Teaching primary learners how to be data citizens

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dataschools.education
Data Education in Schools: What we do

- Curricular Framework for Data Education
- Teaching materials for learners aged 3-18
- Professional Learning workshops for teachers

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What is data literacy?

Data literacy is the ability to ask questions, collect, analyse, interpret, communicate stories about data.

Our focus is on what people do with data, not what machines do with it.
Become a data citizen…

Find meaning in data
Control your personal data trail
Be a critical consumer of data
Take action based on data
Data literacy is already in the curriculum!

Outcomes for **learning** core data literacy concepts include:

- Technologies
- Numeracy and Maths
- Literacy
- Social Studies
Applying data skills across the curriculum

- Energy use and conservation of materials
- Environment and sustainability
- Weather and climate
- Journeys, travel and trade
- More physical activity, better sleep and nutrition
- The journey of food, and calculating food miles
- Water pollution and water conservation
- Using sensors to monitor plant growth
Digital literacy? Data literacy?

- Structuring information
- Using Microbits for data handling
- Internet of Things sensors
- Using tablets/laptops for research
- Understanding data privacy

Data literacy
- Spotting misinformation
- Using software to make graphs

Computational thinking
- Programming

Digital literacy
How to use data to solve problems

It can be difficult to persuade others to help us solve a problem without us explaining the issue and giving evidence.

PPDAC is a way to solve problems using data.
Discover a claim which needs to be investigated, wonder whether it can be true

- Things we see or experience every day
- Simple class experiments
- News stories
Investigating a claim

- How does this information connect with what we already know?
- Is this a fair comparison?
- Does this make sense with what we already learned?
- How much should we trust this information?
- Why is the person who wrote this article/drew this graph interested in this topic? Could they be biased?
Data for physical activity
Decide how to answer your question

• What do you need to know?
• How might they find it out?

Learners could plan to collect data themselves or they might use data that is already available.
Working with collections of objects

We collected lots of items. How can we find what we have collected most of?

I wonder how we could sort them?

Can you tell me how you sorted these? Are there other ways you could sort them?

How many groups have we got?

Is it easy to decide where to put the pictures? Why? Why not?

Are there any unusual values in your data – could these be mistakes?
Using pre-existing data

- What questions do you think had been asked when this data was collected? Who was asked/involved?
- What units of measurement did the researchers use for each variable?
- Do you think this dataset is reliable? Why?
- What is the range of possible values which could have been given to the questions they asked? (e.g. different categories or the sensible range of numerical values, such as not expecting negative values for height)
Gather and sort data
Organise data

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What is the smallest or biggest value that this variable takes in your dataset? What's the difference between the smallest and largest value? (Or spread/variance if your learners have covered these concepts)

What is a typical value for this variable? The most/least common category? (Or mean, median or mode, if your learners have covered these concepts)

Is the data arranged in the best way to help you answer this question?

What kind of graph or table will help you to understand the data most clearly?
Getting to Grips with Graphs

Teaching how to represent frequency counts in graphs of increasing difficulty. Start with categorising* real objects, then move on to showing the objects as symbols.

1. Categorised objects

*Note: other examples will be more appropriate for learners with colour blindness, e.g., categorisation by shape.

2. Picture graph

<table>
<thead>
<tr>
<th>Leaf colour</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>1</td>
</tr>
<tr>
<td>Brown</td>
<td>2</td>
</tr>
<tr>
<td>Green</td>
<td>4</td>
</tr>
<tr>
<td>Red</td>
<td>3</td>
</tr>
</tbody>
</table>

3. Dot plot & tally marks

4. Frequency chart

5. Bar chart

6. Pie chart

(Note: proportional reasoning is assumed)
When looking at a graph:

- Do you see any clusters?
- What do you notice, what do you wonder?
- What shapes do you see here and what do you think they mean?
- How does this group compare to that group?
- Can you explain the pattern?
Visualising data
Human Bar Graphs

@MrsPage_G
PE

 @_SteeleJackson
Using data to change behaviours
Birds!
What is worth noticing about birds on your school playground? Can you think of a question to investigate?

- What do we want to know about or find out more about?
- How can we find out what’s going on?
- What birds do we see? At what time of year? Can we be sure we will notice them all?
- What sort of trail do birds already leave?
Birds!
How will you collect information (data) to answer your question (problem)?

What have you chosen to count/collect as data?

What problems might we encounter? What else do we need to think about, like time of day or tools for data collection?

What do you think the possible answers could be?

Who else will need to use or understand the data?

How could you record this data?

What sorts of details do you need?
Birds!
How will you collect and organise the data?

- How can you gather your data?
- Are you sure that all the details are correct?
- What different ways can you think of to represent this information?
- How can you sort your data?
- Can you sort it in a different way?

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Birds!
What have you found out?

What do you notice?
For each feeder the beginning and end of the story is the same. But what happened in the middle of the story is different. Looking at the graphs, what can you tell about when the seeds were eaten?

What can't you tell?

What do you wonder?
What kinds of graphs or charts or tables or diagrams could you use to share your information?

Are there shapes or patterns that tell you something interesting?
Birds!
Can you answer your question?

- Does what you found out make sense? Is it what you expected?
- Have you learnt something new about your original problem?
- What was effective about how you tried to find out what’s going on? What were the challenges and limitations?
- Are there new problems you need to think about? For example, did things happen at times of day that you didn’t get to find out about?
- Do you need more information to answer your question/problem?
A SUPER GUIDE TO...
ASKING GOOD QUESTIONS!

WHAT ARE YOU MEASURING?
This is your variable.

HOW WILL YOU ANSWER YOUR QUESTION?
How high?
How many? How often?
Most? Least?
Most popular?
Most frequent?

CAN YOU COLLECT THIS DATA?
How high are the clouds above the school?

WHICH GROUPS WILL YOU SURVEY?
This is your population.

HOW LONG WILL YOU GATHER DATA?
Hourly? Daily? Weekly?
Every lunchtime? For a term, for a year?

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Is it an interesting question?
Is it worth answering?

DATA EDUCATION IN SCHOOLS

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TeachData
Data 101 videos for teachers

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Defend the Rhino
The V.I.K.I.N.G.S. (Villains, Insurgents and Kleptomaniacs: Invading Networks and Global Systems)

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The V.I.K.I.N.G.S. Pets

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YOUR TASK...

The VIKINGS are trying to build a new secret mega lair. Discover the location to foil their plans!

We don’t have enough DATA agents to check out all the possible locations. Use information to narrow down the possibilities so that we can send out agents to the most likely targets.
Grid references

Great Britain is covered by grid squares measuring 100 km by 100 km, and each grid square is identified by two letters. This unique reference system is known as the **National Grid**.

The two-letter names of each large 100 km x 100 km square are shown in the bottom right corners of the squares on your map.
Relevant, meaningful, engaging contexts
Books for discussing data
Discussion questions

• What does this mean for your practice? For example, what might you change or try out?
• What data literacy techniques do you already use?
• What questions do you have for us?
Next steps

Learn how to teach data literacy
dataed.in/data101videos

Read our Data Literacy Handbook
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Get in touch
dataschools@ed.ac.uk

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Thank you!

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