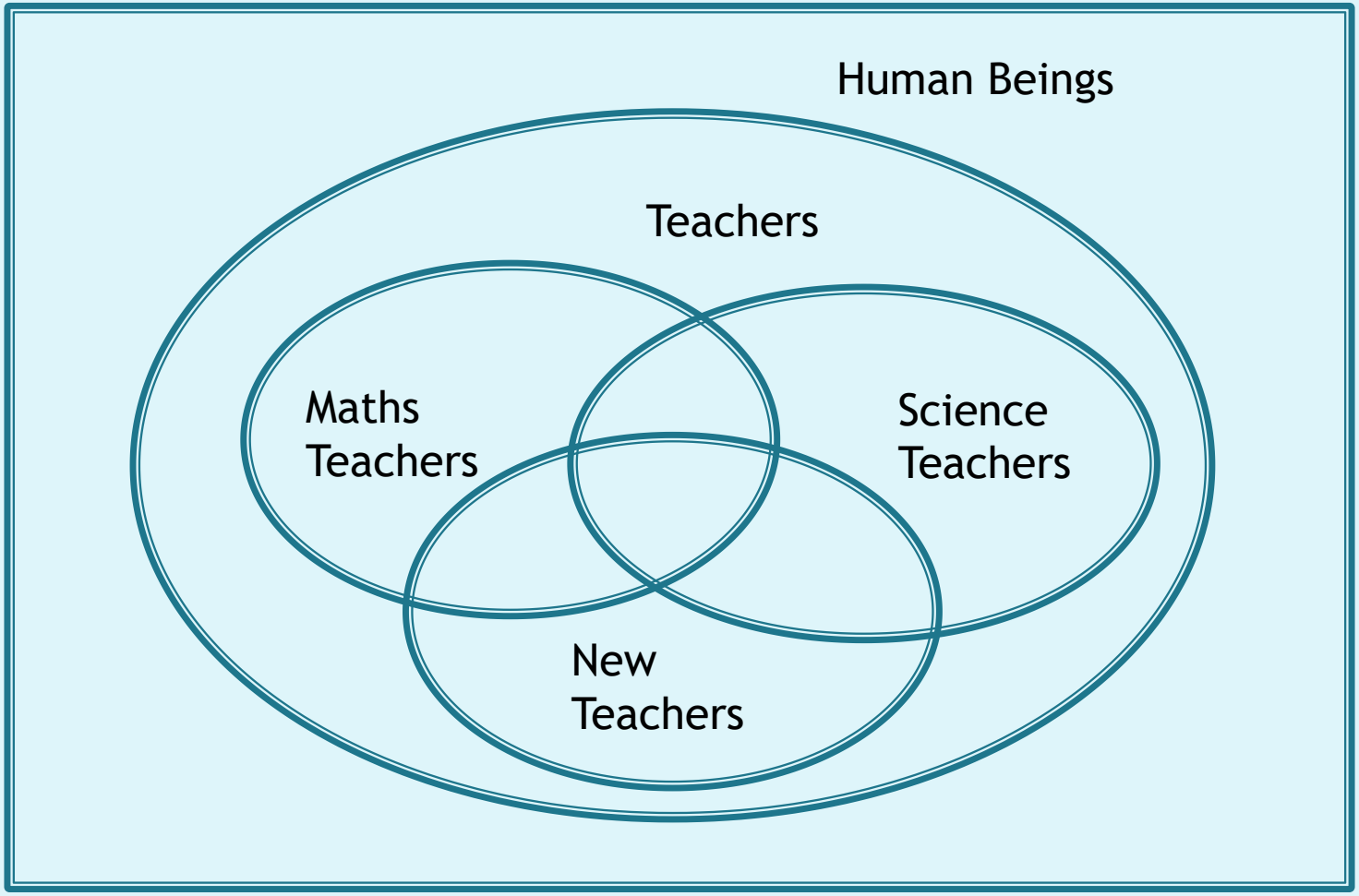


Venn diagram showing where we fit in

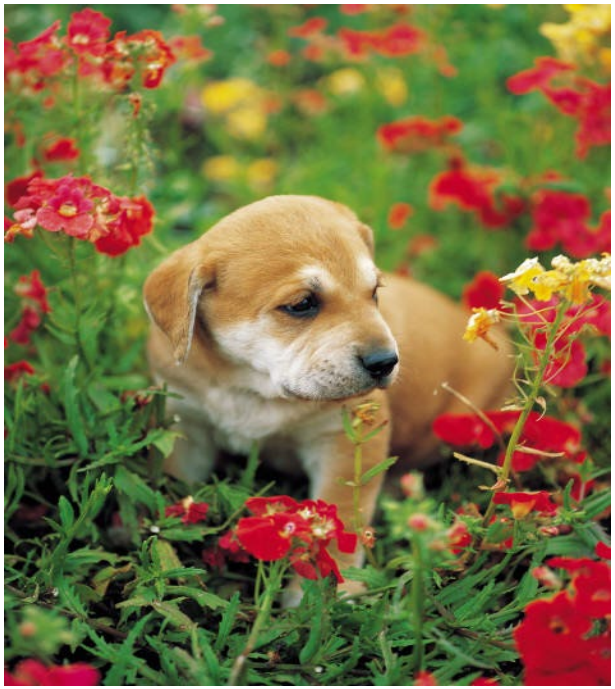
Peter Collins
Parkdale Secondary College
Peter.Collins@education.vic.gov.au

Tricks for young players.

8 things I wish I knew 34.75 years ago; that hopefully you might find useful

(including some stuff written in small font)
34 or 30 astounding powerpoint slides

A few things I learned, or had confirmed,(and subsequently use) from an assortment of places



I've done this talk before. I keep changing it based on new discoveries, new information and feedback.

Contents.

A slide of where you are
1. Objective / SC
2. Cheese model
3. Words and literacy
4. A Graph - concentration
5. Mind map
6. Work it out yourself
7. (Random stuff – maybe not today)
8. Student Input

1. Lesson Objective:- e.g. today,
To improve your capacity to plan for, and cope, and thrive in a Maths Classroom.
1. Success Criteria. You read, have a think, discuss / ask questions now or later; Come away with some ideas that you can actually use.

1. Be clear about what you want your students to learn in each class. The main point(s), The big ideas.

Be clear.
The clarity in your own mind is contagious.

1. Be clear yourself about what is the main thing you are trying to achieve, rather than getting caught up in what it would be nice if they could do.

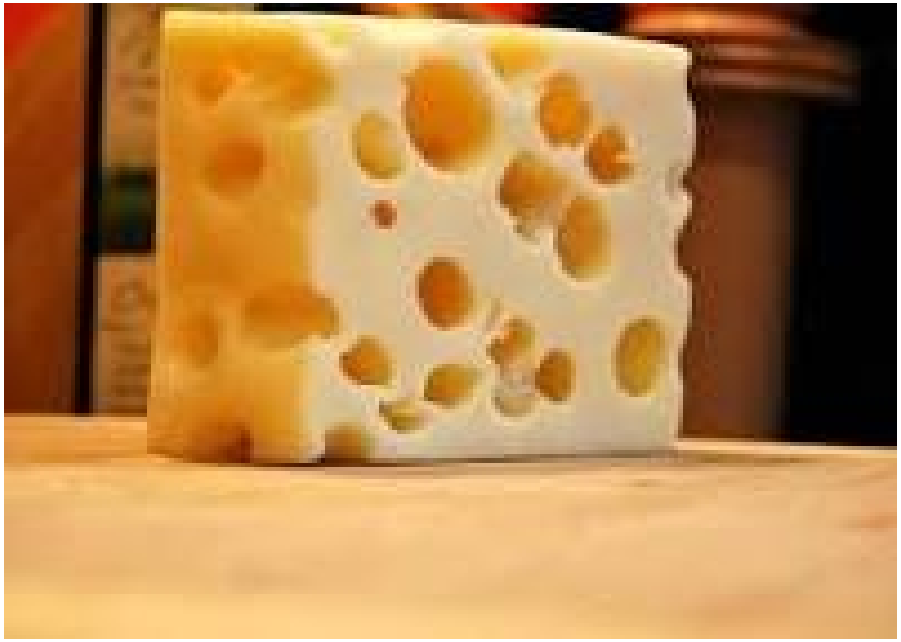
1. eg. If the main point is to learn algebraic substitution, it does not matter if they use a calculator /tables / fingers to work out “Find 3a if a = 4”

Any objective(s) should be made clear to the students at the start of the class, in terms of what is being learnt and what they need to demonstrate to show that they have learnt it

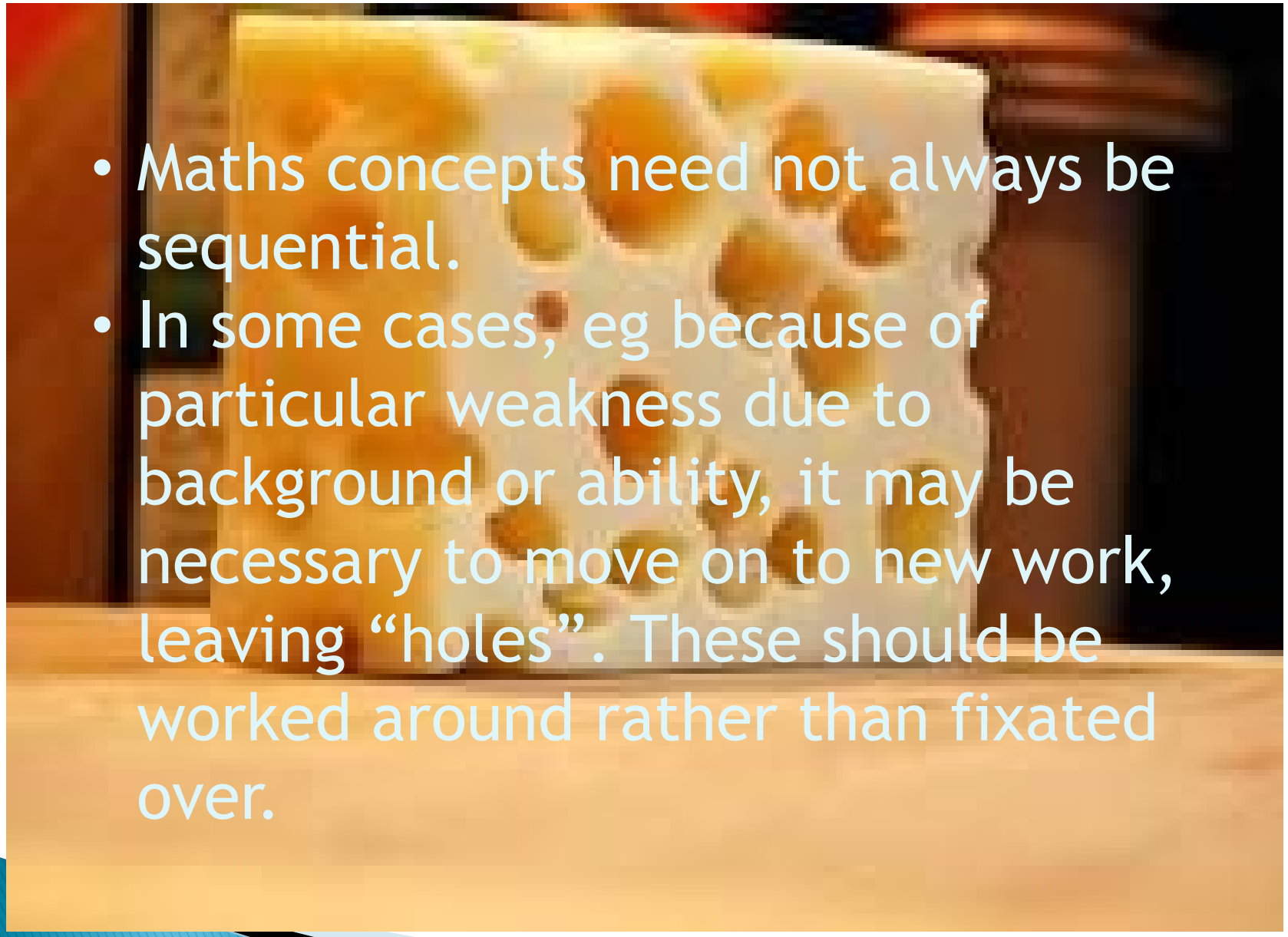
1. Bad old days – Fractions chapter 2

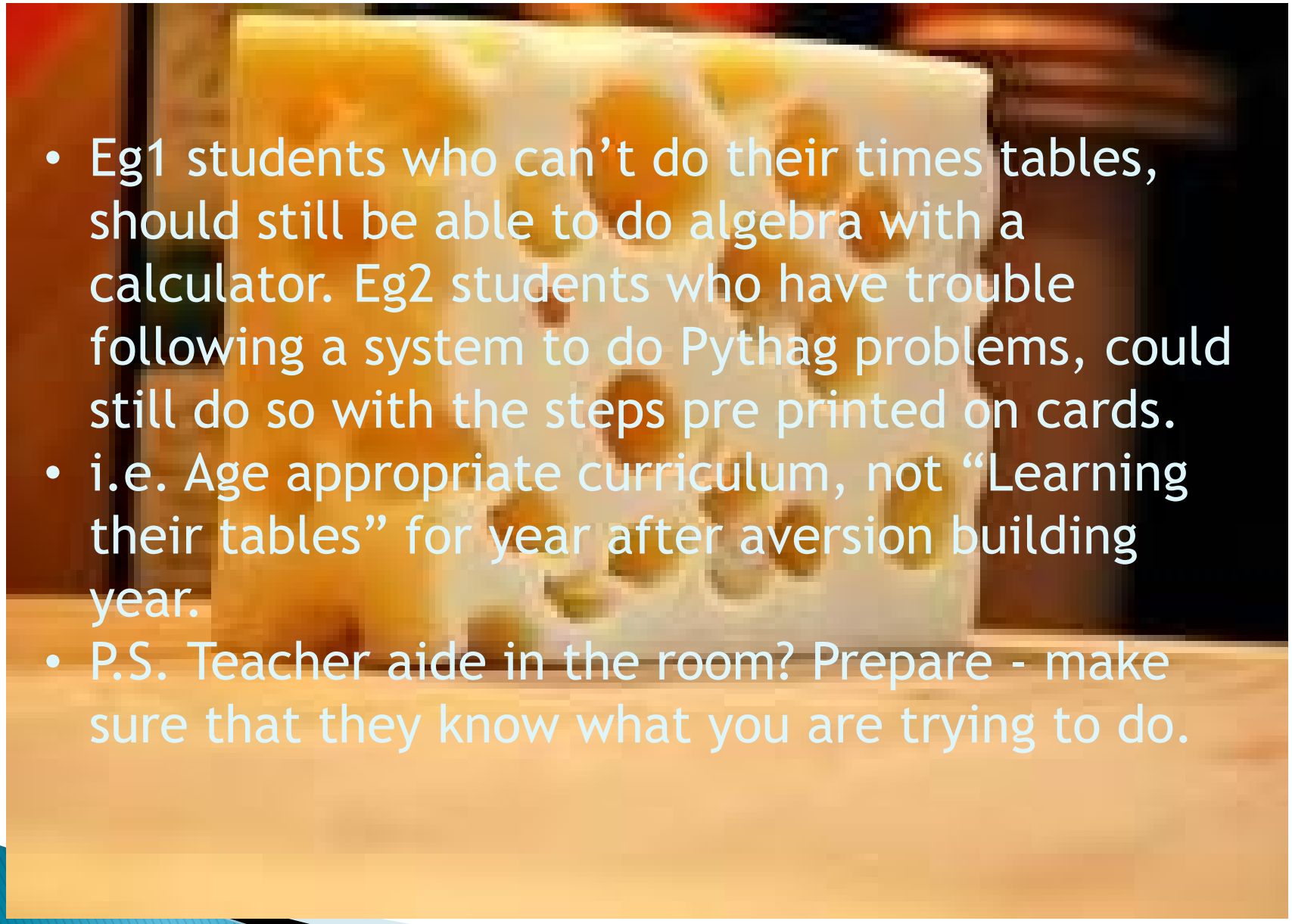
NOW? a) Adding fractions with the same denominator ex 2A Q1, Q2a – d
b) Subtracting fractions with the same denominator ex 2B Q1, Q2
c) Converting fractions to equivalent fractions ex 2A Q3
d) Converting fractions to equivalents having a common denominator ex 1D Q6 etc.
Knowledge is explicit, and any exercises are linked to skills not vice versa

2. Swiss cheese.



(Based on my memories of some of a presentation by Dr. Rhonda Faragher Uni. Of Qld)


• Maths concepts need not always be sequential.
• In some cases, eg because of particular weakness due to background or ability, it may be necessary to move on to new work, leaving “holes”. These should be worked around rather than fixated over.



- Eg1 students who can't do their times tables, should still be able to do algebra with a calculator. Eg2 students who have trouble following a system to do Pythag problems, could still do so with the steps pre printed on cards.
- i.e. Age appropriate curriculum, not "Learning their tables" for year after aversion building year.
- P.S. Teacher aide in the room? Prepare - make sure that they know what you are trying to do.

3. Literacy Strategies

- John Munro literacy strategies.
- These are a series of strategies aimed not just at picking up new knowledge but embedding it. Very literary based, but with a lot of application to maths and any subject :- In Maths make a point of specifically teaching the Vocab. (including symbols) required.

3. Literacy Strategies

- The most effective way to learn vocab, including symbols, is **in context**.
- The important words and relevant symbols (including all synonyms) need to be presented along with the concepts / diagrams / pictures as they are being taught as explicitly required knowledge
- Maths is not a writing free “safe zone” any more. It is a place where Maths concepts and language are co joined.

3. Literacy Strategies (Cont)

- Class begins with “Getting knowledge ready” i.e. explicit links made between real life / student’s experiences interests / topics taught in previous classes and / or previous years; and what you are offering today.

3. Literacy Strategies (Cont)

- Class concludes with reflection on what was done today, and an introduction to what is coming next.
- (Primacy / Recency application known to all public speakers for ever, now proven.)

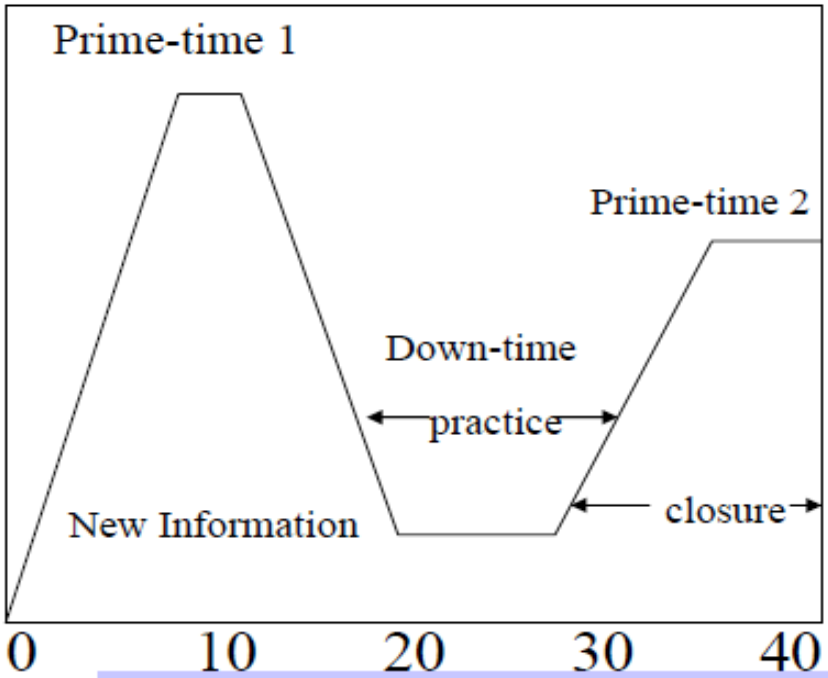
John Hattie (2009)
What is explicit teaching?

- '**Plan** what you are doing before class, **make these plans clear** to your students at the start so that they know what they are doing, question / test students as you go along that they have actually learned what you are "teaching", and **actively conclude** your lesson to summarise / reflect on and hence consolidate the learning that has taken place.'
- *Plan, be clear, start, conclude; which brings us to:-*

4. Primacy / Recency effect

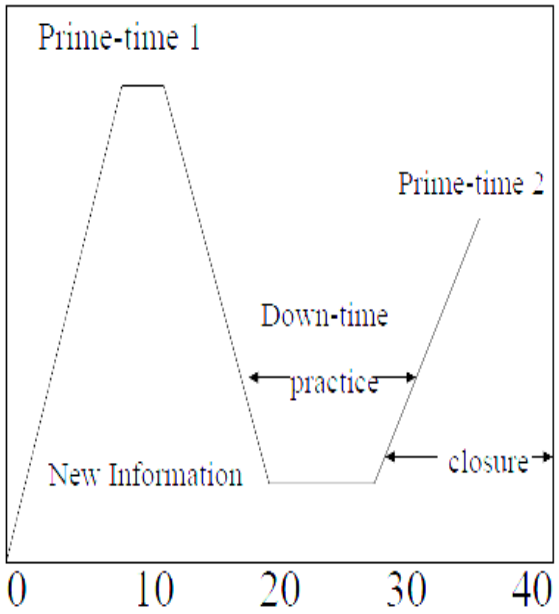
- There is a lot of recent research on how the brain actually learns. Use it. Point 3 above (Munro) uses it; as does
- The work of David O Sousa on primacy / recency effect and concentration
- ‘How the Brain Learns Mathematics’

Primacy-Recency Effect



New information and closure are best presented during the Prime-time periods. Practice (labs/activity) is appropriate For the down-time segment.

Primacy-Recency Effect

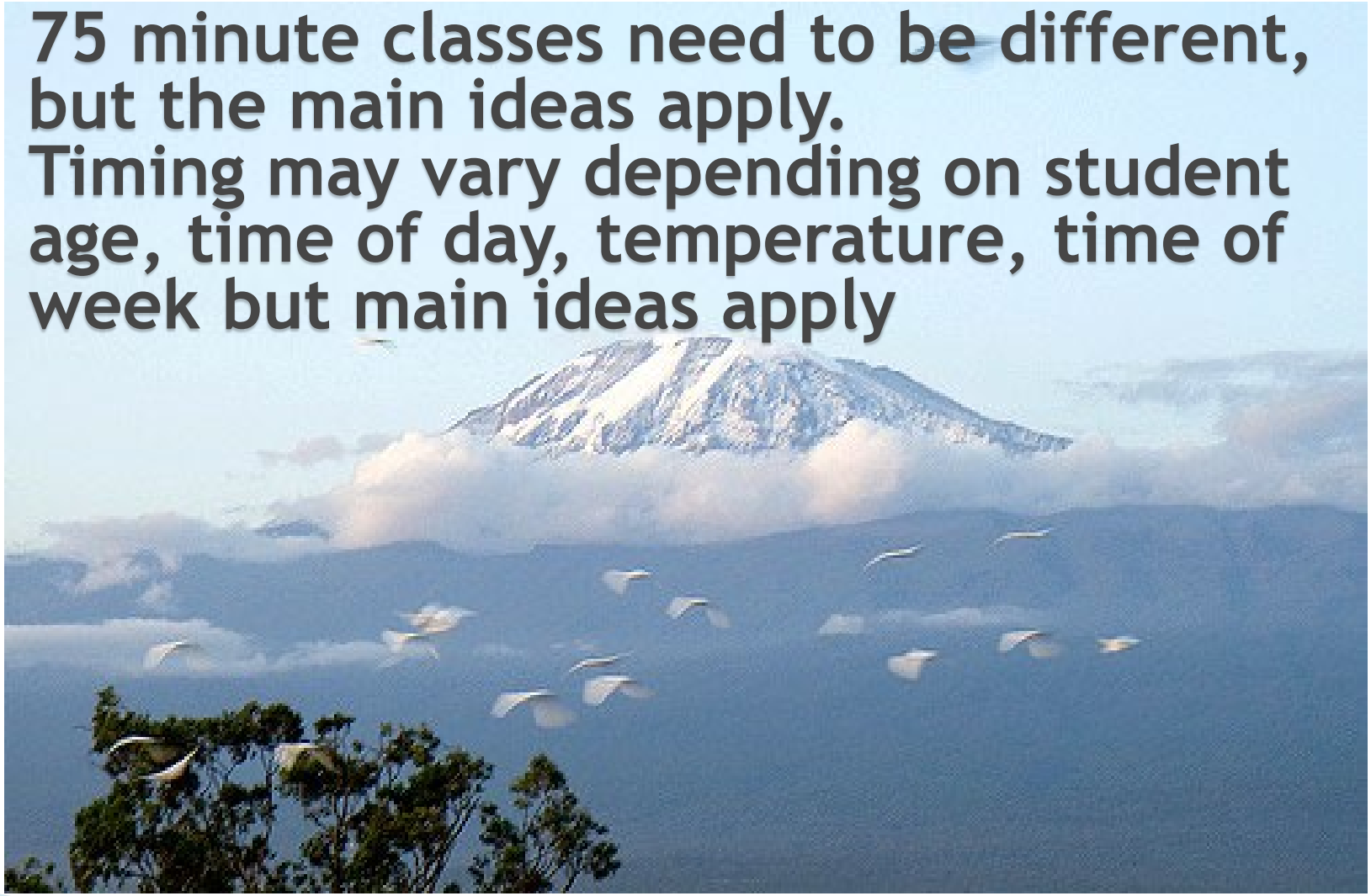


The first few minutes, is set up, student engagers etc.

The next 10, Prime Time 1, is vital.

- It is where the quality teaching must take place (the brainstorms, the new concepts, the quality questioning)
- It must not be wasted. i.e. don't do 20 minutes of warm up activities, or long periods of admin, or start drill exercises thinking you can explain important stuff later
- Prime time 2 - conclude

- 75 minute classes need to be different, but the main ideas apply.
- Timing may vary depending on student age, time of day, temperature, time of week but main ideas apply



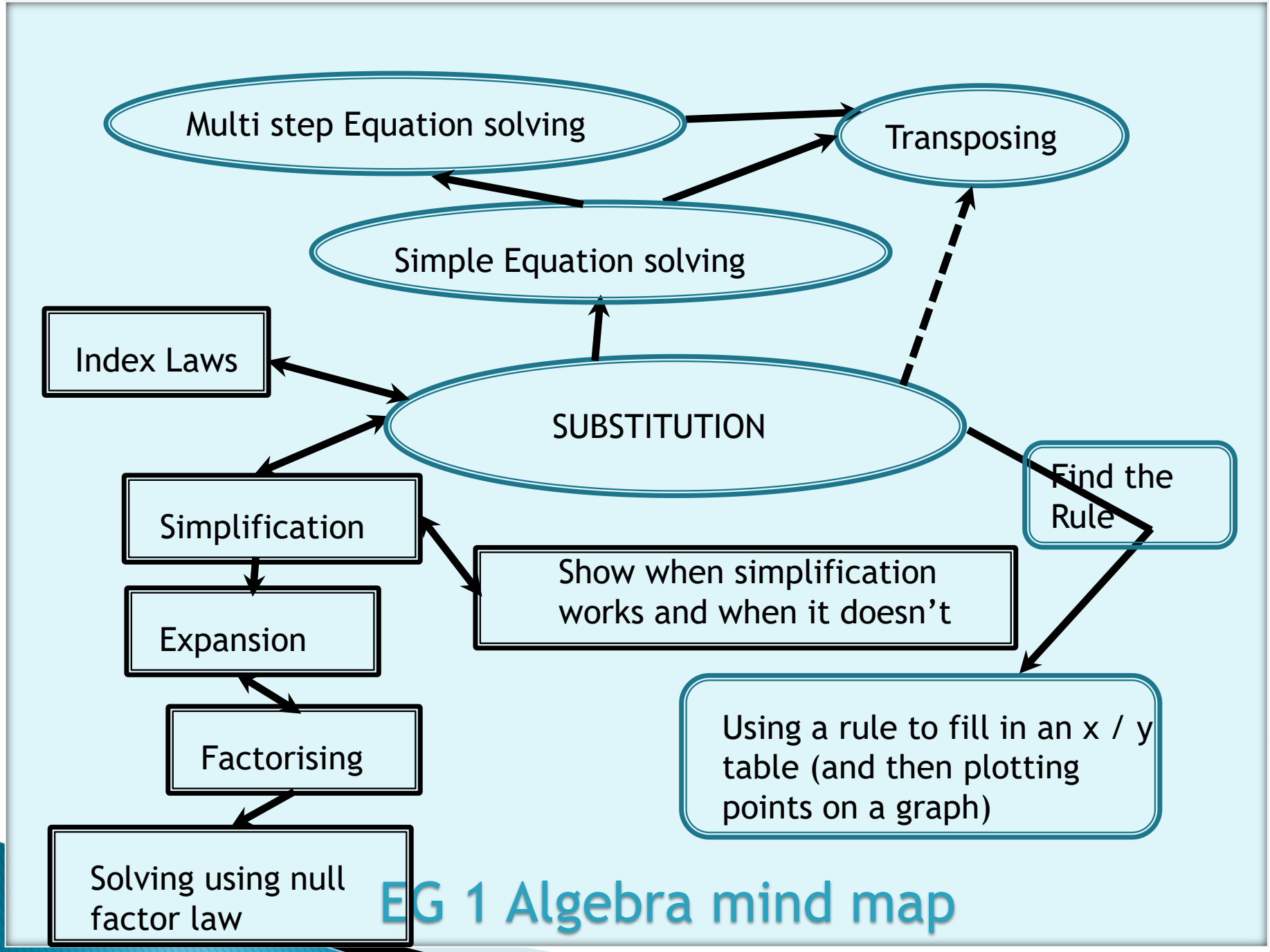
- 5. When teaching a topic show how the different concepts within it relate to

a) Each other
b) Concepts within other topics
c) Previous topics
d) Following topics

i.e. Give the topics a context, show the system they fit within.

Relationships made explicit

Teach a recipe, not a shopping list. Eg:-



EG 1 Algebra mind map

EG 2 Parabolas

- Students systematically sketch, using technology, graphs of the form

$y = ax^2 + c$

after which they will be able to sketch a graph as well as being able to articulate what a and c do

- Students will sketch quadratic formulas in different forms

eg **$y = x^2 - 6x + 8$, $y = (x-4)(x-2)$ and $y = (x-3)^2 - 1$**

- After which they will know what a turning point is, what x intercepts are, what a y intercept is and which form of the equation makes it easier to find which key points
- After which they will know that all three equation types are useful, THEREFORE there is a point in being able to convert one into the other, THEN off you go to factorise, expand, complete the square

6. Inquiry Based Learning - Find out yourself

- The above slide is also an example of knowledge that students find out for themselves being far better learned, because they own it.
- They think and learn, not mimic
- They consolidate it better.
- Do pose focus questions, and discuss the important findings to ensure Learning Intentions are met.

7. Maths Teacher – what to do

- 1. A course outline.(up to VCE, then it's a course outline audited against a study design). Resources (the main one usually being a copy of the student textbook). A timeline (how quickly you are supposed to get through various topics). There may be others.
- *The nice thing about the above is that you roughly know what you are aiming to teach, and with what.*

7. Maths Teacher

- 2. What you actually do in your classroom, how you actually go about teaching.
- You have a schedule of concepts but… If teaching them in a different to set order makes sense, do so. If teaching them in a different order to the text makes sense, do so. Your aim is to help AMAP of the students master topics AWAP in the set time with available resources. The fine details about achieving this aim are ultimately up to the person delivering the program. (Y)

7. Maths Teacher - Random musings

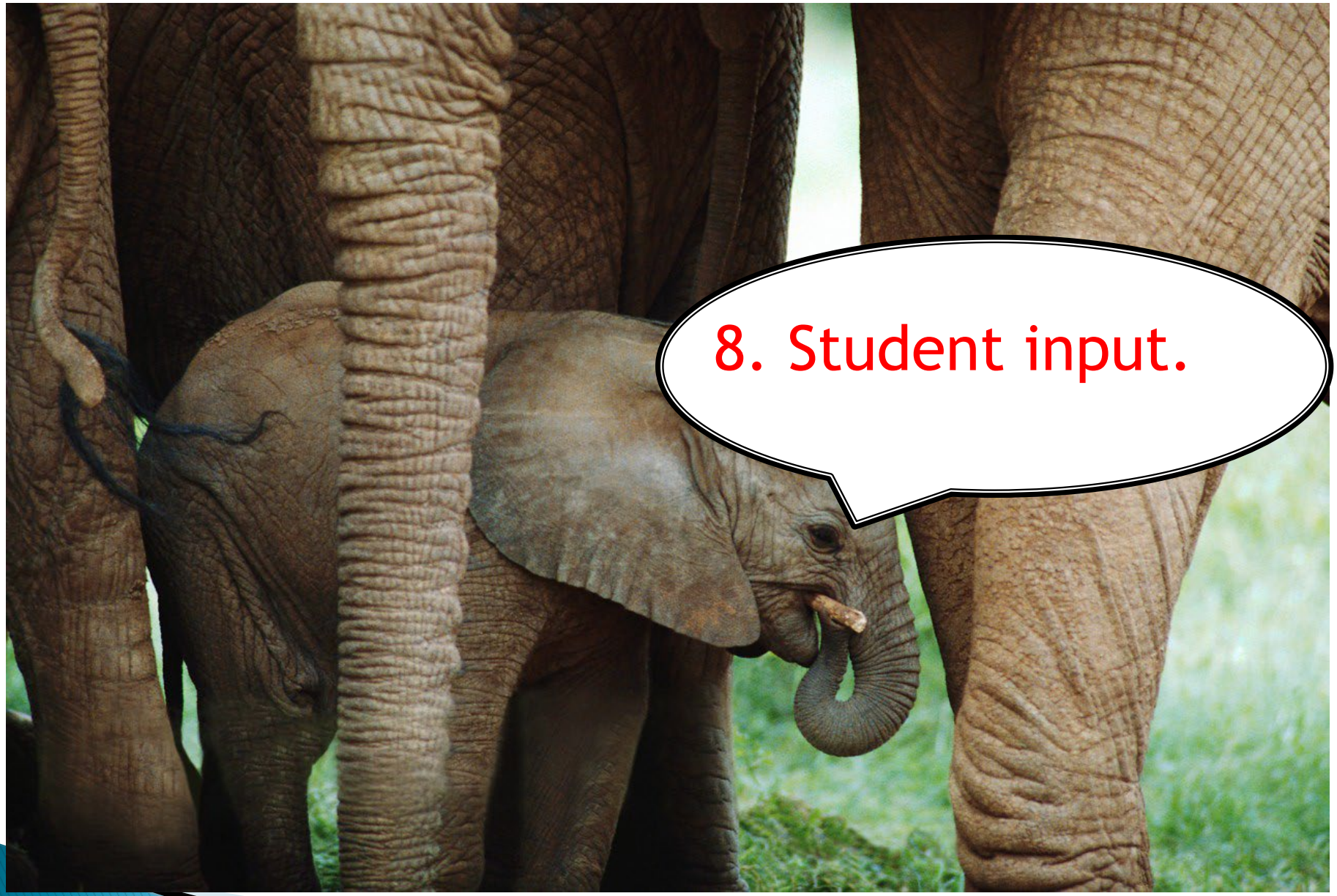
- The text is your servant, not vice versa. If skipping some less worthwhile tasks, and subbing in different ones / extension activities works, do so.
- If adding in activities will help learn the topics (embed the knowledge) better, do so.
- Make the topics you teach as relevant to the rest of the real lives of students as possible
- Make the learning environment as relaxed and non stressful and fun as possible

7. Maths Teacher – more RMs

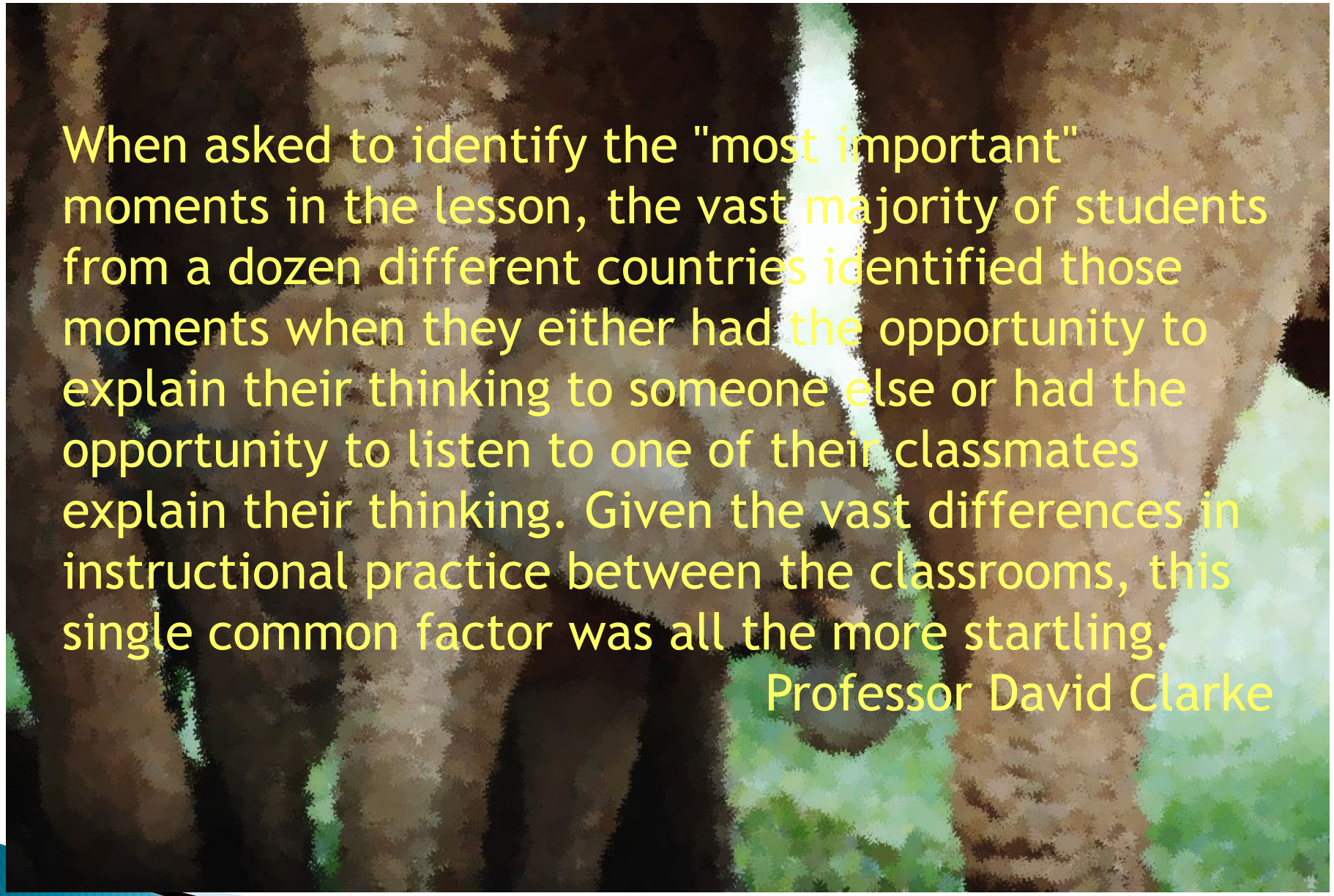
- Try stuff. Especially if the previous method doesn't work.
- "What do we need this for? What use is this?" – Always have an answer. Or don't try to teach it.
- Make lessons relevant to environment. Do not plan to teach a brand new concept Friday afternoon when it's 35°
- Be prepared. The start of this session had an aim (what we were trying to do) and success criteria (how we were going to demonstrate our aim). Use the same. Write them up. Students need to know what they are there for.

7. Maths Teacher – more RMs

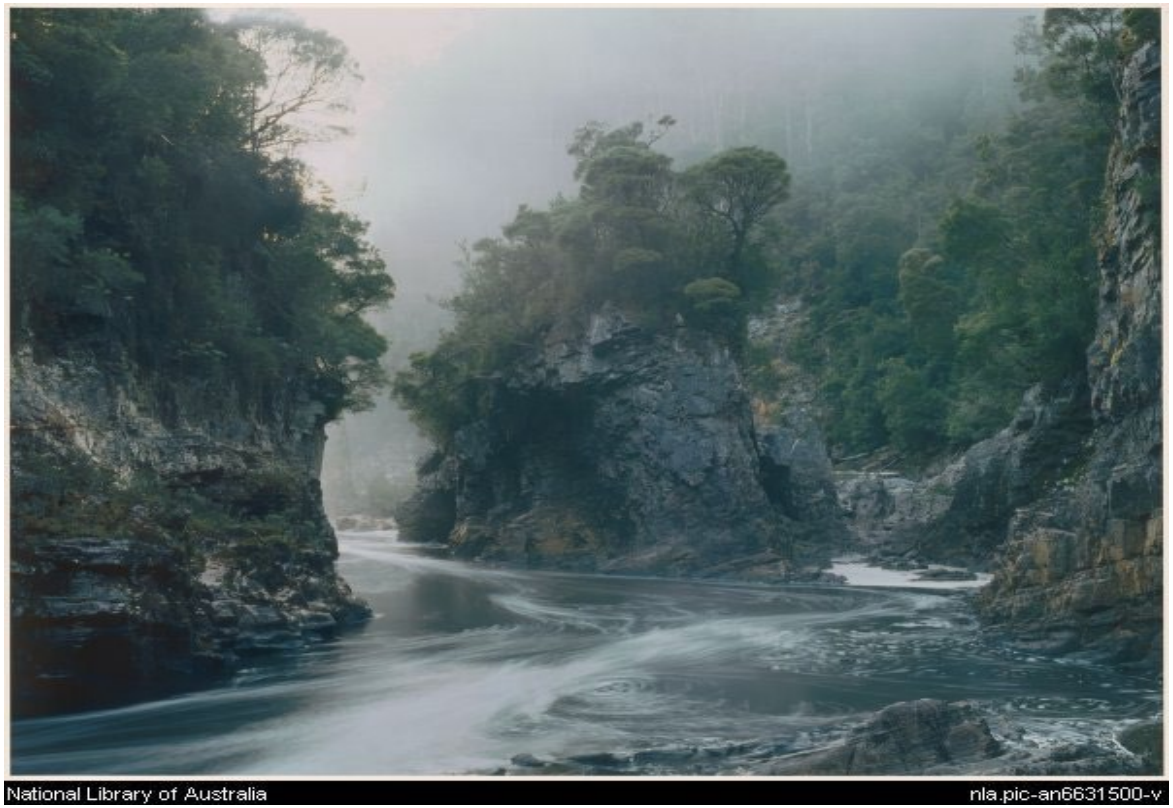
- Be prepared. You need to demonstrate, and model, that the subject is worth thinking about, organising and putting work into.
- Feedback – Get the work back as quickly as possible. It MUST be timely to be effective.
- Group work is good Peer Group > Teacher
- Repeat important ideas at different times, in different contexts to reinforce them


8. Student input.

8. At a maths conference several years ago I attended a session by Professor David Clarke, on an international study he had done on what made a successful maths teacher. 12 Different countries. The conclusion and common thread, was that the successful teachers used student input.


When asked to identify the "most important" moments in the lesson, the vast majority of students from a dozen different countries identified those moments when they either had the opportunity to explain their thinking to someone else or had the opportunity to listen to one of their classmates explain their thinking. Given the vast differences in instructional practice between the classrooms, this single common factor was all the more startling.
Professor David Clarke

The End.



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