



Introduction to Mathematical Resilience & the growth zone model



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Introductions

Aims of this session

- To consider affective barriers to maths learning
- To introduce & apply the ideas of mathematical resilience & the growth zone model
- To explore strategies for overcoming affective barriers & developing mathematical resilience

Sharing experiences

Share your personal experiences of maths learning on the board – put positive experience on the right and negative experiences on the left.

Sharing experiences

Negative

Positvie

Maths teaching

T.R.I.E.D. maths

Tedious

Rote

Isolated

Elitist

De-personalised

(adapted from Nardi & Steward, 2003)

A.L.I.V.E. maths

Accessible

Linked

Inclusive

Values-based

Engaging

(Johnston-Wilder et al, 2015)

Maths anxiety

“A feeling of tension, apprehension, or fear that interferes with maths performance” (Ashcraft, 2002)

Results in:

Negative attitudes & motivation towards maths

Avoidance

Lower grades

Negative self-perceptions

Impact on working memory

http://www.mccc.edu/~jenningh/Courses/documents/math_anxiety.pdf

How prevalent is maths anxiety in UK?

Baker 2019

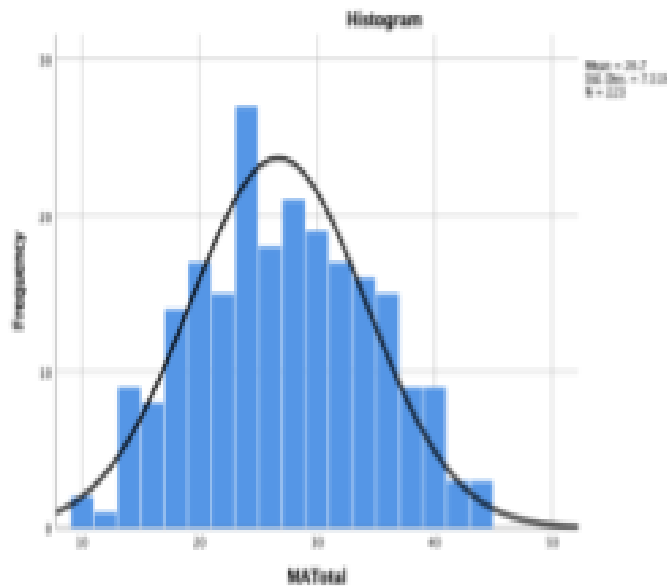


Figure 1 – Distribution of mathematics anxiety

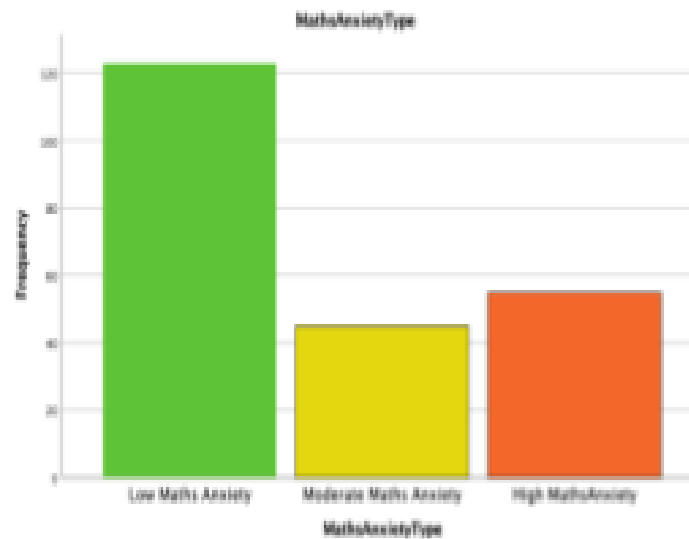


Figure 2 – Grouped mathematics anxiety

The problem

- Learners are naturally curious
- Fear is learned
- Things that cause fear become avoided
- Vicious cycle
- Combined with fixed mindsets:
 “I am not a maths person”
- Self-fulfilling prophecy

The facts

- As a survival strategy the brain seeks to distinguish challenge from threat to well-being
- The brain doesn't distinguish between physical and social threats, such as being left behind or humiliated or shouted at
- Previous threats are remembered
- When the brain (sub-consciously) perceives a threat, it responds by fight or flight mode, at least initially

Student experience

[the teacher] would shout across the classroom: ‘You can do it! I know you can!’ (N:109)

[the teacher] would make you stand in front of everyone, and then she would just be, like, ‘You’re not good, you don’t understand, you’re stupid.’ (H:107)

I always felt like I was stupid ... There were times when I did something, and I knew I’d done it right, but it didn’t make any difference. It didn’t outweigh the other times. (N:63)

Starting maths this year it still gives me chills, (N:245)

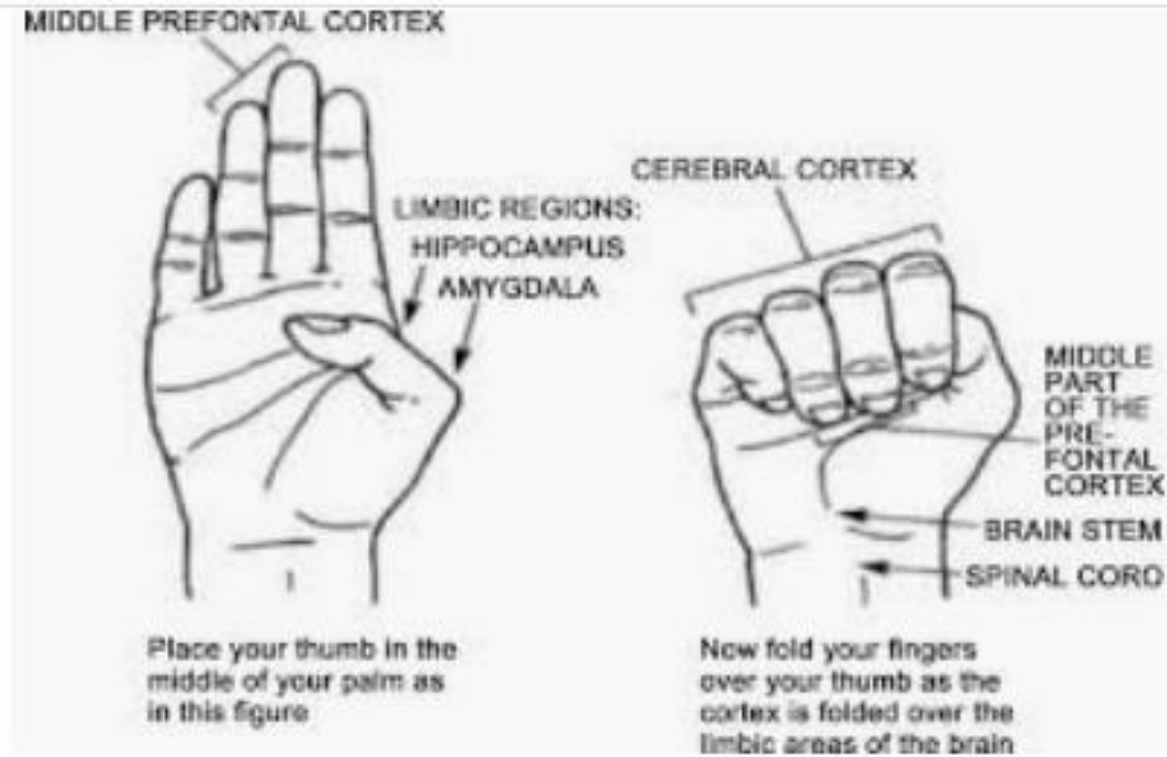
‘Cos even now, you know, that fear of saying ‘Oh I don’t get it! I still don’t get it!’ is still there. (N:142)

‘It is not just behaviour it is managing fear, it is managing a very deep sense of failure, being rubbish’.

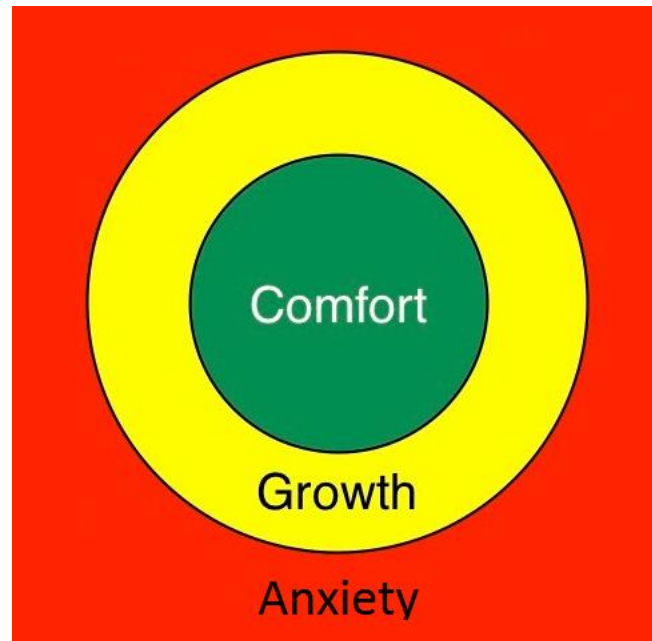
‘In the early stages [of teaching] it’s 90% psychology and only 10% maths’

(Quotations from maths teachers: ETF (2014) ‘Effective Practices in Post-16 Vocational Maths’)

The hand model of the brain

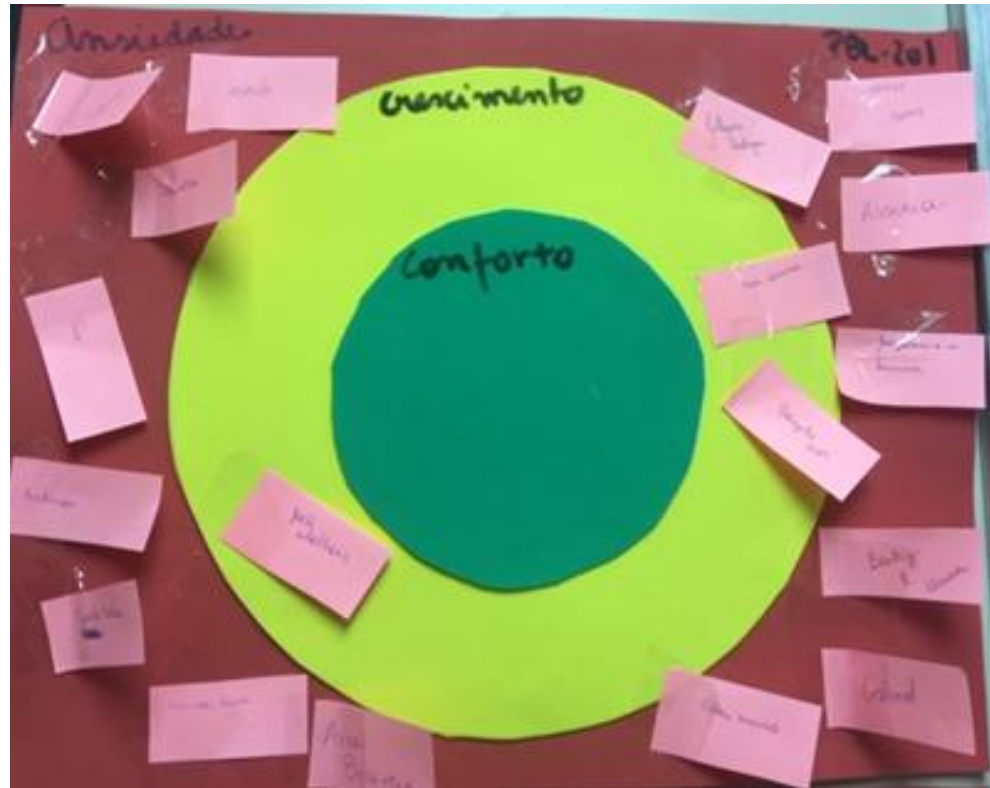
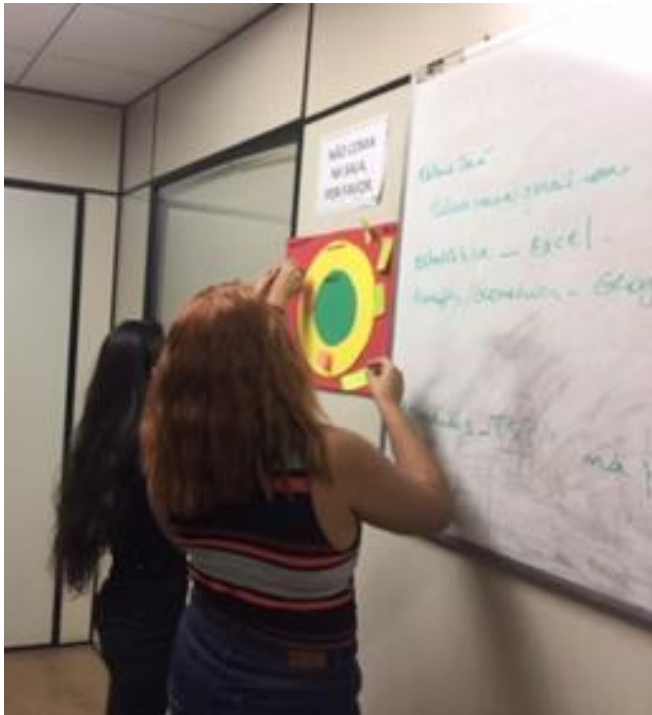


The growth zone model





The growth zone model



Let's have a go ...

The growth zone model

The growth zone model

- Accept feeling of stupidity in red zone as temporary
- How to get out of the red zone?
- Building experience of being in and extending the orange zone

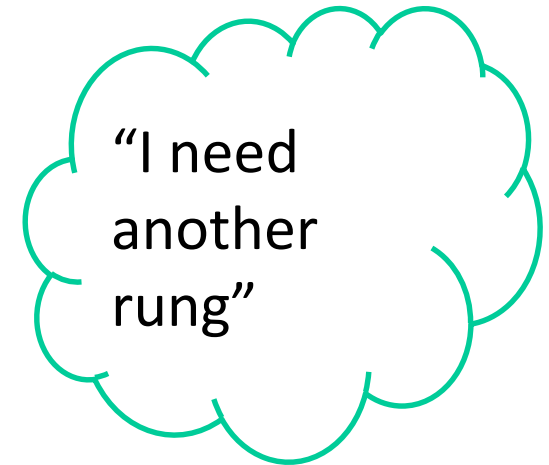
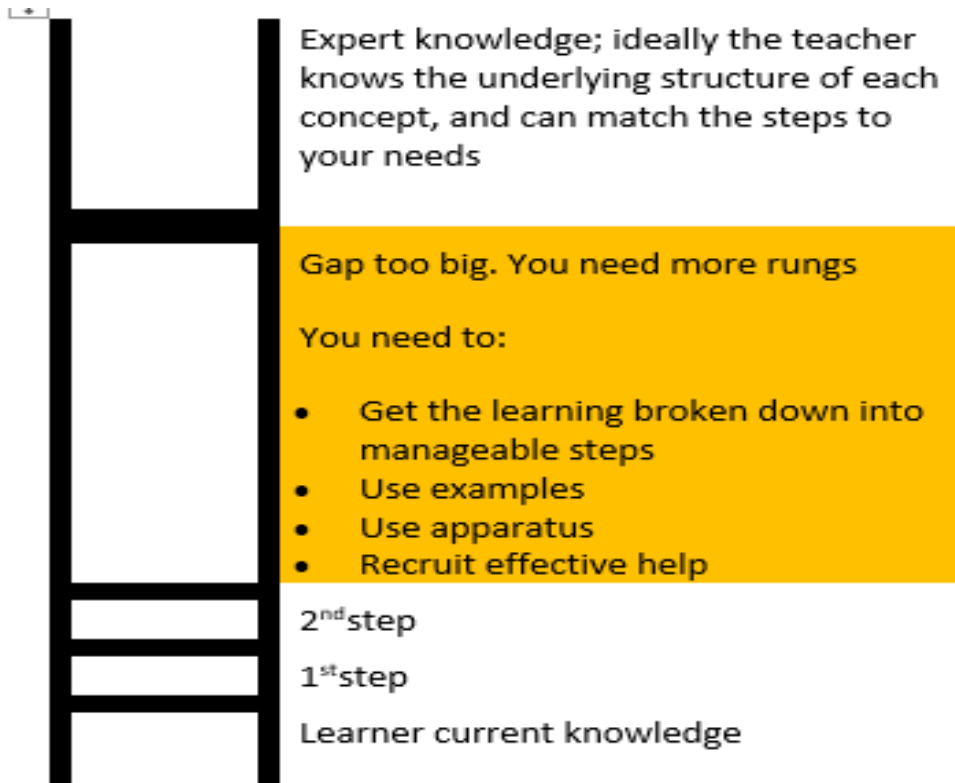
Getting out of the red zone

- Relaxation response (Benson 2000)
- Rest and digest
- 5/7 breathing
- Focus on 5 things you can hear
- Go for a walk
- Don't try to do maths whilst your brain is focused on the "tiger"!
- Has anyone met mindfulness?
- ...

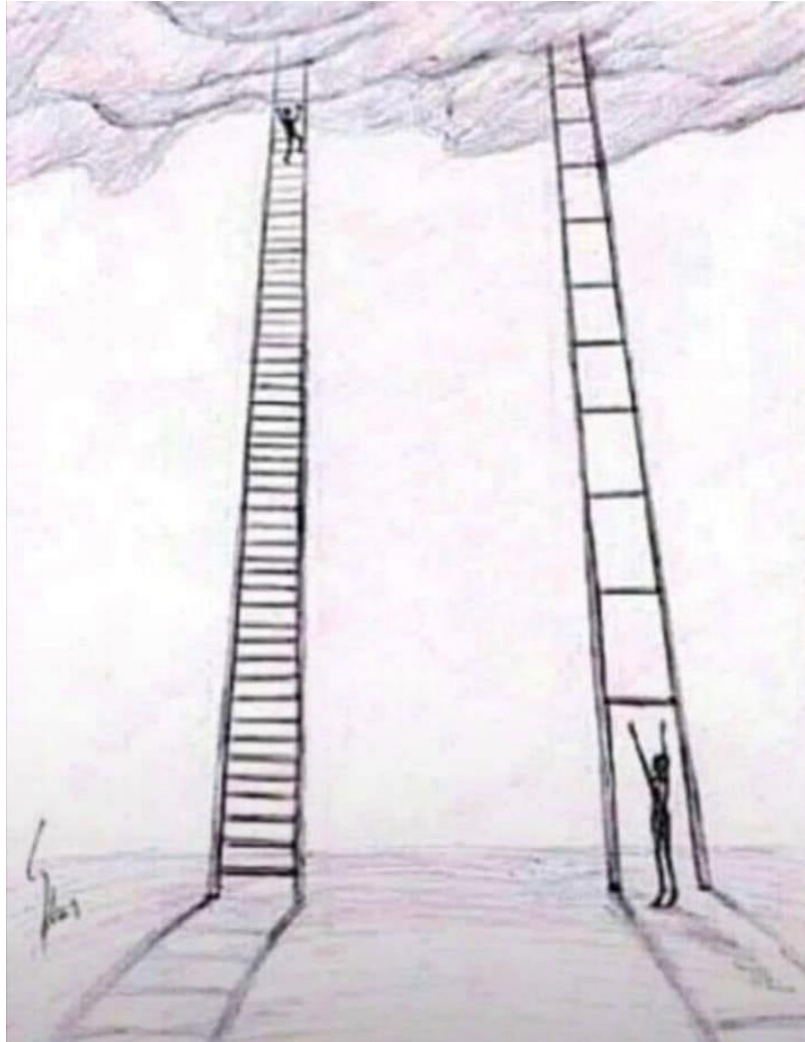
Building the orange zone

- Ask questions
- Try a simpler example
- Support each other
- Use the Internet
- Expect to get stuck
- Expect to make mistakes
- Use rough work
- ...

The ladder model



The ladder model



Tools in practice

- Building a shared language for mathematical safeguarding
- Red means stop talking and listen! This practice takes a while to develop as a teacher!
- Some teachers give each learner a copy of the GZM to use with a coin
- Some teachers give learners opportunity to write their own words for the feelings in each zone
- How would you use the tools?