Teaching primary learners how to be data citizens

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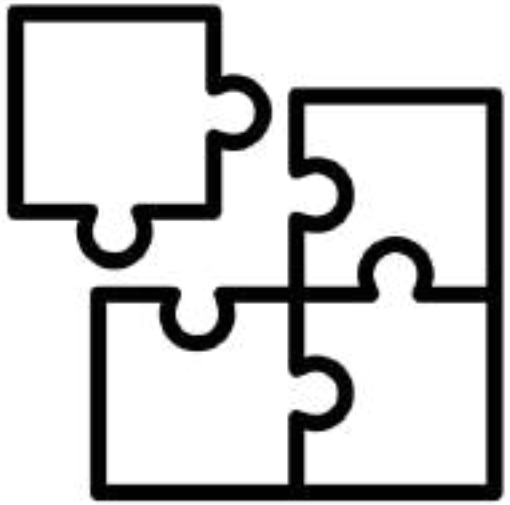
dataschools.education

Data-Driven Innovation

Data Education in Schools

THE UNIVERSITY of EDINBURGH

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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Data Education in Schools

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

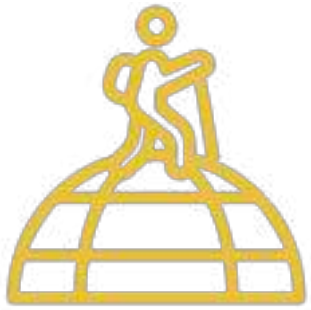
The journey of food, and calculating food miles

More physical activity, better sleep and nutrition

Energy use and conservation of materials

Water pollution and water conservation

Using sensors to monitor plant growth

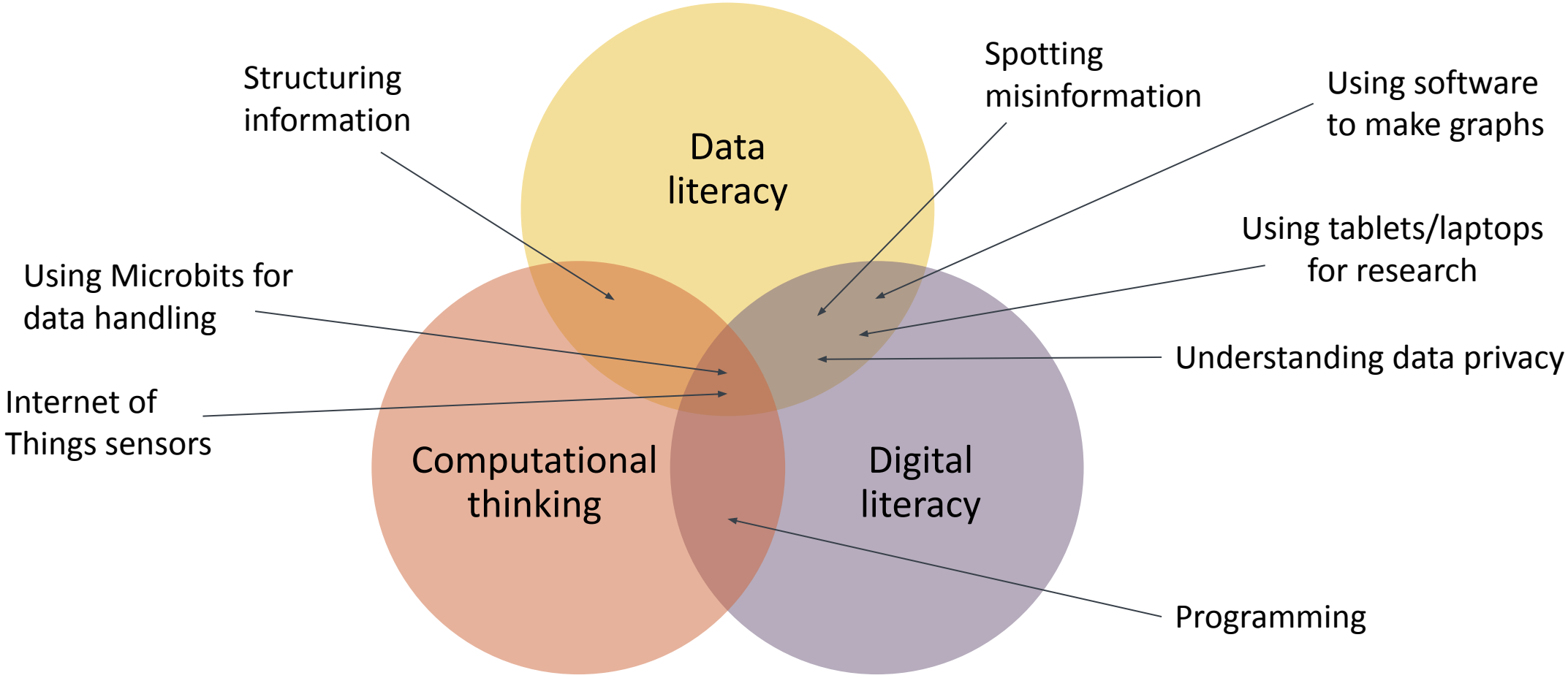


Environment and sustainability

Weather and climate

Journeys, travel and trade

Digital literacy? Data 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.

problem

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

problem

Investigating a claim

Is this a fair **comparison?**

How does this information **connect** with what we **already know?**

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?**

problem

Data for physical activity

plan

Decide *how* to answer your question

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

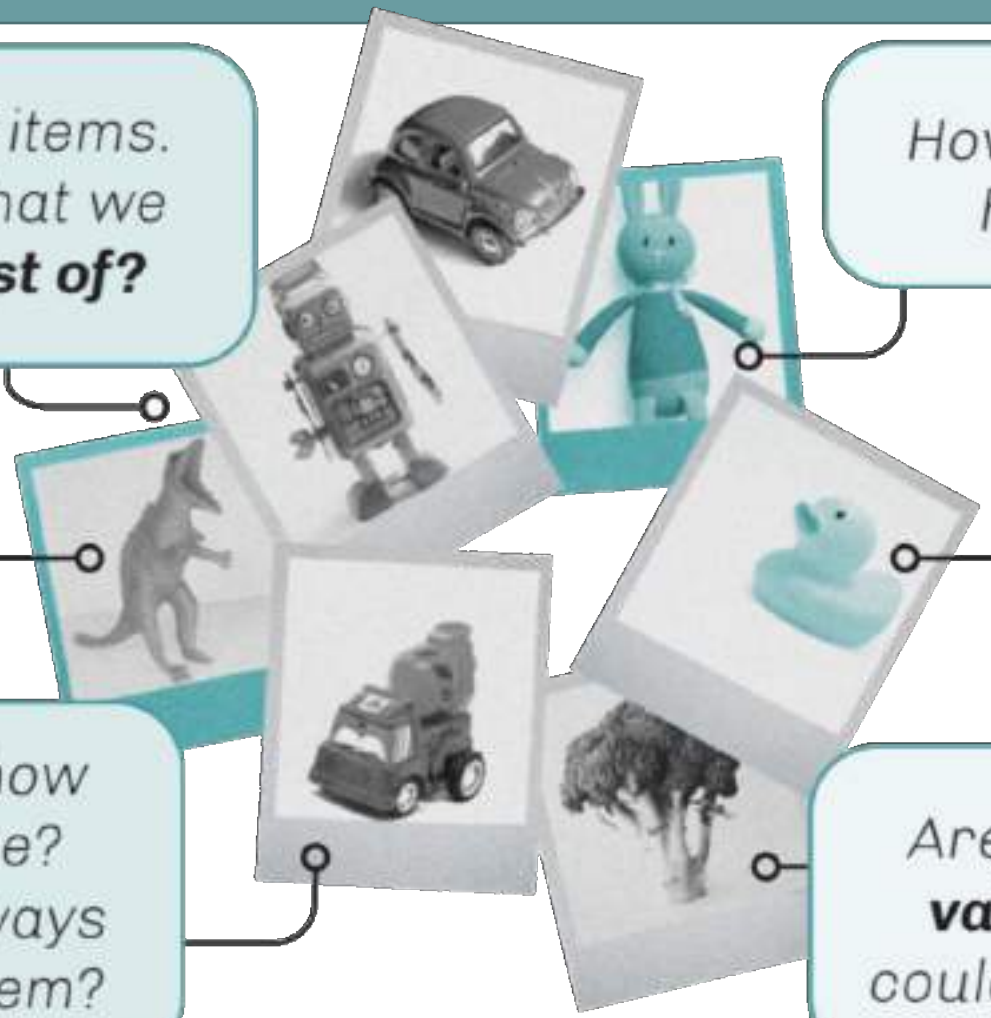
Learners could plan to collect data themselves or they might use data that is already available.

data

Working with collections of objects

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

How many **groups** have we got?



I wonder how we could **sort** them?

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

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

Are there any **unusual values** in your data – could these be **mistakes**?

Using pre-existing data

data

What questions do you think had been asked when this data was collected? **Who** was asked/involved?

Do you think this dataset is **reliable?** Why?

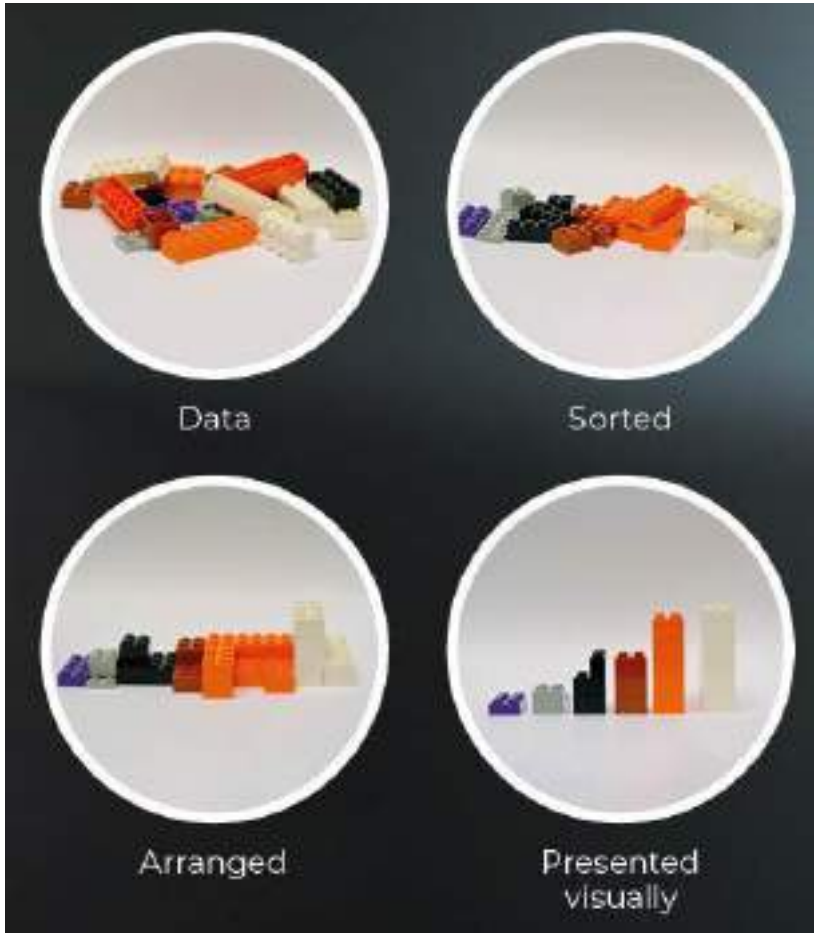
What **units of measurement** did the researchers use for each **variable?**

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)

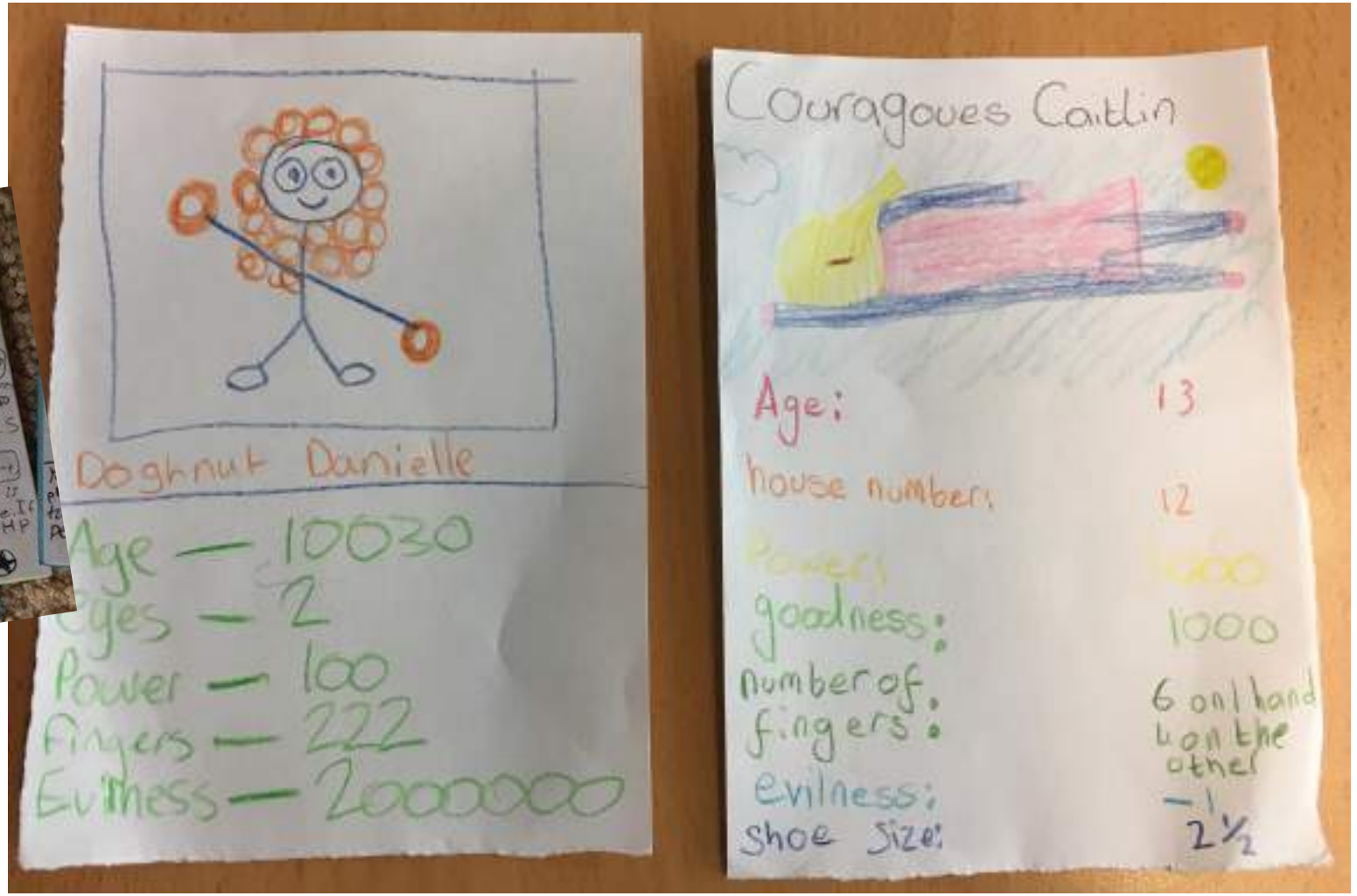
data

Gather and sort data



Organise data

data



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analysis

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

analysis

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.*

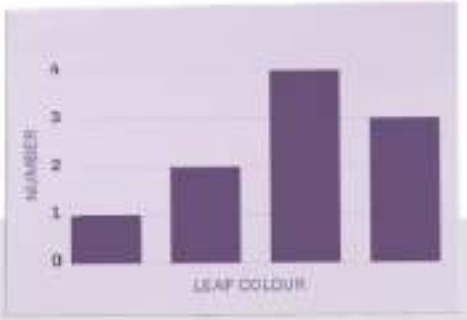
1. Categorised objects

2. Picture graph

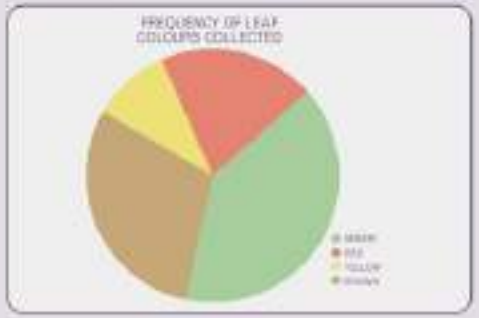
Leaf colour	Frequency
Yellow	1
Brown	2
Green	4
Red	3

4. Frequency chart

3. Dot plot & tally marks



5. Bar chart



6. Pie chart

(once proportional reasoning is secure)

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

When looking at a graph:

analysis

Do you see any **clusters?**

What do you **notice,** what do you **wonder?**

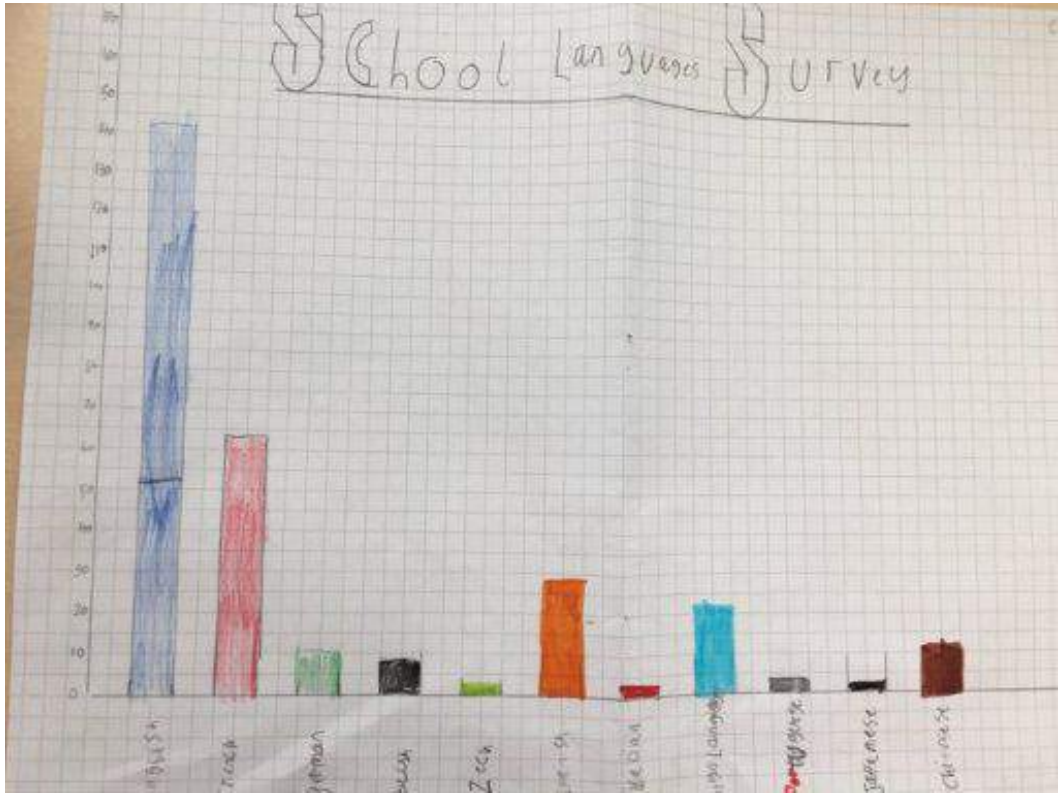
How does this group **compare** to that group?

What **shapes** do you see here and what do you think they **mean?**

Can you explain the **pattern?**

analysis

Visualising data



analysis

Human Bar Graphs

@MrsPage_GPE

@_SteeleJackson_

conclusions

Think back to the questions you wanted to answer in the Problem stage. What are your **answers?**

Which of your **results** did you find most **surprising?**

Should we **trust** these results? Why/Why not?

Have you got any ideas about how we could **improve** the way we did this investigation?

Would the **results** of your investigation be the same if you had worded the questions in a **different** way?

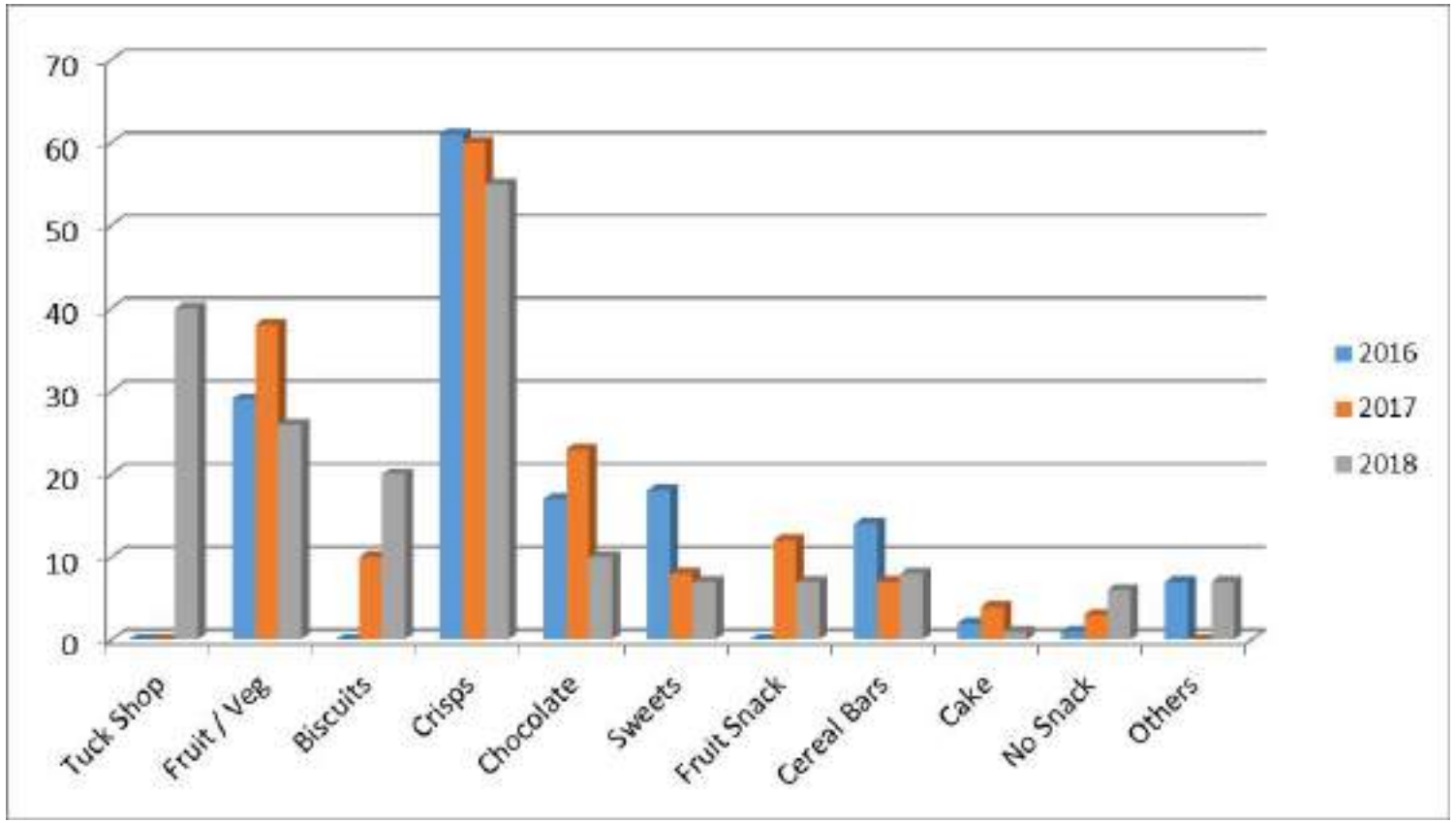
How does what you found out relate to our **community?**

Do you have any **more questions** you'd like to answer now?

What **action** do you think we should take to change things based on your analysis? How could we **persuade others to act?**

Using data to change behaviours

conclusions



problem | plan | data | analysis | conclusions

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?

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problem | plan | data | analysis | conclusions

Birds!

How will you collect information (data) to answer your question (problem)?

What have you chosen to count/ collect as data?

Who else will need to use or understand the data?

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

How could you record this data?

What sorts of details do you need?

What do you think the possible answers could be?

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problem
plan
data
analysis
conclusions
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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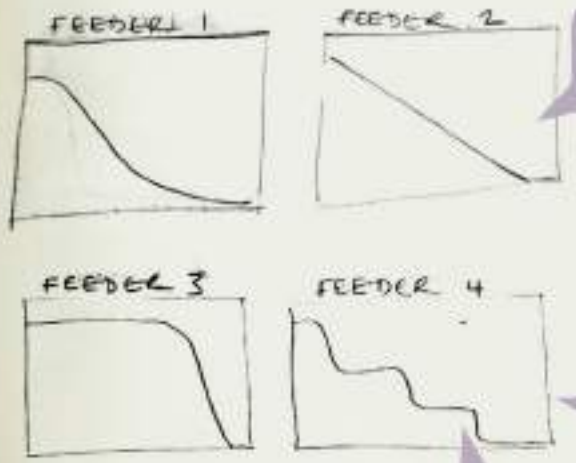
problem | plan | data | analysis | conclusions

Birds!

What have you found out?

What do you notice?



What do you wonder?

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

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?

Are there shapes or patterns that tell you something interesting?

What can't you tell?

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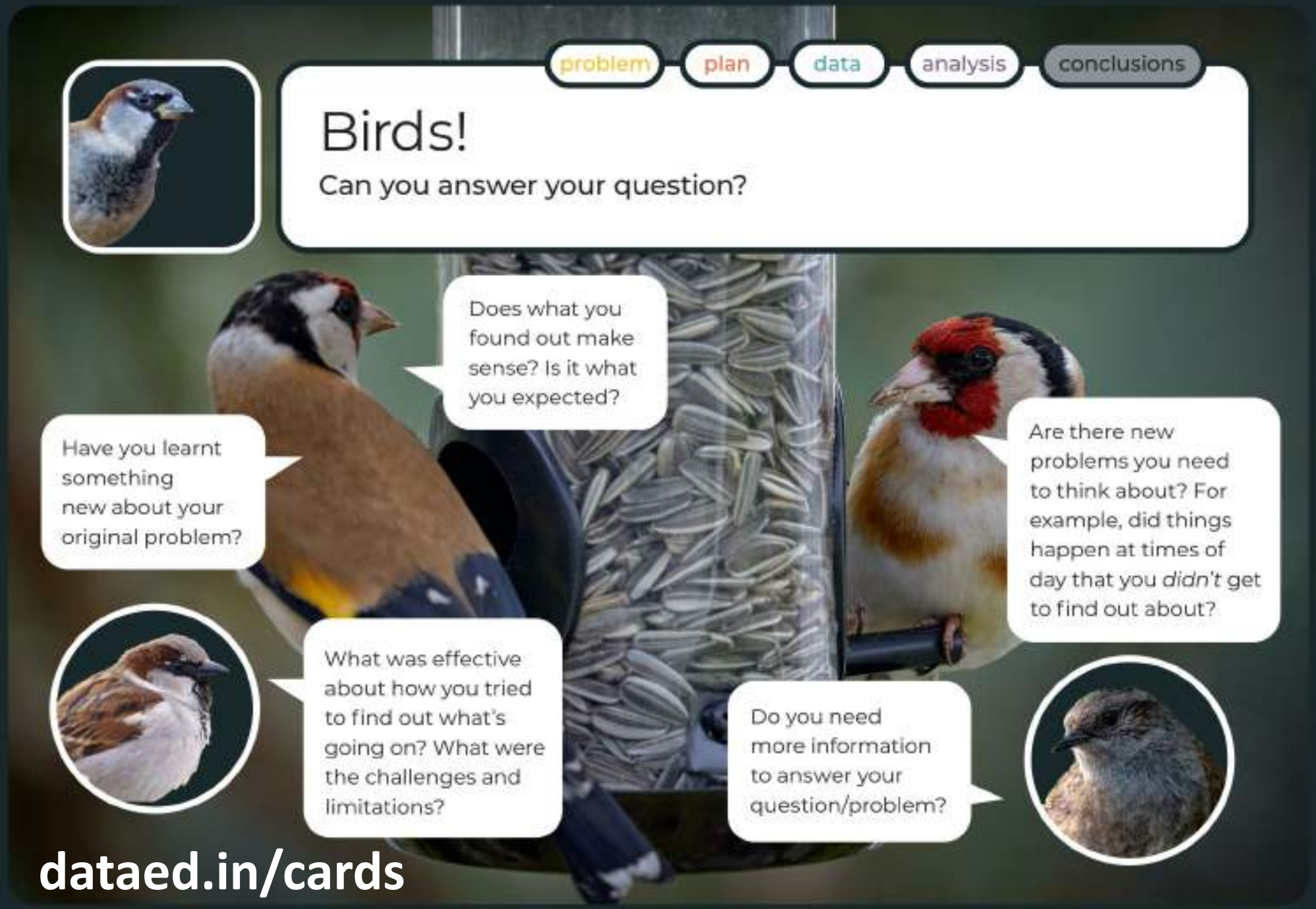
problem
plan
data
analysis
conclusions
Birds!
Can you answer your question?
Does what you found out make sense? Is it what you expected?
Have you learnt something new about your original problem?
Are there new problems you need to think about? For example, did things happen at times of day that you *didn't* get to find out about?
What was effective about how you tried to find out what's going on? What were the challenges and limitations?
Do you need more information to answer your question/problem?
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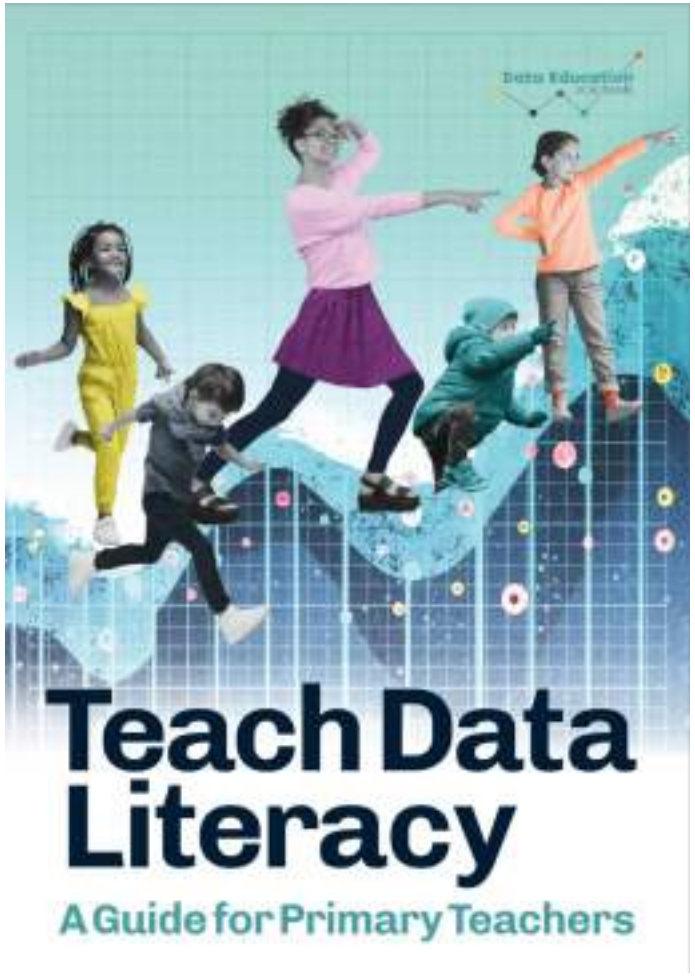
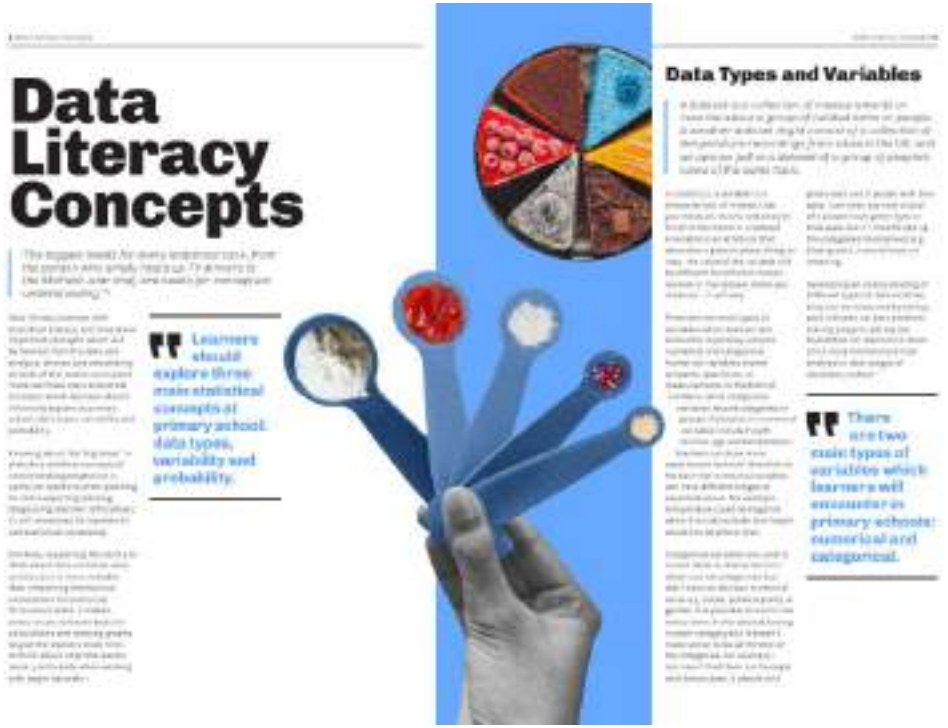
Teach Data Guide for Primary Teachers





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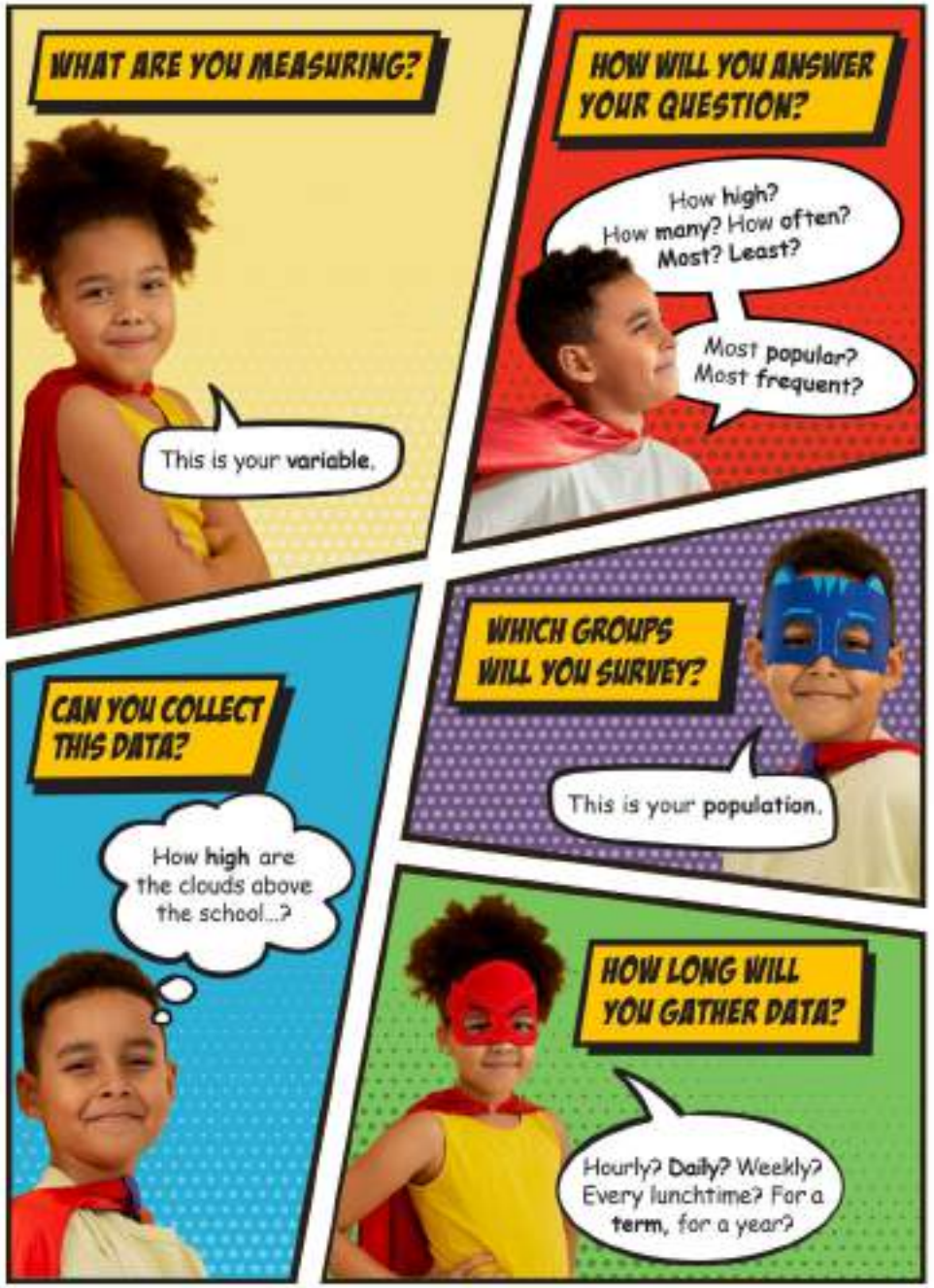
A SUPER GUIDE TO...

ASKING GOOD QUESTIONS!

Data Education in Schools

USING DATA TO CHANGE THE WORLD!



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Data 101 videos for teachers

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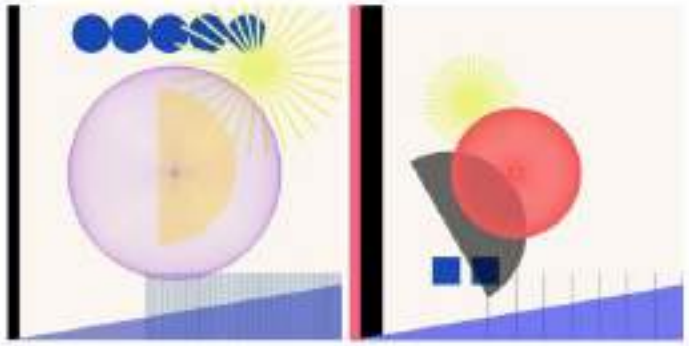
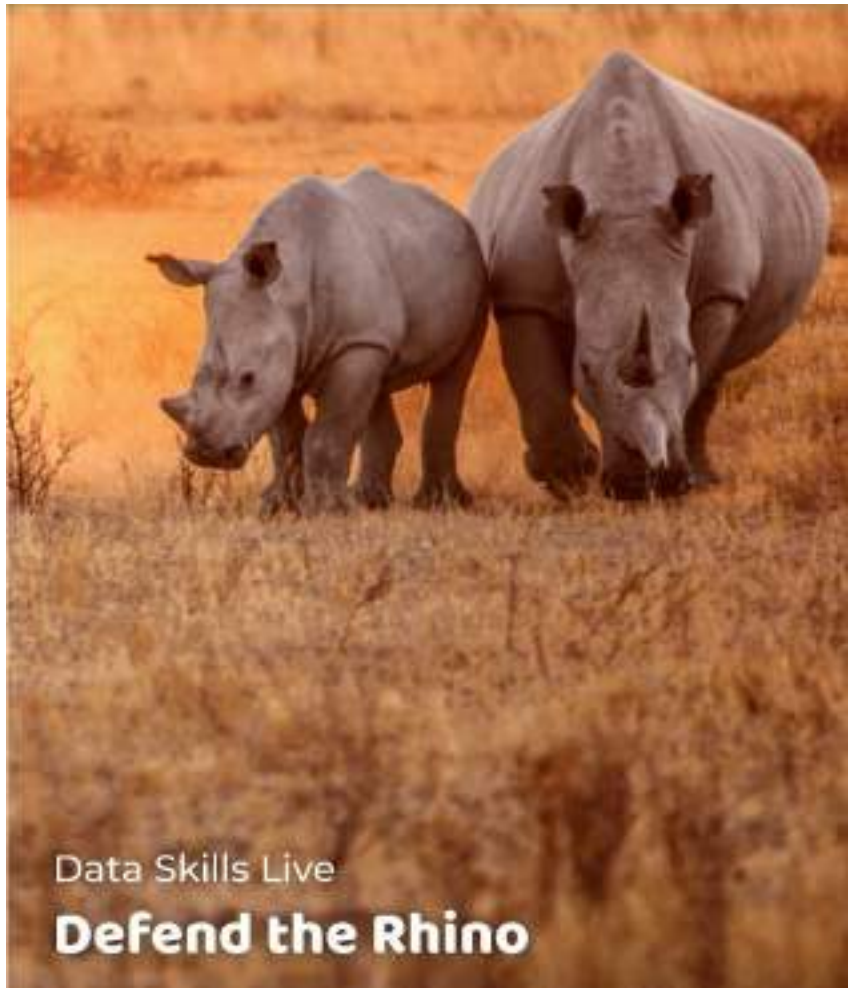
Data Literacy Live Lessons



cyberskillslesson.com/data

Defend the Rhino



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

(Villains, Insurgents and Kleptomaniacs: Invading Networks and Global Systems)

DR. EVELYN SCOTT

LILIAS BRIDGE

JAKUB GRAY

VI BANKS

dataed.in/escape

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

THE PROFESSOR

PINKY

PETER

"LASER"

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AGENT BRIEFING

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.

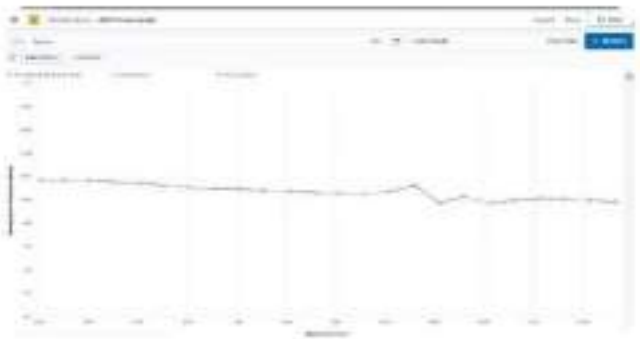
This unique reference system is known as the **National Grid.**

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

Tommy Lawson
@_tommylawson

To P6 - we think this is the pressure wave from the Tonga eruption, detected on your outdoor AQM sensor @RoslinPS @MrBurt101 @RoslinMrsLove



21:29 · 15/01/2022 · Twitter for iPhone

Colin Burt
@MrBurt101

Firstly we found out the distance between Tonga and Roslin (clockwise) travelling over Asia and Europe...this was approximately 10,500 miles or 16,900km... Primary 6 Data Team @RoslinPS @_tommylawson @DataCapitalEd @data_schools @EdinburghUni #DataDoneRight

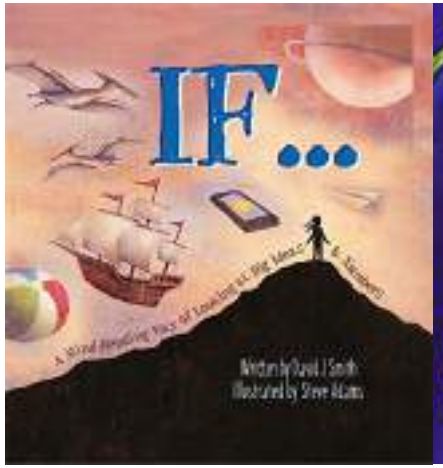
2:56 PM · Jan 25, 2022 · Twitter for iPhone

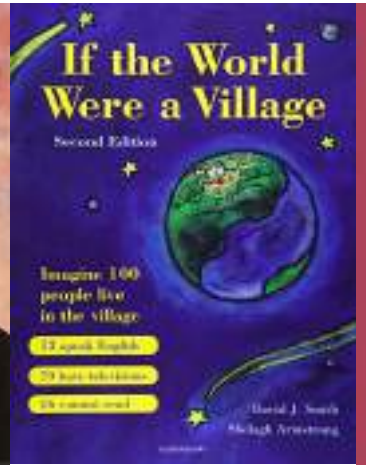
Colin Burt
@MrBurt101

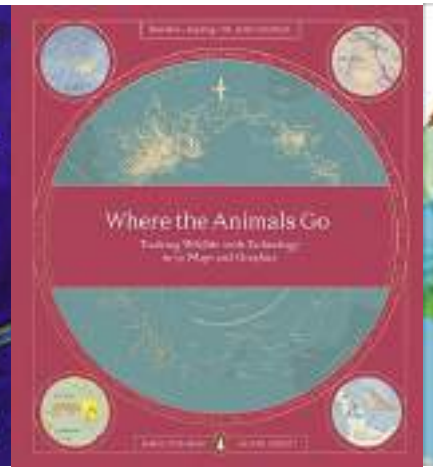
Absolutely brilliant afternoon for @RoslinPS Primary 6 with @EdinburghUni Volcano Expert Andrew Bell live from Quito, Ecuador and @_tommylawson from @data_schools to talk about the data from the Tonga Eruption... #DoingDataRight #IoT

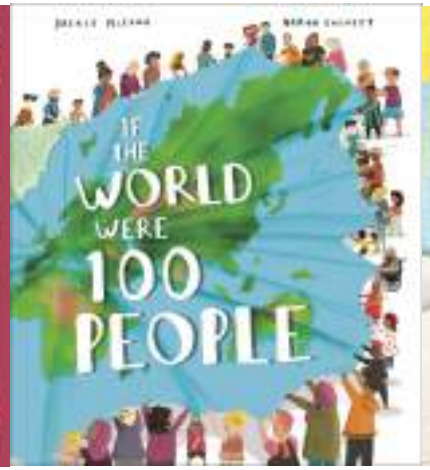
2:29 PM · Feb 7, 2022 · Twitter for iPhone

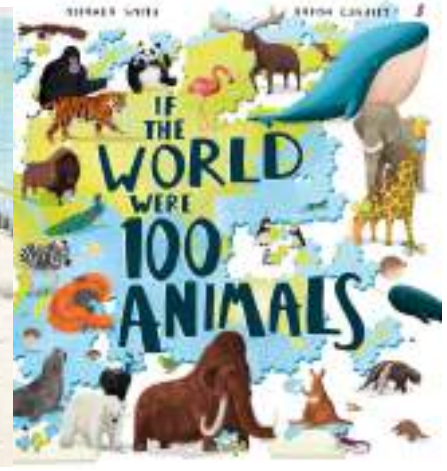
Books for discussing data

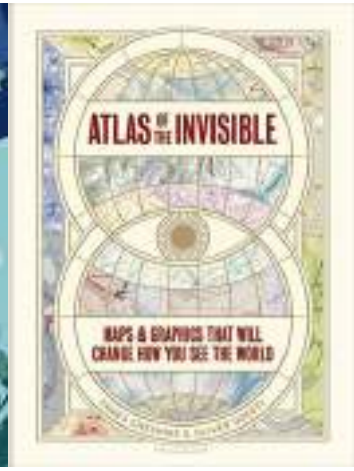


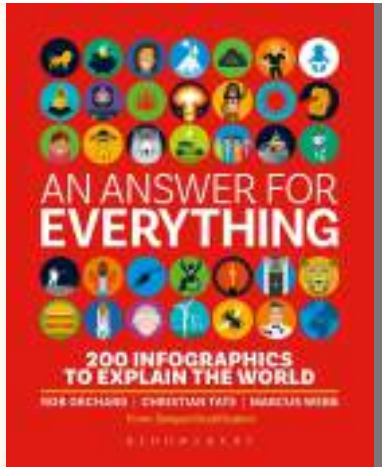


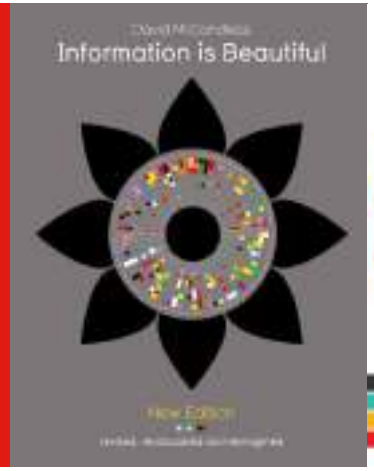


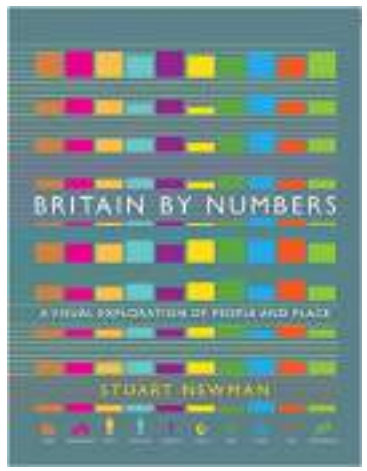












Discussion questions

- 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

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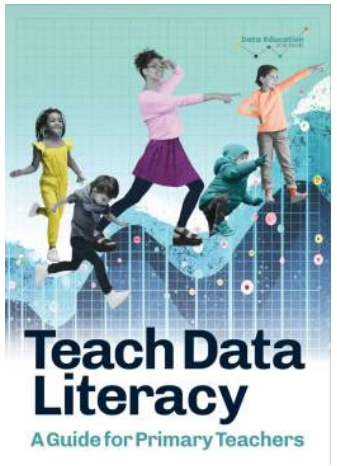
data101videos

Read our Data Literacy Handbook

dataed.in/TeachData



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