GCSE RE-SITS: DEVELOP YOUR PRACTICE (LEVEL 5 MODULE) MATHS

SESSION 8 – MAKING CONNECTIONS

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JUNE/JULY 2020

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WELCOME

TEACHING APPROACHES

MEETING THE NEEDS OF ALL LEARNERS

You should have watched the video Meeting the needs of all learners and noted the strategies used to address the range of learner needs.

"When we try to meet the needs of learners, we may find that we need to be more relaxed about covering the syllabus. We need to address their learning needs, not our own predetermined agenda."

How do you respond to this?

LEARNING OUTCOMES

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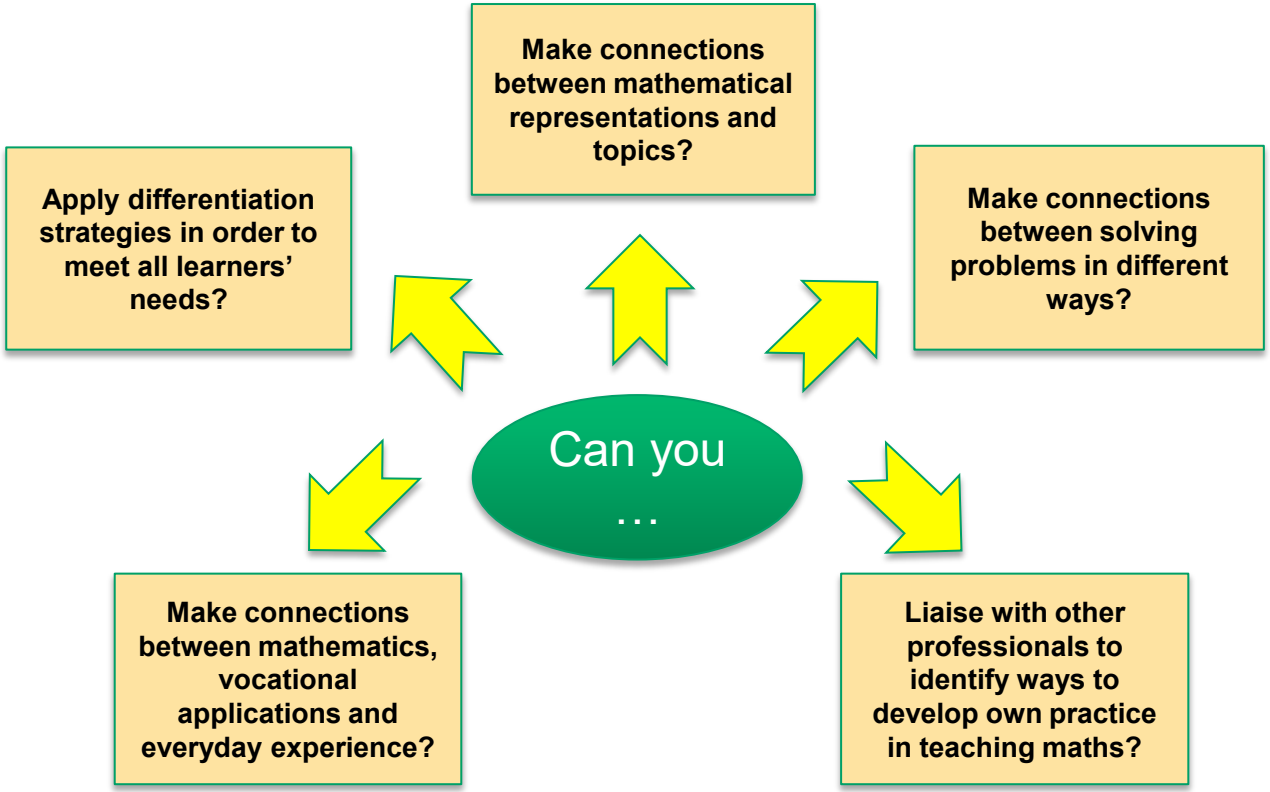


MAKING CONNECTIONS

Studies of effective teaching found three main teaching approaches were in use.

- Transmission
- Discovery
- Connectionist

- Askew, M., Brown, M., Rhodes, V., Baker, D., Denvir, H. and Millett, A. (1997) *Effective teachers of numeracy*. London: King's College London.
- Coben, D., Brown, M., Rhodes, V., Swain, J., Ananiadou, K., Brown, P., Ashton, J., Holder, D., Lowe, S., Magee, C., Nieduszynska, S. and Storey, V. (2007) *Effective Teaching and Learning: Numeracy.* London. NRDC.

TRANSMISSION

- Mathematics is
  - A given body of knowledge and standard procedures.
  - A set of universal truths and rules which need to be conveyed to learners.
- Learning is
  - An individual activity based on watching, listening and imitating until fluency is attained.
- Teaching is
  - Structuring a linear curriculum for the learners;
  - giving verbal explanations and checking that these have been understood through practice questions;
  - correcting misunderstandings when learners fail to grasp what is taught.

DISCOVERY

Mathematics is

- A creative subject in which the teacher should take a facilitating role, allowing learners to create their own concepts and methods.

Learning is

- An individual activity based on practical exploration and reflection.

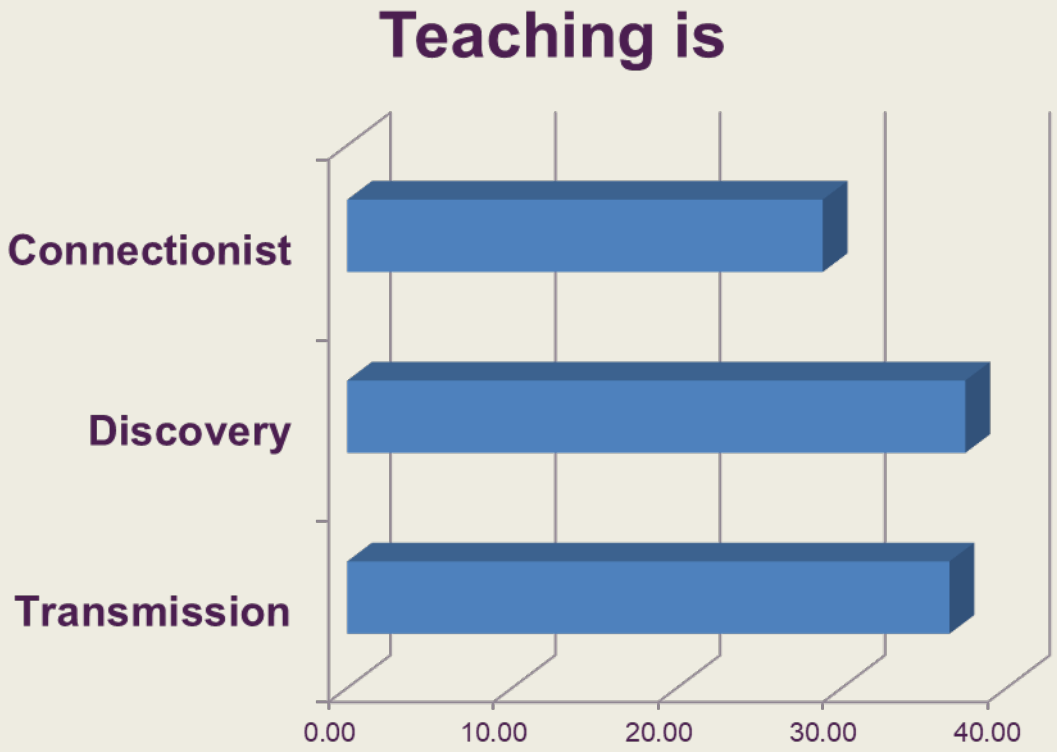
Teaching is

- Assessing when a learner is ready to learn;
- providing a stimulating environment to facilitate exploration;
- and avoiding misunderstandings by the careful sequencing of experiences.

CONNECTIONIST

- Mathematics is
  - An interconnected body of ideas which the teacher and the learner create together through discussion.
- Learning is
  - An interpersonal activity in which learners are challenged and arrive at understanding through discussion.
- Teaching is
  - A non-linear dialogue between teacher and learners in which meanings and connections are explored verbally.
  - Misunderstandings are made explicit and worked on.

PARTICIPANTS' BELIEFS



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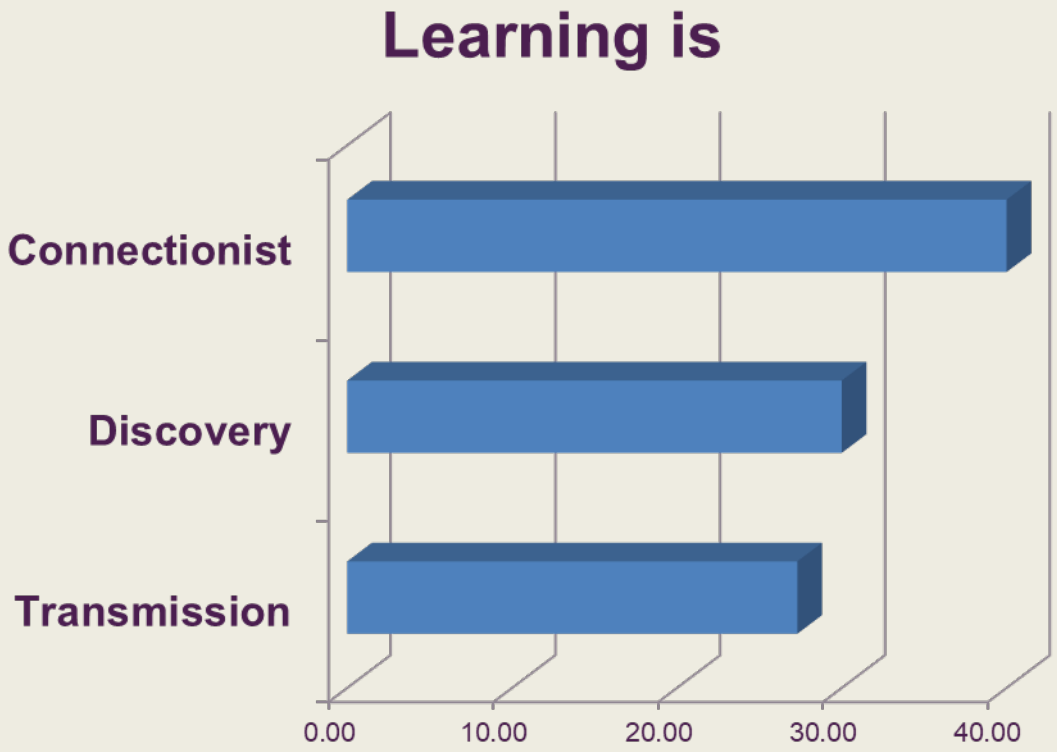

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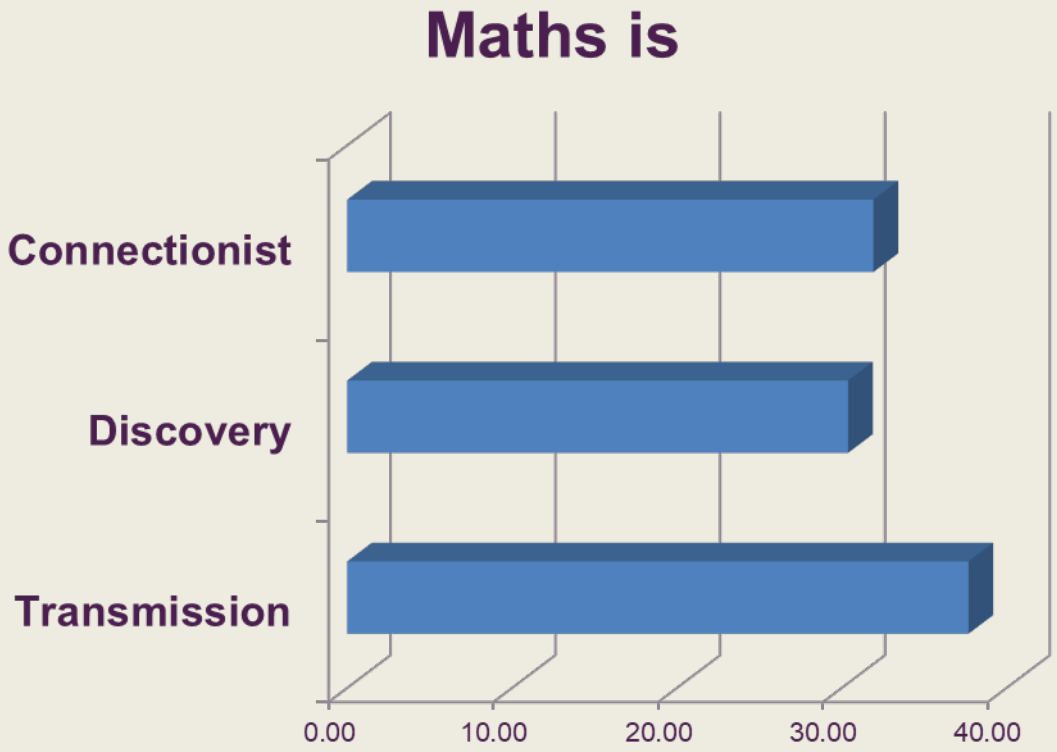

MAKING CONNECTIONS

- The ‘connectionist’ approach to teaching and learning maths was found to be the most effective.
- Learners develop a deeper understanding of concepts instead of just gaining fluency at following procedures.

- Askew, M., Brown, M., Rhodes, V., Baker, D., Denvir, H. and Millett, A. (1997) *Effective teachers of numeracy*. London: King’s College London.
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LEARNING AND THINKING

LEARNING STYLES

- Widespread belief in the concept of learning styles.
- Recent studies (Coffield et al, 2004, Riener and Willingham, 2010) question their value.
  - Not helpful to pigeon-hole learners.
  - More important to match the presentation with the nature of the subject.
  - Target a range of learning styles.
- May be of more value to consider learners' cognitive style (Chinn, 2007). 'If children don't learn the way we teach, then we have to teach them the way they learn

THINKING STYLES

- Do these questions in your head and remember how you worked out the answer.
  1. 432 + 96
  2. 621 – 198
  3. 2 x 3 x 4 x 5

CONCRETE -> PICTORIAL -> ABSTRACT

- You can user paper and pencil for these ones. Remember how you worked out the answer.
  4. Red pens cost 17p and blue pens cost 13p. If I buy two red pens and two blue pens how much do I pay?

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Did you visualise this layout in your head?

$$\begin{array}{r} 432 \\ +\ 96 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 621 \\ -\ 198 \\ \hline \\ \hline \end{array}$$

VISUALISATION (SINGAPORE BAR MODEL)

3. 2 x 3 x 4 x 5

4. Red pens cost 17p and blue pens cost 13p. If I buy two red pens and two blue pens how much do I pay?

THINKING STYLES

- It's useful to have access to a mixture of methods for solving problems.
- If you got all ‘I’s or all ‘G’s you may be less flexible.
- Having access to both thinking styles helps you to check your answer.
- What are the implications for teaching GCSE maths?

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MAKING CONNECTIONS

MAKING CONNECTIONS

- Some (numeracy) examples –
  - Probability can be connected to fractions, decimals and percentages.
  - Division can be connected to fractions and ratio.
  - Multiplying and dividing by powers of 10 can be connected to converting between metric units of measure.

MAKING CONNECTIONS

Can we make connections between GCSE maths topics?
Watch the video and note the connections made between topics.

GEOGEBRA

Dynamic maths package that demonstrates the connection between geometry and algebra (and many other things).
Available to download at https://www.geogebra.org/download
Web version available at https://web.geogebra.org/app/
Geogebra Tube http://tube.geogebra.org/ for free interactive learning and teaching resources.
Geogebra YouTube channel for quick start guides and tutorials.

Autograph and Desmos are alternatives

CONTEXTUALISING AND EMBEDDING

- Learning maths in contexts that relate to vocational studies, everyday life or work experience can help learners -
  - To feel maths is less threatening;
  - To make maths more meaningful to them;
  - To develop a more positive attitude towards maths;
  - To develop a deeper and more sustained understanding of maths concepts

FOLLOW-UP ACTIVITY

Talk to a vocational tutor. Make them aware of the content of GCSE maths. Find out what maths occurs naturally in their subject. Agree a few examples of how maths topics could be contextualised or embedded.
Or: Research some ways that GCSE maths topics are used in everyday life. Create a few examples of maths topics contextualised to general life and personal interests

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SUMMARY

RME

- Less emphasis on algorithms.
- More emphasis on understanding and problem solving.
- ‘Guided reinvention’.
  - Teacher uses ‘realistic’ materials to guide learners
- Use of models to represent contextual situation
  - Bridge the gap between informal and formal methods.

SUMMARY

- Reflect on what you have learned from this session
- Self-assess against the objectives for the session
- What do you think are the most important issues arising from this session?
- How will you apply this in your teaching & learning?

LEARNING OUTCOMES

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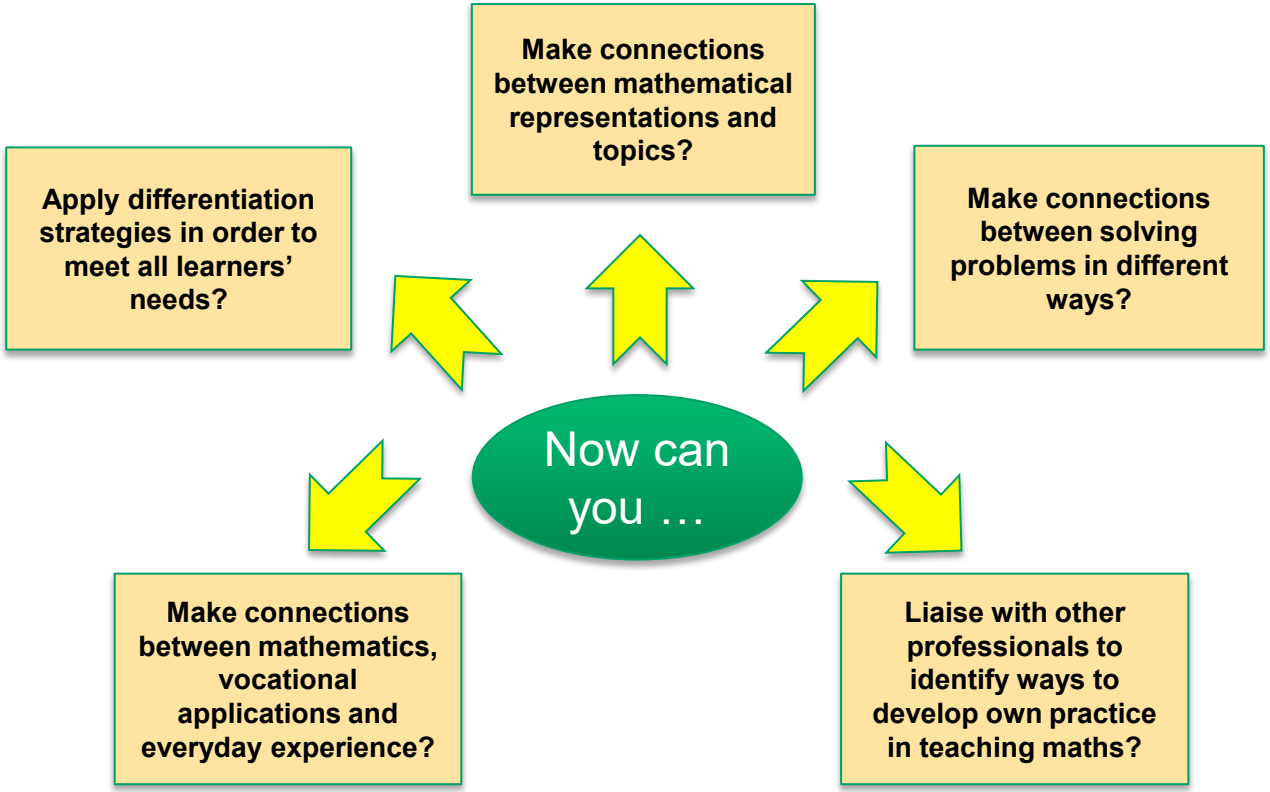

FURTHER READING (FOR THOSE PURSUING ACCREDITATION)

- Askew, M., Brown, M., Rhodes, V., Baker, D., Denvir, H. and Millett, A. (1997) *Effective teachers of numeracy*. London: King's College London.
- Coben, D., Brown, M., Rhodes, V., Swain, J., Ananiadou, K., Brown, P., Ashton, J., Holder, D., Lowe, S., Magee, C., Nieduszynska, S. and Storey, V. (2007) *Effective Teaching and Learning: Numeracy*. London. NRDC.
- Coffield F., Moseley D., Hall E., & Ecclestone K. (2004) *Learning Styles and Pedagogy in post-16 learning: A systematic and critical review.* London: LSRC.
- Riener, C., & Willingham, D. (2010). The myth of learning styles. *Change: The magazine of higher learning*, 42(5), 32-35. [available at http://new.peoplepeople.org/wp-content/uploads/2012/07/The-Myth-of-Learning-Styles.pdf].
- Robey, C. and Jones, E. (2015) *Engaging Learners in GCSE English and maths,* Leicester: NIACE. [available at http://shop.niace.org.uk/engaging-learners-gcse-maths-english.html].
- Casey, H., Cara, O., Eldred, J., Grief, S., Hodge., Ivanic, R., Jupp, T., Lopez, D. & McNeil, B. (2006) *"You wouldn't expect a maths teacher to teach plastering…": Embedding literacy, language and numeracy in post-16 vocational programmes – the impact on learning and achievement.* London: NRDC.

PREPARATION FOR NEXT SESSION

- Read the MEI booklet: Strategies for preparing learners for maths examinations
- Make notes of the key points & evaluate the different approaches to revision.

An opportunity for reflection: Engaging with the ETF's Professional Standards

- In preparation for each of our courses we ask that you reflect upon your own professional progress and development in relation to the Education and Training Foundation's Professional Standards for FE Teachers.
- You may have also completed the ETF Professional Standards self-assessment Tool: Professional Standards - Self Assessment.
- You may now wish to revisit the Professional Standards:
  - *has your learning today supported your progression in relation to the professional standards?*
  - *has your learning today encouraged you to explore other areas of professional and/ or personal development as they relate to the professional standards?*

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THANK YOU
ANY QUESTIONS?