Global Data for Teaching and Learning in Mathematics

Summary of research conducted by Victoria Pendry
Overall Research Questions

• Why is it important to use global data to support teaching and learning in mathematics?

• How can global data be best used to support teaching and learning in mathematics?

• What impacts are there when global data is used to support teaching and learning in mathematics?
• **Rationale**

• There are few research studies that look specifically at global learning and mathematics.

• The report will provide information for schools trying to develop global learning.

• The report will provide information for the GLP trying to develop global learning within mathematics.

• The report will establish a set of core principles to support the planning, delivery and evaluation of global learning in mathematical contexts.
**Painting the World by Numbers**

**Exploring how Global Learning can be used as a rich context for developing data handling and problem solving skills in KS2 mathematics.**

## Meeting the aims of The National Curriculum for England 2014

<table>
<thead>
<tr>
<th>Our curriculum should:</th>
<th>Our pupils should be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide pupils with an introduction to the essential knowledge that they need to be educated citizens;</td>
<td></td>
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<tr>
<td>Use every relevant subject to develop pupil’s mathematical fluency;</td>
<td></td>
</tr>
<tr>
<td>Provide opportunities for numerical and mathematical reasoning in every subject so that pupils can understand and appreciate the importance of mathematics.</td>
<td>Become fluent in the fundamentals of mathematics and solve increasingly complex problems;</td>
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<tr>
<td>Recall and apply knowledge accurately;</td>
<td></td>
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<tr>
<td>Reason mathematically by following a line of enquiry and move fluently between</td>
<td></td>
</tr>
<tr>
<td>representations of mathematical ideas.</td>
<td></td>
</tr>
</tbody>
</table>

## Meeting the requirements of Ofsted as described in the School Inspection Handbook August 2015

| The spiritual, moral and cultural development of pupils is shown by their:              | In mathematics, inspectors will consider how well teaching:                                  |
| Sense of enjoyment and fascination in learning about themselves, others /               | Requires pupils to think and reason mathematically for themselves.                            |
| and the world around them.                                                            | Enables pupils to apply their mathematical knowledge and skills in other subjects in the     |
| interest in exploring, improving understanding of and showing respect for different    |
| faiths and cultural diversity and the extent to which they understand, accept, respect and celebrate diversity. |
| curriculum where appropriate.                                                          | Enables pupils to solve a variety of mathematical problems, applying the mathematical        |
|                                                                                       | knowledge and skills they have been taught.                                                  |

Course currently of offer from the Curriculum Foundation in association with the Global Learning Programme. This course triggered thinking for this research project!
Summary of Activity.

7 Primary Schools. Newcastle, Liverpool, York.

Year 3 and Year 5 Classes – 21 Classes in total.

22 teachers in total.

2 visits to each school. 4 – 6 weeks between visits.

Demonstrate, illustrate and generate ‘global data materials’ for use in mathematics.
‘Demonstration’ Lesson during first visit

• Exploring current attitudes and knowledge of global data of teachers and pupils.

• Setting the scene for global learning and this research.

• Illustrating an approach to mathematics that embraces critical thinking and other student competences.

• Encouraging teachers and pupils to embrace challenge....
Development education is a **process** of learning, rather than a fixed, ideal education end goal. It encourages and **promotes critical and reflective thinking** and an understanding of development themes. It is located within a **values base** of social and global justice. It encourages learners to **make connections** between their own lives and the lives of others throughout the world. It **encourages positive and active engagement in society** in ways that the learner feels could contribute to their own perspective of what a better world could look like.

This is an example of an activity that promotes critical thinking in mathematics. It also illustrates the importance of units of measurement.

Where in the world?

3,074,067 100
148.3 16
20,782 58

Possible units of measurement?
Where in the world?

*Total population in 2016
*°C annual average temperature
*mm monthly average rainfall
*area of the country in Km²
*people per km²
*% of the total population unemployed
*Letters in this place name

If these are the units of measurements, can we make possible connections to the numbers we have just seen?
<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population in 2015</td>
<td>3,074,067</td>
</tr>
<tr>
<td>°C annual average temperature</td>
<td>148.3</td>
</tr>
<tr>
<td>mm monthly average rainfall</td>
<td>20,782</td>
</tr>
<tr>
<td>Km² Area</td>
<td>100</td>
</tr>
<tr>
<td>people per km² Population Density</td>
<td>16</td>
</tr>
<tr>
<td>% of population unemployed</td>
<td>5.9</td>
</tr>
<tr>
<td>Letters in this place name</td>
<td>58</td>
</tr>
</tbody>
</table>
3,074,067 Total population in 2016

148.3 people per km² Population Density

20,782 Km² Area

100 mm monthly average rainfall

16°C annual average temperature

5.9% of population unemployed

58 letters in this place name: Llanfairpwlwgwynfgyllgogerychwyrndrobwlllant
What’s this map all about?

This activity and the following examples, encourage pupils to examine what they already know about maps and the world. They need to use this to form opinions about what this map could be representing. By removing the units of measurement again, pupils can see how hard the map is to interpret!
• Select three places that have a much lower life expectancy than England.

• Is there any correlation between countries with high population densities and low life expectancies? Compose a written report to explain your answer.
List the names of 5 countries who have a low daily calorie intake.

Discuss with your partner, what factors contribute to daily calories intakes in two contrasting countries.

Is this map a useful tool to ascertain levels of poverty across the world?
8. Worldwide Driving Orientation by Country

Map by ChartsBin.com
This illustrates an activity that promoted pupils to estimate how far food travels, based on the book ‘The World Came to my Place Today.’
Languages

In the global village there are almost 6000 Languages, but more than half the people speak these 8 languages:

<table>
<thead>
<tr>
<th>Language</th>
<th>Percent</th>
<th>Decimal</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Hindi</td>
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<tr>
<td>Spanish</td>
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<td>Arabic</td>
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<tr>
<td>Bengali</td>
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<td>Portuguese</td>
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<td></td>
<td></td>
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<tr>
<td>Russian</td>
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</tbody>
</table>

1. Use the hundreds chart to fill in the percentages of each world language. (Use legend)

2. Express each world language as a percent, a decimal, and a fraction (in lowest terms)

3. If the amount of people who speak Spanish were to increase by 300%, how many people in the village would speak Spanish
These photos illustrate a range of activities that took place during the
These photos show some materials and activities which teachers developed in response to what they had seen during the demonstration lesson in Visit 1.
Summary of Findings

There was complete agreement amongst teachers that the use of global data in mathematics is an important strategy for making maths ‘real and relevant’ which provides a significant motivator for pupils to engage in their learning.

All teachers also agreed that enabling pupils to develop the skills to interpret global issues is ‘essential’.
• Pupils and teachers described their **enjoyment** of the maths activities that were demonstrated and provided.

• Teachers were particularly keen to **connect learning** in maths to other areas of the curriculum.
• **Time to prepare materials** related to global data was described as the biggest barrier to continuing to design maths lessons in this way. Some teachers suggested that a collection of short starter activities related to National Curriculum outcomes would be useful and would probably provide a context for the rest of the lesson.

• Other teachers commented that, ‘*This was actually easier than I thought and now I know where to look and have some simple activities that can adapted, I will be able to do this kind of learning more often.*’
• Teachers commented that a motivating factor for developing these materials was the support from the researcher via the demonstration lesson, subsequent relevant resources and the opportunity to discuss strategies for using global data during interviews.

‘I feel inspired to carry on! It was thrilling to see how well the children responded to this style of learning.’ Lynn, Newcastle.
Interviews with pupils revealed that they enjoyed learning about ‘big numbers to describe the world’ but when asked about what they liked learning in maths overall, their comments often related to strategies for learning table facts and methods for long division.

It would be useful to explore this further. Do pupils enjoy this structural, decontextualized approach to mathematics because a) it is clearer without a context b) it is more ‘right or wrong’ c) they do not recognise some of this global learning as maths.
Thank you for listening!

pendryv@gmail.com

@VictoriaPendry1