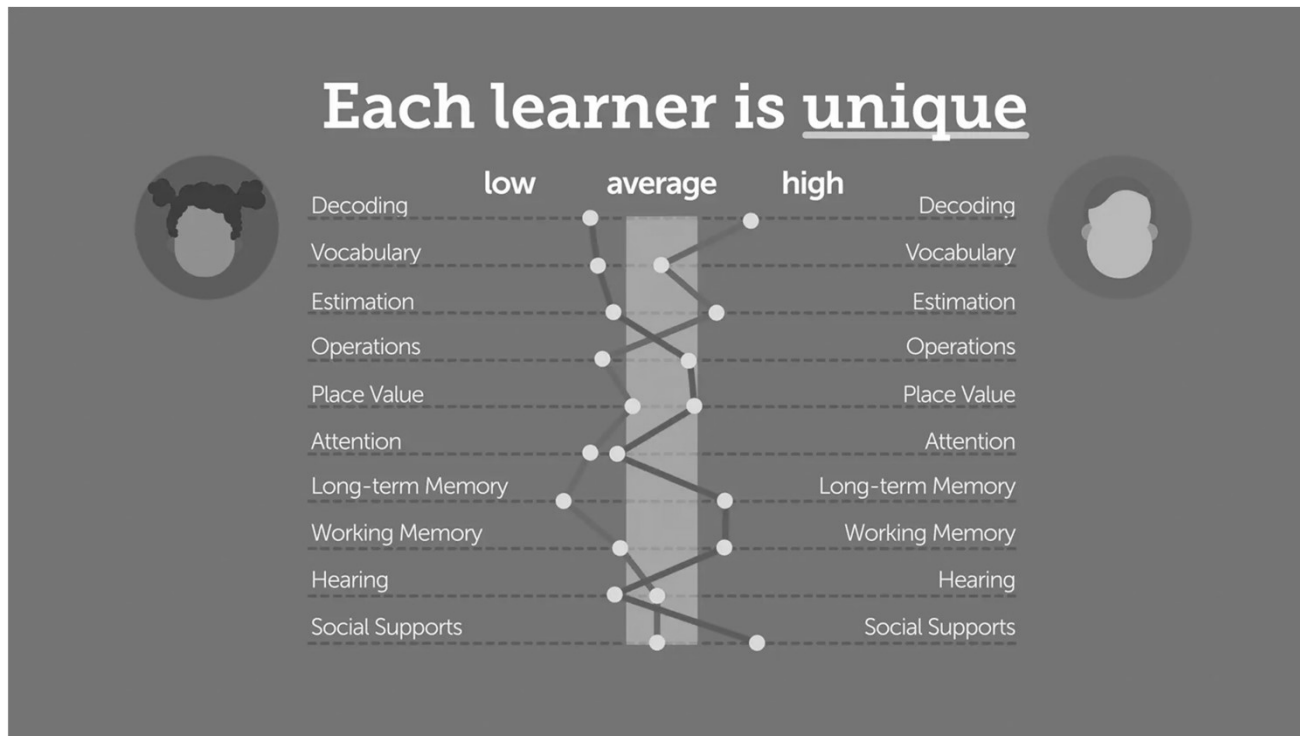
Enabling Numeracy for All Across the Curriculum

Assumption 1: Least Dangerous Assumption

- “the least dangerous assumption is to presume [every] student is competent to learn general education curriculum and to design educational programs and supports based on that assumption”
[Jorgensen, 2006 cited in Jorgenson et al., 2007, p.]



Assumption 2: Learner Variability



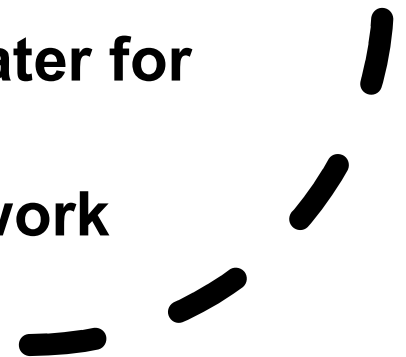
<https://vimeo.com/366279613>

Presumed Competence

Barriers

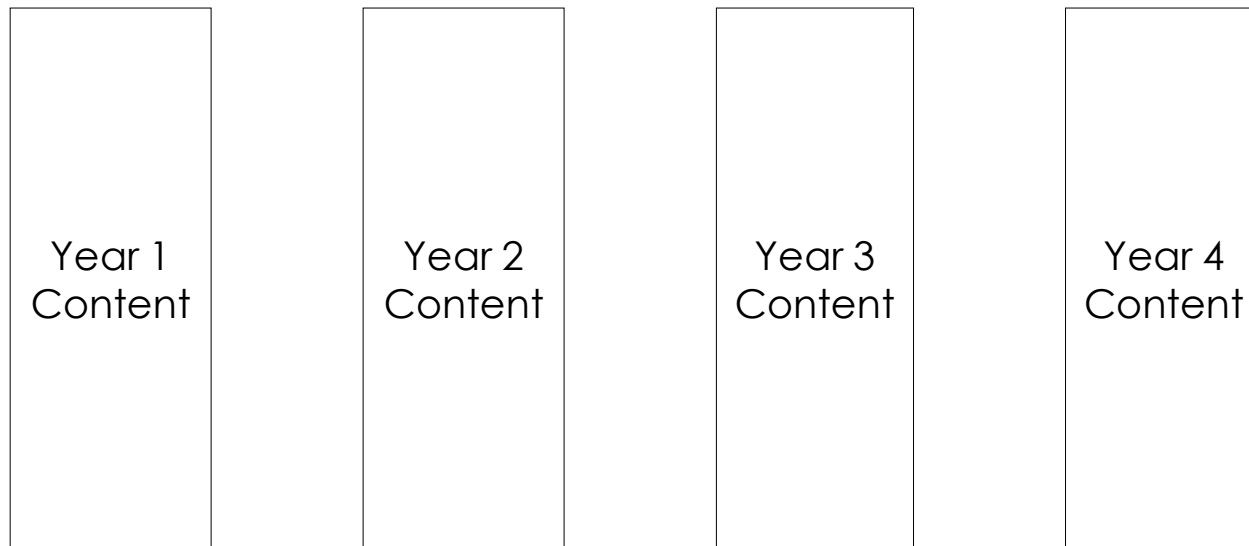
- **Curriculum is often designed for the “average” learner**
 - Designing for the average ...
- **Learners are seen in terms of ‘ability’**
 - ...
 - and not curious individuals seeking to solve tomorrow’s problems
- **Planning and teaching to cater for variability ...**

... is tough work



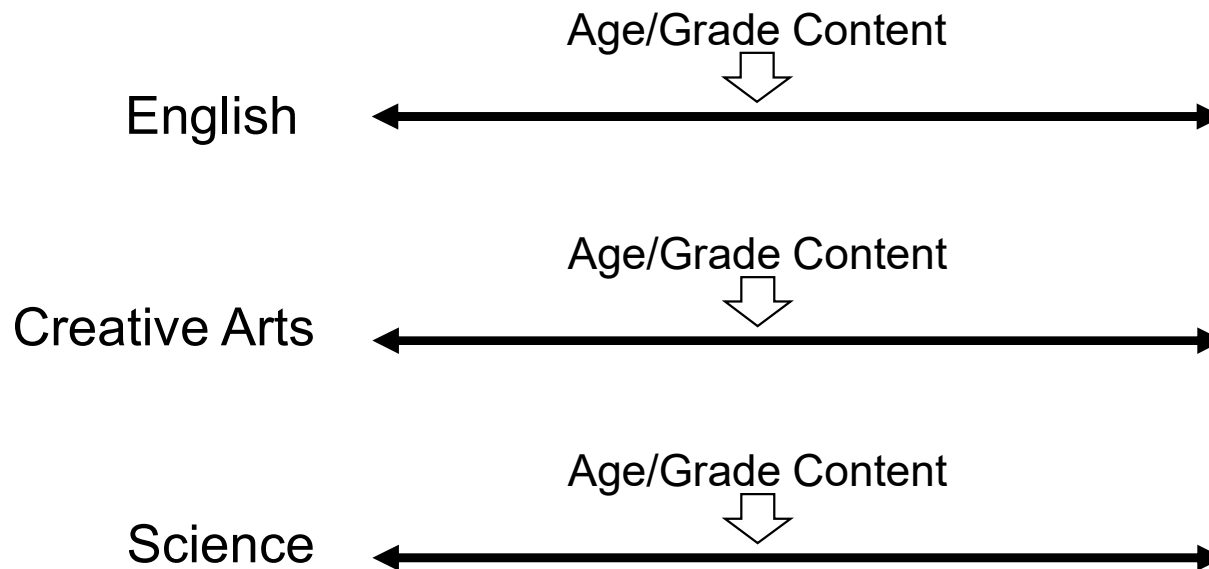
Assumption 3: Flexibility in the Curriculum Framework

Traditionally

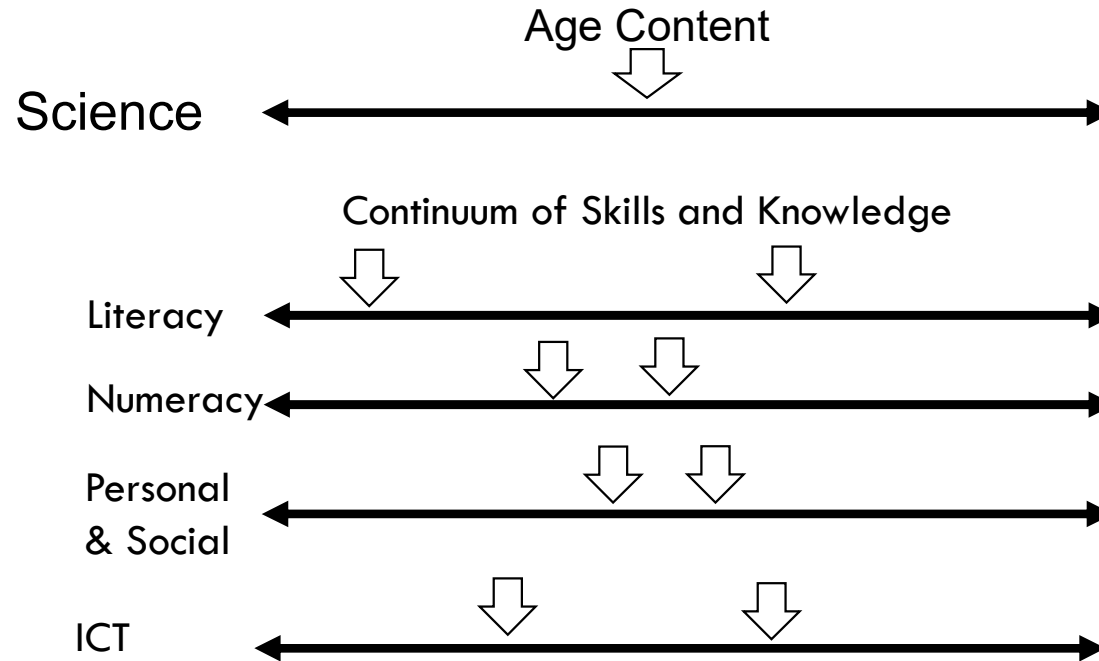


Normative thinking

Flexibility in the Curriculum Framework: Content

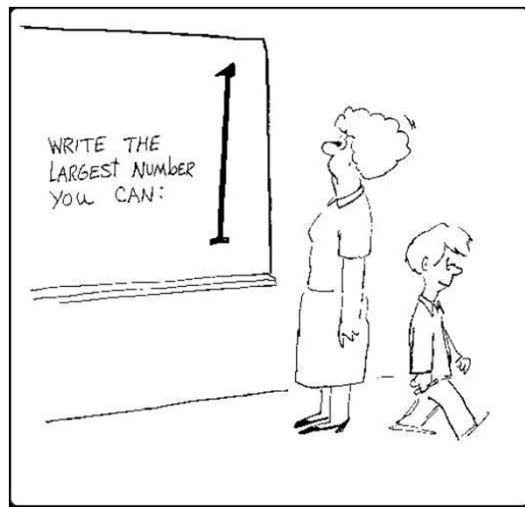


Flexibility in the Curriculum Framework: 21st Century Learning Skills

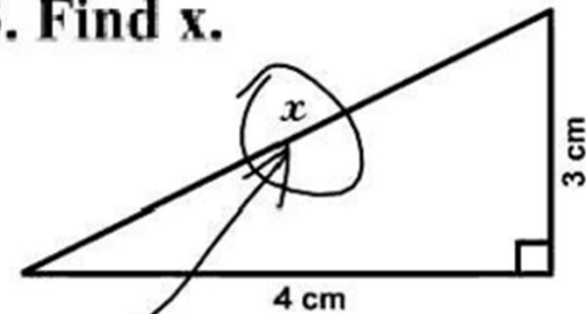


Enabling All Students Through Numeracy

“The challenge to parents and educators is to help [students] maintain a productive disposition toward mathematics as they develop the other strands of their mathematical proficiency.” [Kilpatrick et al., 2000, p.171]



3. Find x .



Here it is

Numeracy

- **Students become numerate as they develop the knowledge and skills to use mathematics confidently across all learning areas at school and in their lives more broadly. Numeracy involves students in recognising and understanding the role of mathematics in the world and having the dispositions and capacities to use mathematical knowledge and skills purposefully.** [Australian Curriculum, 2016]

Item #1

Without calculating an exact answer, identify the best estimate for:

$$36 \times 0.96$$

- A. More than 36
- B. Less than 36
- C. Equal to 36
- D. Impossible to tell without working it out

Item #2

- Without calculating an exact answer, identify the best estimate for:

$$\frac{12}{13} + \frac{7}{8} =$$

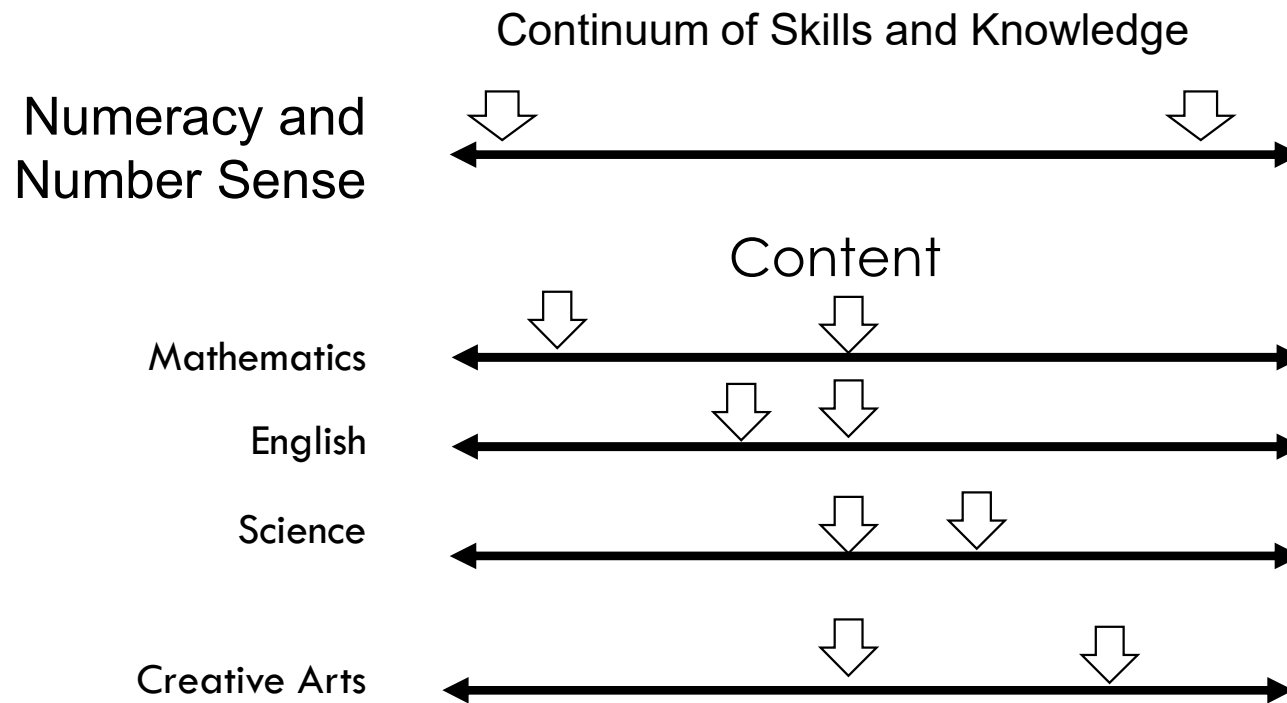
- A. 1
- B. 2
- C. 19
- D. 21
- E. I don't know

Number Sense

- ... flexibility in thinking about numbers and operations as a well-organised network of numerical knowledge that allows numbers to be used and represented in multiple ways, including relating them to each other, composing and decomposing them, or embedding them in various contexts of mathematical operations and problem solving.

[Reuss, 2000]

Flexibility in the Curriculum Framework: 21st Century Learning Skills



(Some) Potential Barriers to Number Sense

- **Relevance and value of mathematics**
- **Symbols and vocabulary**
- **Fluency with key ideas and concepts**

Addressing Barriers

- **Relevance and value of mathematics**
 - Know your students
- **Symbols and vocabulary**
 - Provide specific instruction
- **Fluency with key ideas and concepts**
 - Provide scaffolded and sustained practice

Conclusion

- Numeracy is key to quality of life – for all
- It is part of every curriculum domain
- An awareness of the demands of numeracy in curriculum areas (potential barrier) can be leveraged to enhance numeracy outcomes