Making an impact on the National Maths Hubs as a National Teaching Fellow

Jenny Field
Principal Lecturer in Primary Teacher Education
j.field@gre.ac.uk (NTF since 2016)
GOVERNMENT Statutory National Curriculum for Maths

NCETM [https://www.ncetm.org.uk/](https://www.ncetm.org.uk/) 
(National Centre for The Excellence of Teaching of Mathematics) 
Funded by government to support primary and secondary maths in schools

35 National Maths Hubs (since 2014) 
Funded by NCETM to provide support to primary and secondary schools in regions across UK 
A main focus of the National Maths Hubs …

A National focus on:
Shanghai Exchange Programme
(2014- current day)
WHY?

**TIMSS** (Trends in International Mathematics and Science Study)
63 Countries: Children aged 10-14

‘East Asian countries continue to lead the world in mathematics achievement’ (TIMSS 2011:7)
Singapore average percentage 73% England 48% (content and cognition)

**Pisa** (Programme for International Student Assessment)
65 Countries: Children aged 14
2012 mean score: Shanghai 1st   England 26th
So we are trying to find out whether …

… pedagogical approaches developed in Shanghai and Singapore can inform our own teaching and learning in primary mathematics and beyond?
2015 Government Focus: Large Exchange Programme involving 60 teachers from Shanghai
Mathematics Curriculum Framework
Singapore

(CPDD, 2013)
Attitudes to mathematics

Discuss in groups:

• What is the stereotypical attitude towards this subject?
• Why do you think this has come about?

Research indicates 3 key factors
A British Problem?

Mathematical skills are not in decline worldwide.

Attitudes towards mathematics differ hugely between countries

A British Culture Issue?
“children’s initial experiences of education can have profound implications for their future success and well-being. Children are innately curious about the natural world. But, year after year, large proportions are ‘turned off’ science and mathematics by the time they reach secondary school.”
‘our children are not stupid; our children are not inherently inadequate; our children are not born hating maths, we just manage to convince them that they should!’

Carol Vorderman Guardian 17th June 2008
Research into primary mathematics shows that:

‘teachers who dislike maths will find it difficult to be enthusiastic about teaching it.’

‘teacher anxiety … can often be passed on to the children they teach’, thus perpetuating the cycle of negativity’

‘teachers own negative attitudes to mathematics can have a significant influence upon children’


VERY DIFFERENT ATTITUDES IN SHANGHAI AND SINGAPORE
As a NTF I have been allowed time to develop and lead two external research and enterprise projects – looking at lessons we can learn in two particular areas:

Two large nationally funded projects:

Whole School Approaches to Teaching Times Tables (19 schools)

Whole School Approaches to Consistent Modelling (Bar Model) (21 schools)
In a class, 18 of the children are girls.

A quarter of the children in the class are boys.

Altogether, how many children are there in the class?
Singapore Approach
(consistent across all schools)

Visualisation

CPA approach
Bruner’s theory\(^1\): knowledge representation develops in 3 stages

i. Enactive - based on hands-on sensory experiences of physical objects together with the consequences that go after.

ii. Iconic - Knowledge can now be represented using models and pictures. Learners know how to make mental images of their world.

iii. Symbolic - Learners can think in abstract. So abstract terms and symbol systems can be used to represent knowledge like numbers, mathematical symbols, letters and language.
Helen has 9 times as many football cards as Sam.

Together they have 150 cards.

How many more cards does Helen have than Sam?
Have a go

• A herbal skin remedy uses honey and yoghurt in the ratio 3 : 4.

• How much honey is needed to mix with 120 g of yoghurt?
Fractions in year 2 (age 5/6)

NC ‘Add and subtract fractions with the same denominator with one whole’

Using the bar
Video clip – then have a go
Reasoning about fractions (KS1)
https://www.ncetm.org.uk/resources/43609
Take a Strip and a paperclip
What do our students struggle with?

<table>
<thead>
<tr>
<th>0</th>
<th>50%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>0.5</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
<th>1/2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In many ways it is this consistency and progression in modelling that appears to make the difference.
例题：
小胖原有的苹果数量是3个。

1. 把“3个苹果”看作1份，增加2倍就是增加这样的2份。也就是增加2个3。
2. 把小胖的苹果数增加到3倍是几个苹果？
3. 把小胖的苹果数增加到5倍是几个苹果？

「小胖的苹果数增加到5倍是？」

计算过程：
1. 第一份：3个（原始苹果数）
2. 第二份：3个（增加的苹果数）
3. 第三份：3个（增加的苹果数）
4. 第四份：3个（增加的苹果数）
5. 第五份：3个（增加的苹果数）

总共有：3 + 3 + 3 + 3 + 3 = 15个苹果。
SO where next …

Step one:  
Action Research – results published and presented for both projects

Step two:  
Next year a Case Study of several schools as they take this forward (more longitudinal study)

Step three:  
Repeat both projects with 40 new schools 😊
Being a NTF has:

- Raised my profile
- Increased my value to my university
- Given me more freedom to nurture my research and enterprise work
- Allowed me to extend my role to become even more outwards facing and spend more time pursuing the things I love

… thanks for listening 😊