



Enquiry Learning and Problem Solving

Conceptual Understanding in Numeracy

Professional Learning Pack

This pack contains five papers relating to the topics of enquiry learning and problem solving. The papers should stimulate reflection on the place of problem solving and enquiry learning within everyday teaching of mathematics and the contribution these make to developing resilience in learners. There are case studies of lessons which allows for practitioners to reflect upon the structure and organisation of their own maths lessons.

READING 1

Maths with Meaning, Mike Askew (2008) – King’s College, University of London

Weblink: <http://mikeaskew.net/page3/page2/files/Mathswithmeaning.pdf>

Askew argues for the importance of starting with a problem solving context. Where the context is related to real life contexts children intuitively bring necessary background knowledge. The author believes in the importance of ‘hooking’ children in to the problem rather than starting the lesson with a WALT.

Reflective Questions

1. Why is it important to use meaningful contexts for problem solving?
2. Which part of this lesson do you think was most important and why? Discuss.
3. What might be a problem with starting a maths lesson with a WALT statement?
4. Summarise the key messages from the text.

READING 2

Child Centred Inquiry Learning: How Mathematics Understanding Emerges, Nigel Calder and Chris Brough – University of Waikato (2013)

Weblink: <https://www.cimt.org.uk/journal/calder.pdf>

The authors believe that mathematical learning can begin with a meaningful problem that arises from the real life of the children. There are three case studies which are discussed. The authors contend that this enquiry approach within a meaningful co constructed context leads to children being motivated and engages in conceptual understanding.

Reflective Questions

1. What might be the strengths and weaknesses for learners when teachers use a student initiated inquiry approach to mathematics?
2. In what ways do you see a link between inquiry learning and interdisciplinary learning?
3. The authors contend that inquiry learning involves skills not measurable through standardised testing. To what extent do you feel your teaching is influenced by standardised testing?
4. Summarise the key messages from the text.

READING 3

Transforming Pedagogical Practice in Mathematics: Moving from Telling to Listening, Christine Suurtamm and Nancy Vezina - University of Ottawa (2010)

Weblink: <https://cimt.org.uk/journal/suurtamm.pdf>

Mathematical procedures are often imposed upon children in ways which mean they do not develop mathematical thinking and can create barriers for children. Problem solving involves children in constructing and discussing strategies often using manipulates. The importance of teachers listening to children’s thinking cannot be understated. The authors stress the importance of using errors to explore thinking. Teachers in this study reported that children realised they were developing an understanding that did not disappear unlike memorised procedures. Also raises subject of teacher confidence.

Reflective Questions

1. To what extent have you developed a ‘listening orientation’?
2. The authors imply that teachers may lack confidence in allowing learners to share their mathematical thinking. To what extent does this resonate with you?
3. What benefits are there to learners’ discussions about mathematical thinking?
4. Summarise the key messages from the text.

READING 4

Keeping All Students on the Learning Path, Judy Mousley et al (2007)

Weblink: https://sites.unipa.it/grim/21_project/21_charlotte_MousleyPaperEdit.pdf

These authors note that open ended problems can be accessible to all. All students start with the problem but some may get to a point where they need an enabling activity. Teachers need to be aware at the planning stage of potential barriers and have enabling prompts available during the lesson.

Reflective Questions

1. What do you think the authors mean by ‘self fulfilling prophecy effects’?
2. What implications does this approach have for planning?
3. How do the authors cater for differentiation?
4. Summarise the key messages from the text.

READING 5

‘An Inquiry Based Approach to Instruction’ pgs 19-23 in ‘Developing Number Knowledge’ (Red Book), Robert Wright et al (2012)

The authors of these Maths Recovery books advocate an enquiry model based upon problem solving. They emphasise the need for children to work just beyond the cutting edge (ZPD) and should be given time to tackle problems. They make a distinction between two modes, enquiry and rehearsal. Enquiry mode is when children engage with challenging problems, have space and time to work and are involved in discussion and reflection. Rehearsal mode involves recall with answers checked immediately. The time is short and the pace is brisk and the task is usually externally directed.

Reflective Questions

1. What do you think the authors mean by ‘significant mathematical tasks’?
2. What issues might you see in the assertion that teachers must finely adjust tasks during lessons to ensure that learners are working at the cutting edge of their learning?
3. What dangers do the authors identify with the use of materials such as numeral rolls etc?
4. Summarise the key messages from the text.