

Oakhill Drive PS IR Team Term 3 2017

**Focus: Student Talk in
Mathematics**

Talk Moves

Maths Talk Questions

- Why do you think that?
- Why does that make sense?
- Convince us. Prove it.
- What have you discovered?
- Does anyone have a different way to think about that problem?
- Are everyone's answers the same?
- Can you see a pattern?
- Does anyone have another explanation?
- Do you think we've found the best solution?
- Is there a more efficient way to solve this?



7 WAYS TO IMPROVE LEARNING THROUGH CLASS TALKS

SUSTAIN THE QUESTION
Use productive questioning by continuing probing of one student to explain, extend and elaborate ideas to deepen responses.
What else do you know? Can you give an example? What makes you say that? What is your evidence?

EXTEND & DEEPEN THINKING
Invite other class members, as a community of learners, to explore ideas, opinions and concepts more deeply.
Who can tell me more? Who can give another example? Use Snowballing – in small groups, build onto others' ideas.

CHALLENGE THINKING
Promote students to recognise and challenge bias, viewpoint, stereotypes, positioning and power.
Would this apply in all situations? Does it always work that way? Who wrote this? What context is being reflected? What assumptions have been made?

ACTIVE LISTENING
Students and teachers reframe contributions, showing they are valued and provide opportunities for responses.
So you're saying... Can someone summarise... Who can explain... What did your partner say?

WAIT TIME
Allow time to think before going 'public', to think through ideas and to rehearse responses.
This is a complex question, let's think... Take your time, we'll wait. That's an interesting idea, let's think about that some more.

OPEN GUIDING QUESTIONS
Ask questions that guide thinking, providing room for multiple view points, provide opportunity for critical reasoning and provide space for in-depth conversation.
What makes...? Why...?

VACATE THE FLOOR
Create opportunities and time for students to talk.
Turn to talk; Eye to eye, Knee to knee; EACH (easy, challenging); Mind mapping; Think-write-share; Think-pair-share; Think-pair-square; Three step interview; Expert jigsaw.

Summarised from
Classroom Talk: Christine Edwards-Groves, Michele Anstey, Geoff Bull

Talk Moves

Reflection Stems

- Do you think you've improved?
- What part of your learning have you enjoyed?
- What have you learnt?
- Have your feelings changed?
- In what areas do you still need to work on?
- Did you achieve the success criteria? Why?
- Did you work towards your goal?
- What is one thing you'd like to improve about this?
- What things do you need more help with this?
- If you were the teacher, what feedback would you give about this?



Maths Talk

Sentence Starters

- I solved the problem by ...
- The strategy I used was...
- Another strategy you could use would be ...
- I know the answer is reasonable because...
- I can check my answer by...
- I can prove my thinking by...
- I discovered that...
- I noticed that....
- I'm learning...
- I wonder....
- I compared...
- My strategy was like.... because
- This is a good strategy because ...



Questioning Student

Question Formulation Technique-applicable in all KLAs

1. *Design a question focus*-designed by teacher
2. *Produce questions*-students record as many questions as they can, write down every question asked
3. *Work with open and closed questions*-open questions will provide more information, closed questions are clear, quick answers
4. *Prioritise questions*-may be for a assessment or to produce more information on the topic. Chose the most important questions that are to be answered.
5. *Plan next steps*-students and teacher discuss how they will present answers to chosen questions
6. *Reflect*-discussion on how one question was chosen over another. What did you learn? How did you learn that?

Student Questioning

Applying QFT to maths example

1. *Sara received 73 votes in the school election. Ben received 25 fewer votes than Sara. How many students voted?*

First: Find how many students voted for Ben.

Next: Find the total number of votes.

2./3. Students solve problem individually and then discuss in groups what strategies they used to solve the problem. Types of sentence starters could include

Describe how you solved it

How do you know your answer is correct?

How did you get that answer?

Why did you choose to do it that way?

4./5 Prioritise questions and plan next steps-students will discuss their answers and make possible changes based on other student challenges and results. Students may also go over their solution to check they are correct

6. Reflect-following so much student talk students will become strong in their opinions as they will need to defend their position and strategies. 'making a mark on the brain'-way of defining correcting an answer 'I respectfully disagree'

Advantages for maths-enabling a formative assessment just by listening to student maths talk especially during reflection time.

Asking Questions & Listening to Answers

- develop and deepen students' understanding of important ideas and processes so that they can transfer their knowledge within and outside the school.
- serve as doorways or lense through which learners can better explore the keys concepts, themes, theories, issues and problems that reside within the content.

What will happen next? How sure are you ?(statistics, patterns)

- Intent Trumps Form: why you ask the question matters more than how you phrase it. Do we envision an open indepth exploration, debate of complex issues or do we plan to lead students to a prescribed answer? Do we hope that our questions will spark students to raise their own questions or do we expect a conventional interpretation?

What's the pattern? eg 1, 2, 3 p. 8 (Essential?)

- Listen carefully before asking questions
- Listen to the answers
- Ask appropriate follow up questions
- Show respect

Asking Questions & Listening to Answers

Questions That Hook: **How do we get more lollies with our dollar?**

- asked to interest learners about topic
- spark curiosity, questions or debate
- framed in engaging kid language
- asked once or twice but not revisited

Questions That Lead: **What is 7×6 ? What is true of all four sided shapes?**

- asked to be answered
- have a correct answer
- support recall and information finding
- asked once until answer is given
- require minimal support

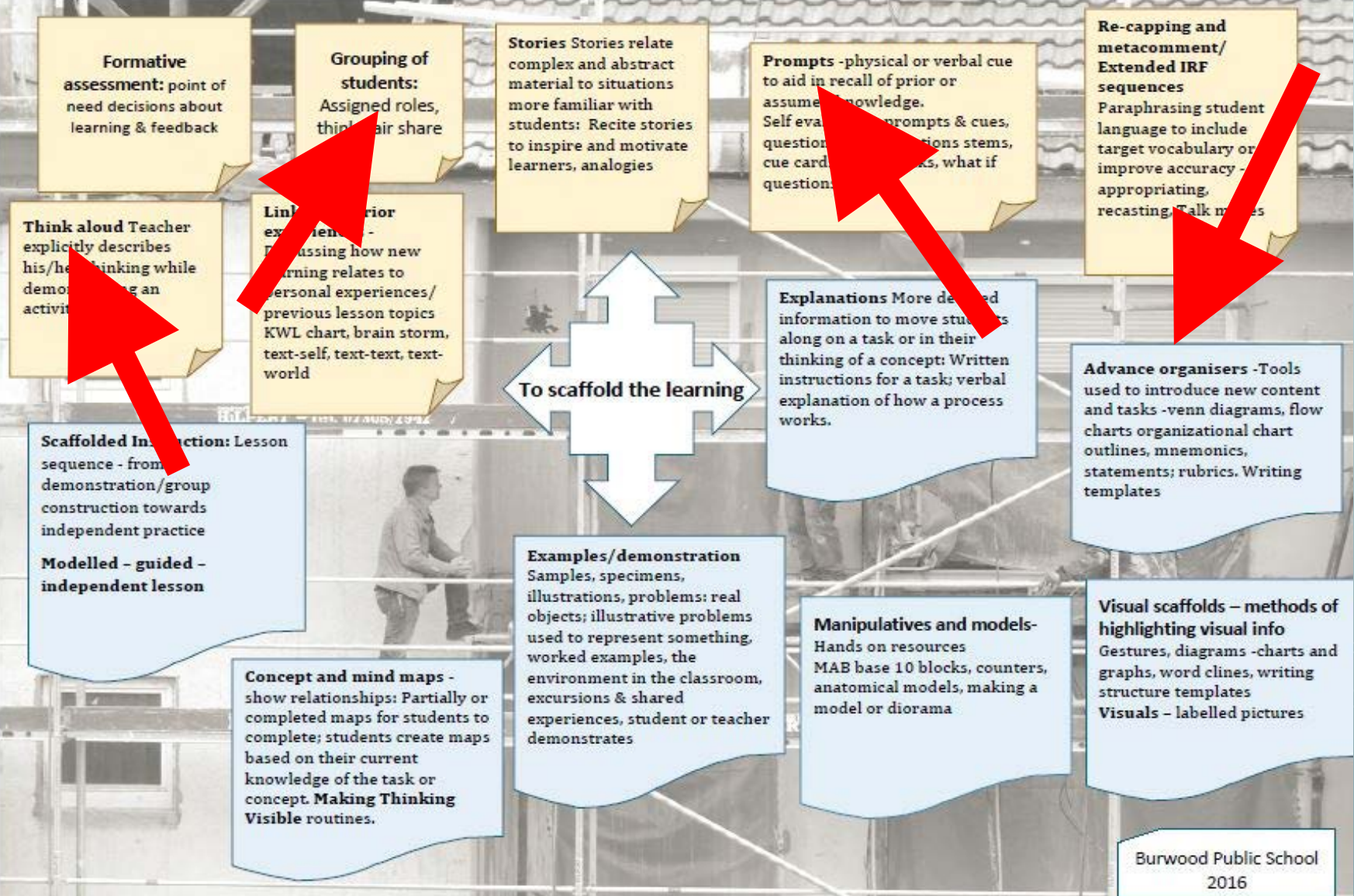
Questions That Guide: **Why must the answer be less than zero?**

- to encourage and guide exploration of topic
- point toward desired knowledge and skill (but not to a single answer)
- may be asked over time
- require explanation and support

Essential Questions **When and why should we estimate? How does what we measure influence how we measure?**

- asked to stimulate ongoing thinking and inquiry
- raise more questions
- spark discussion and debate
- asked and re asked
- demand justification and support
- answers may change as understanding deepens

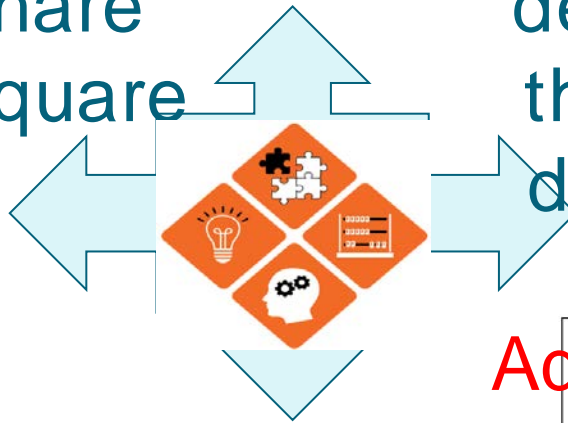
Scaffolds to assist student talk



Examples of scaffolds to assist student talk in mathematics

Grouping of Students:

Thinking Buddies
Think Pair Share
Think Pair Square



Think Aloud:

Learner explicitly describes his/her thinking while demonstrating

Prompts:

Newman's Prompts
Problem Solving Toolkit

all link to WM proficiencies

Advance Organisers: Use Frayer Model to elicit metalanguage

Completed Frayer Model:
Math Example

Definition a polygon with four sides and four angles	Characteristics <ul style="list-style-type: none"> • sum of the interior angles = 360 degrees • exactly four sides • exactly four angles • each of line segment • has two diagonals • divided four
Examples <ul style="list-style-type: none"> • parallelogram • rhombus • square • rectangle • trapezoid 	Nonexamples <ul style="list-style-type: none"> • circle • triangle • oval • straight line • star • octagon

Term
quadrilateral