Learner empowerment: Maximizing student talk and engagement through learning the language of Mathematics

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How do we help students unpack the text?

(1) Highlight of key words

(2) Deconstruct complex sentence patterns for students

(3) Decompose words

(4) Transform the information of a question to a table

Linguistic challenges in mathematical texts

The difference of two positive integers is 5. Two times the square of the smaller one exceeds the square of the larger one by 71. Find the two integers.

Strategies for helping students develop and extend their language capacity for learning maths using EMI

How do we help students **unpack** the text?

(1) Highlight of key words

The difference of two positive integers is 5. Two times the square of the smaller one exceeds the square of the larger one by 71. Find the two integers.

(2) Deconstruct complex sentence patterns for students

The difference of two positive integers is 5.{ [Two times (the square of the smaller one)]exceeds (the square of the larger one) by 71}. Find the two integers.

(3) Decompose words

- Examples of Prefixes:
  - equi- (equilateral, equiangular)
  - poly- (polynomials, polygon)
- Examples of Suffixes:
  - -sect (bisect, trisect)
  - -gon (pentagon, hexagon, heptagon, octagon)
  - -nomial (binomial, trinomial, polynomial)
  - -lateral (equilateral, quadrilateral)

(4) To transform the information of a question to a table or picture

- Kevin is jogging at a constant speed x km/h on a 12 km journey. If he decreases his speed by 2 km/h on his return journey, he takes 1 hour more.
- Mary and John are 5km apart. When they walk with constant speeds towards each other, they will meet in an hour. When they walk in the same direction, John will overtake Mary in 5 hours.

(4) To transform the information of a question to a table or picture

	Speed(km/h)	Distance(km)	Time taken(h)
outbound	x	12	
return	x−2	12	

$$\frac{12}{x-2}-\frac{12}{x}=1$$

What could we do *during* lessons?

- **Mind set (why, how and what for)**
- **Safe & comfy environment (lights, pause & discussion)**
- **Form a bridge from past to present ⇒↑ ease**
- **↑ participation ⇒↑ initiative & enthusiasm**
- **Challenging (elaboration & extension)**
- **↑ chance of success ⇒↑ eagerness in learning**
- **Good atmosphere (humour, fairness, excitement & enjoyment)**

(1) Link concepts and form webs

- Expansion & Factorization
  - $(x+y)^2 \equiv x^2 + 2xy + y^2$
- From Past to Present
  - $\frac{1}{2} + \frac{1}{3} = \frac{3+2}{6} = \frac{5}{6}$
  - $\frac{1}{2x} + \frac{1}{3x} = \frac{3+2}{6x} = \frac{5}{6x}$
  - $\frac{1}{2x+2} + \frac{1}{3x+3} = \frac{1}{2(x+1)} + \frac{1}{3(x+1)} = \frac{3+2}{6(x+1)} = \frac{5}{6(x+1)}$

(2) Expand students' vocabulary

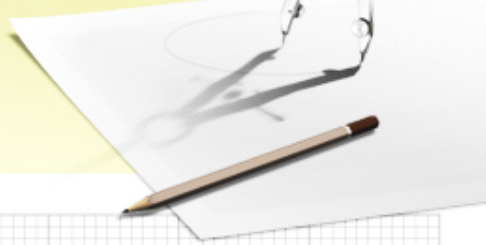
- Keeping a vocabulary book
- Decomposing words
- Forming webs systematically
  - factor
  - factorize
  - factorization
  - factor theorem

(3) Questioning

- By ‘deep understanding’, it refers to an understanding of generalised / abstract ideas, the relationship between representations, or the extension of meaning from one representation to another.
- ↑ involvement and motivation

Teachers as…

- Analyst
- Mediator
- Scaffolder
- Classroom Manager:
  "participatory classroom culture"
  (Schleppegrell, 2007, p. 151)
- Language support
- Feedback-giver
- Facilitator of 'Maths Talk'
  "The technical language has to be practiced and developed along with the mathematics concepts."
  (Schleppegrell, 2007, p. 150)



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Thank you ^.^