

Session 1

Significance of data and quantification skills

Relevance for FSC

David Holmes

@dave905947

david@david-holmes-geography.co.uk

Session outline

1. This session will introduce the relevance and meaning of quantification skills in geography
2. We will think about how skills and data fit into the new GCSEs and AS/A level
3. Framing the context from an FSC perspective

Q. Why are data skills relevant?

As Andreas Schleicher, OECD Deputy director for education, puts it:

“The world economy no longer pays for what people know but for what they can do with what they know.”



Source:
TED Blog <http://bit.ly/N1i4zC>

Francis Maude, MP
“Data is the material of the new Industrial Revolution.”



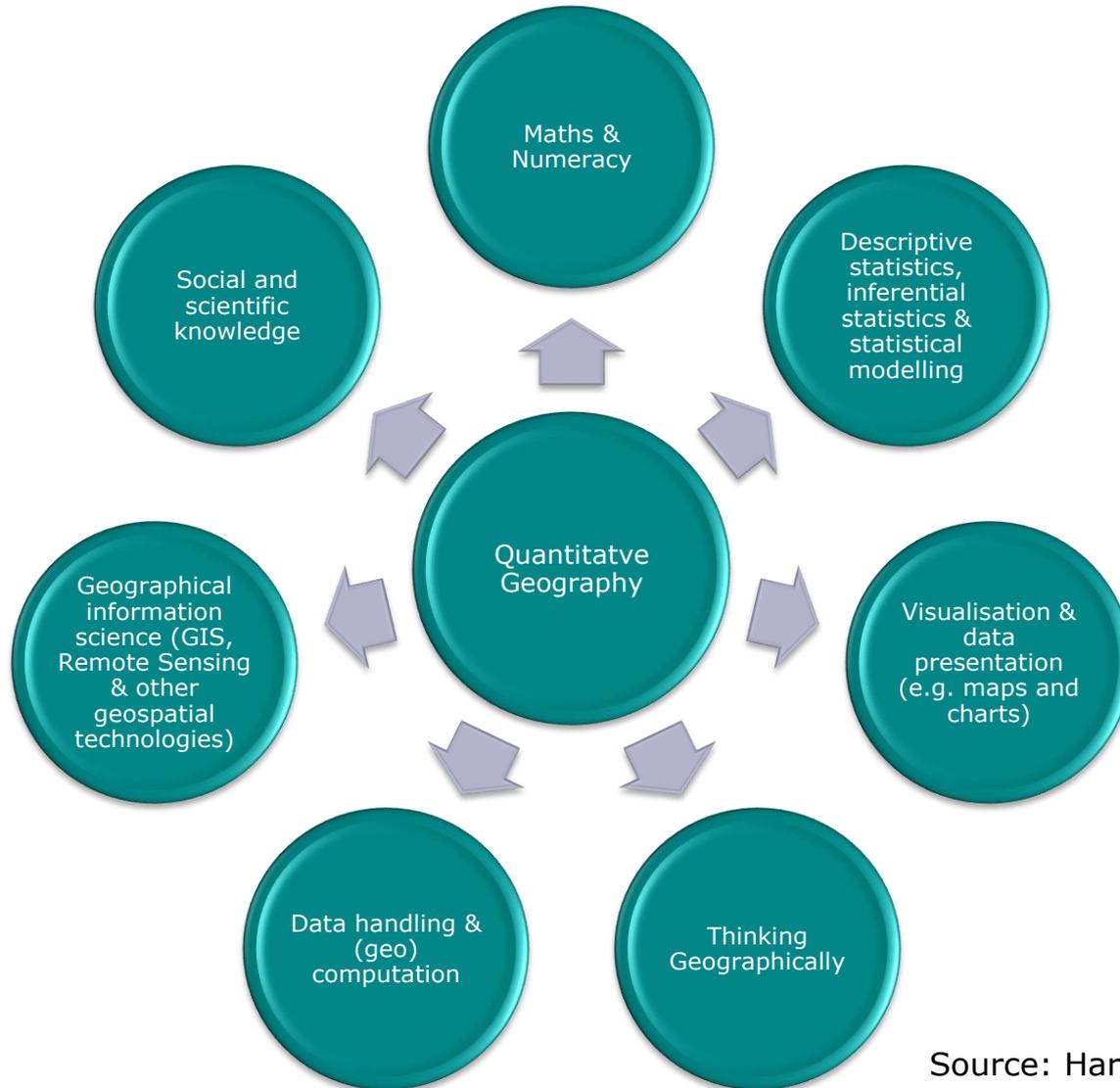
Source:
https://en.wikipedia.org/wiki/Francis_Maude#/media/File:Francis_Maude,_Minister_for_the_Cabinet_Office.jpg

Take a moment....

“Geographers require skills in the **presentation**, **interpretation**, **analysis** and **communication** of quantitative data. They are familiar with a range of statistical techniques including simple descriptive statistics, inferential tests and relational statistics such as correlation and regression; principles of research design and ways to collect data; the retrieval and manipulation of secondary datasets; and geospatial technologies such as digital cartography, Geographic Information Systems (GIS) and remote sensing. Attention is given to spatial statistics, to issues of spatial dependency, to spatial difference and to the effects of scale.”

**QAA
University
Subject
Benchmark
for
Geography**

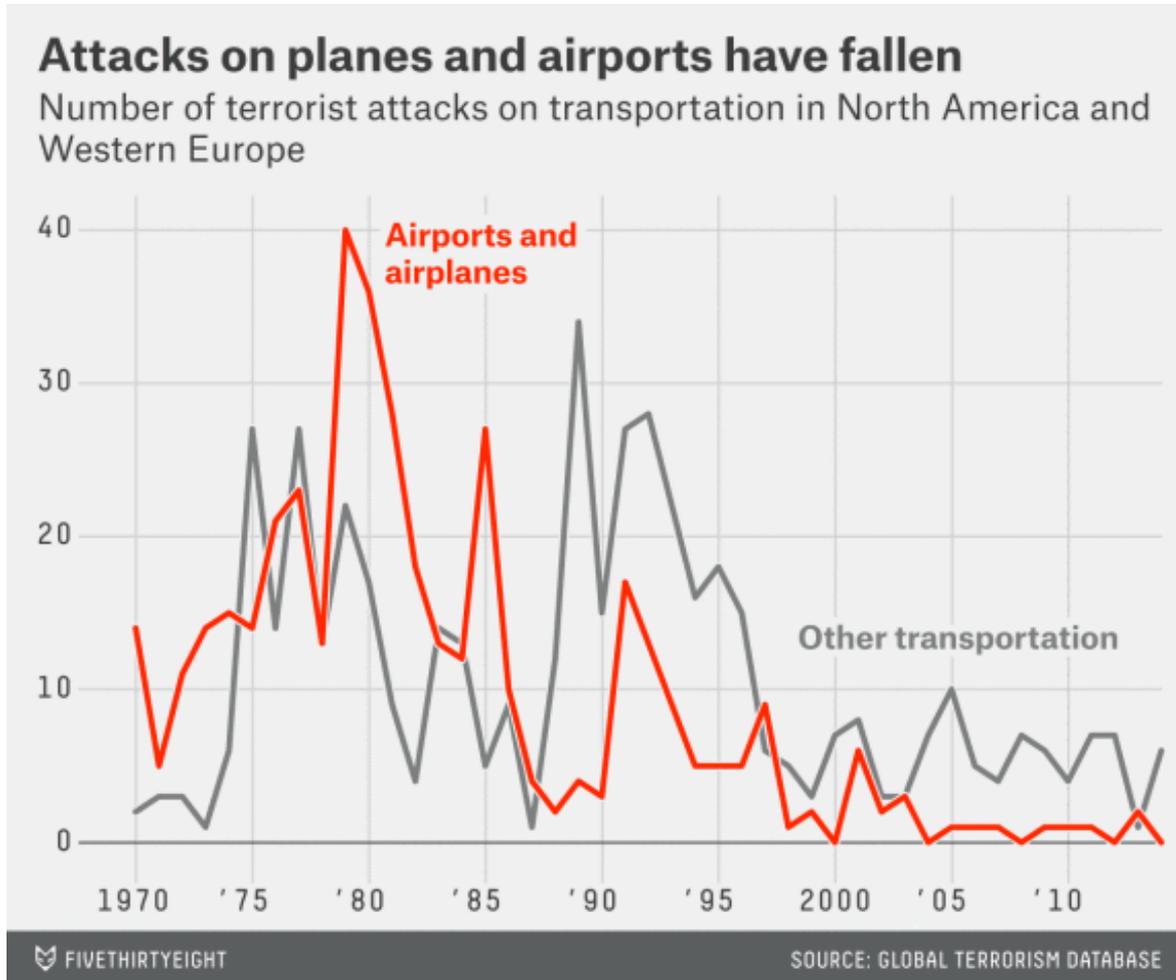
A range of quantitative skills



“Its more about the geography than the maths”

Source: Harris (2016): RGS

Q. What do you make of this?

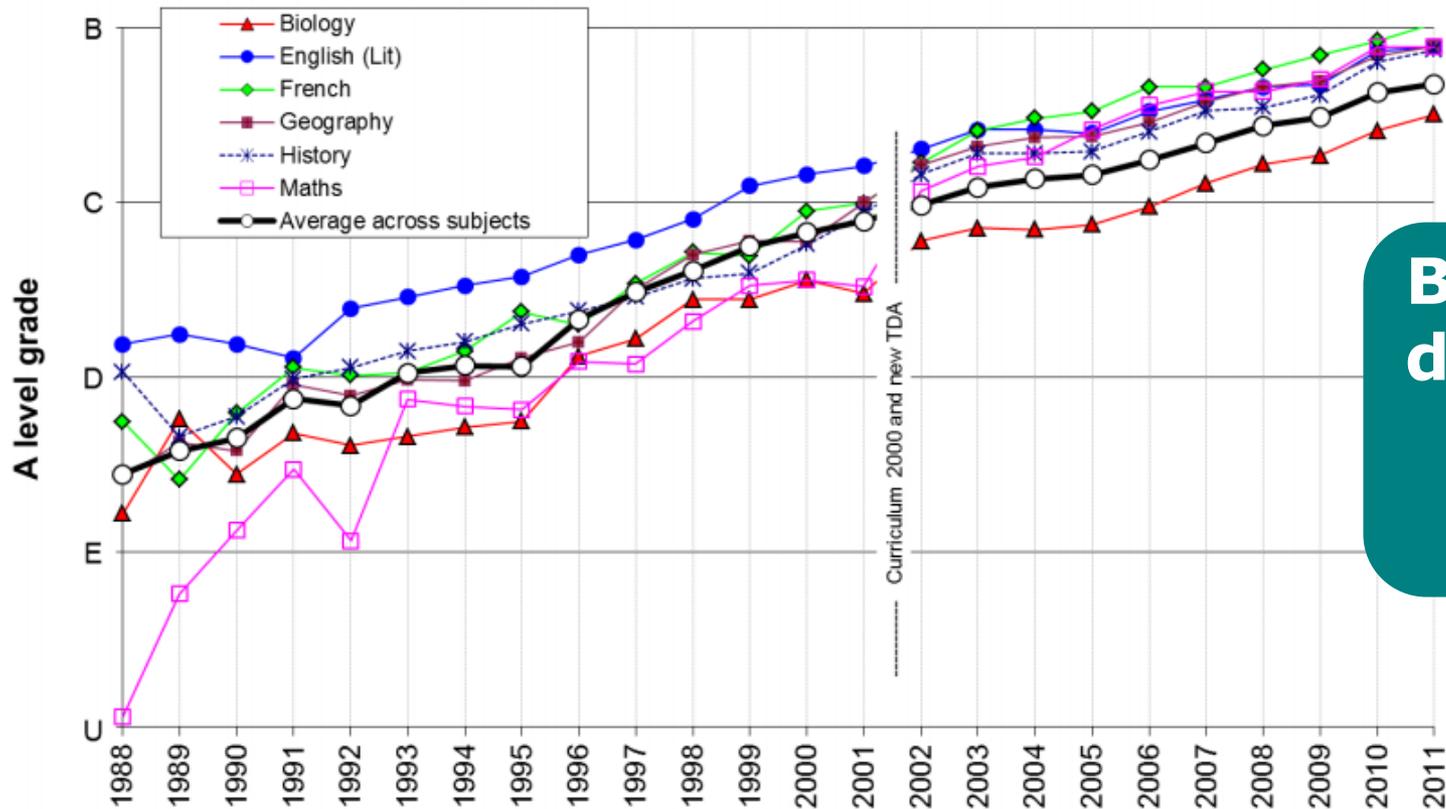


**Is it becoming
more risky to
travel in
North America
and Western
Europe?**

<http://fivethirtyeight.com/features/attacks-on-transportation-targets-like-those-in-brussels-have-become-rarer/>

A-level standards: change over time

Average grade achieved by students with the same ability (ITDA=50)

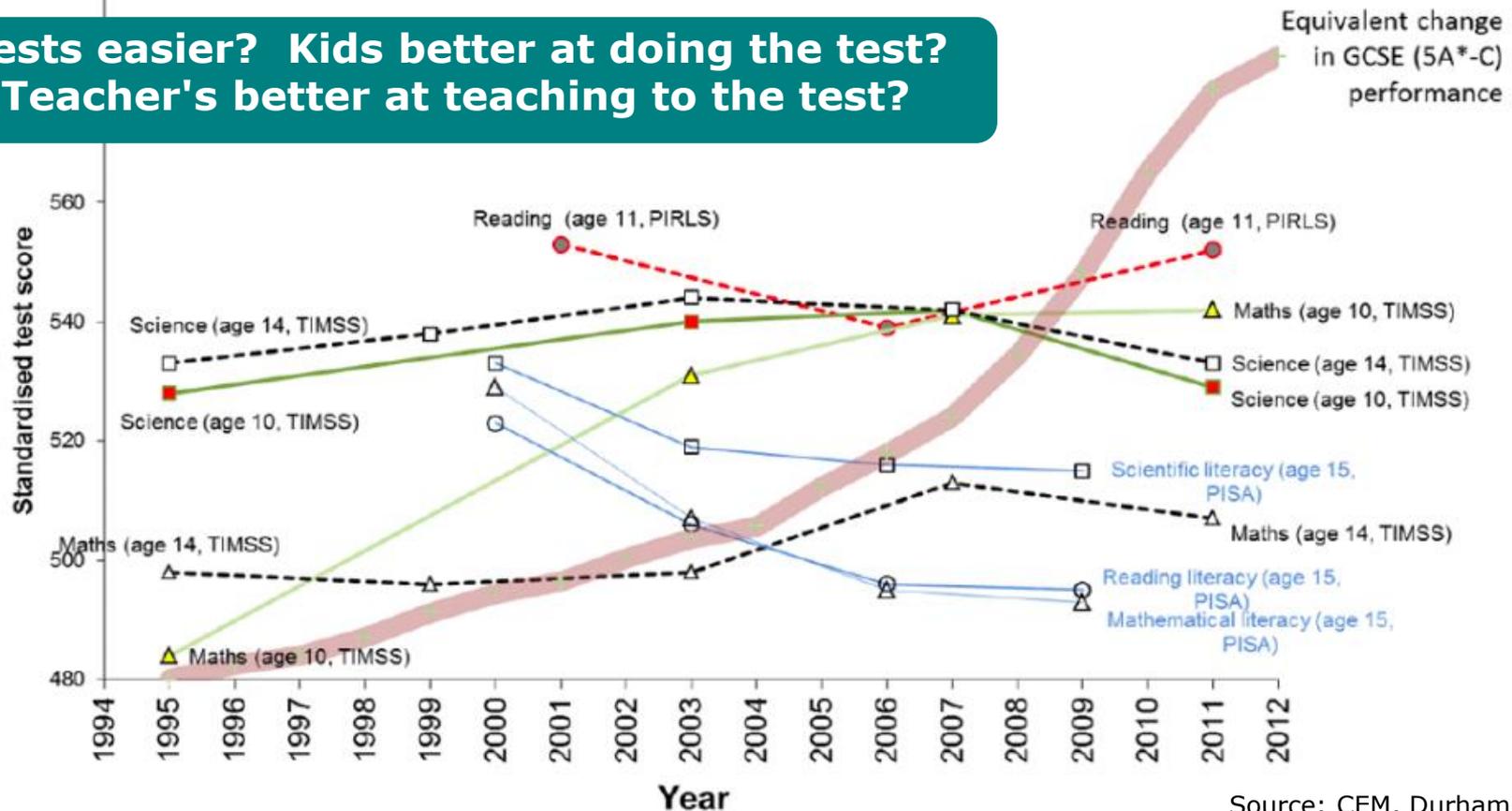


But what does this *really* mean?

A similar story for GCSE

Performance of England in international surveys

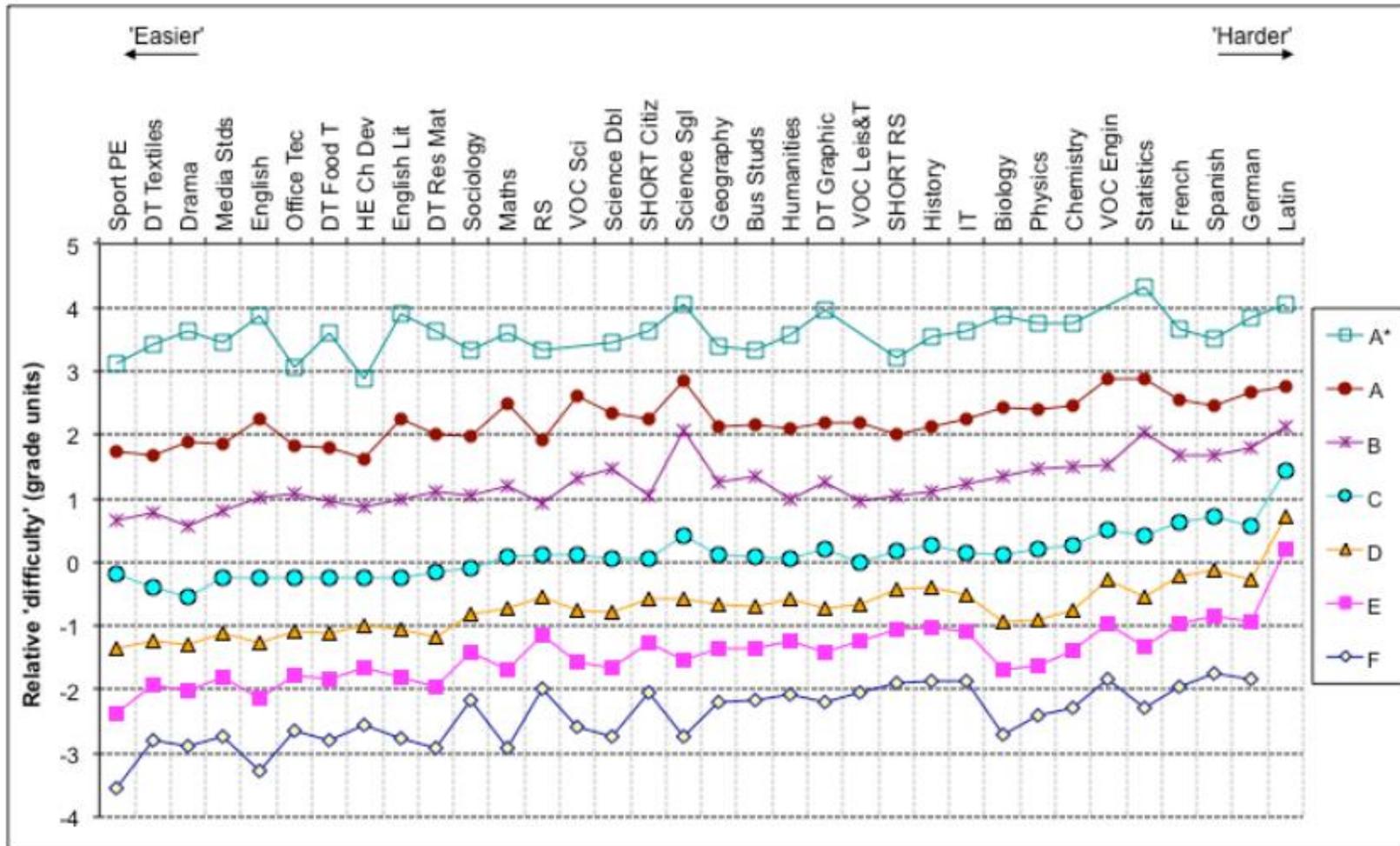
Tests easier? Kids better at doing the test?
Teacher's better at teaching to the test?



Source: CEM, Durham University

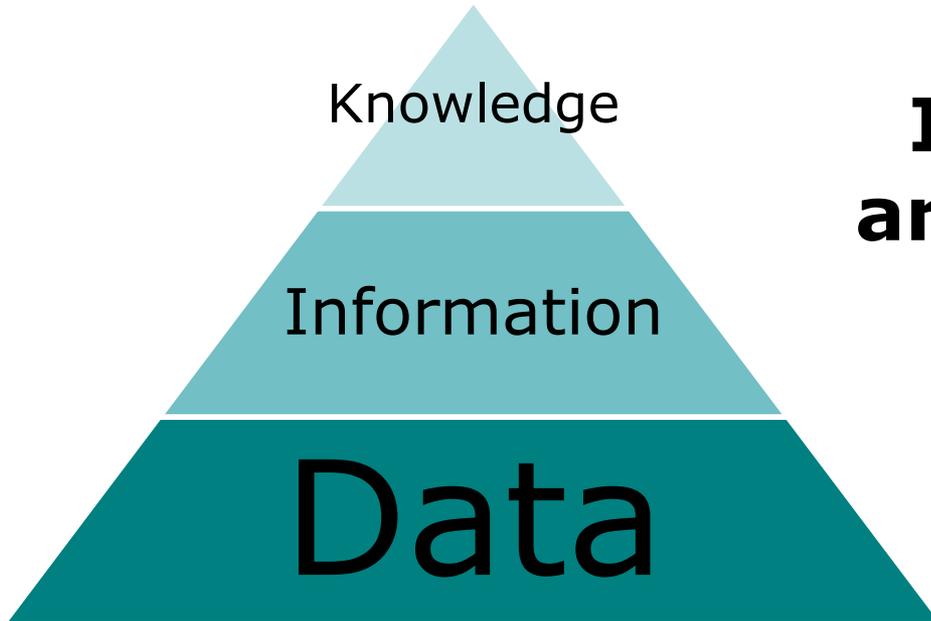
What about 'difficulty'?

This is a quantified analysis comparing 'difficulty' across subjects and then ranked...





Why are we doing this....?



Isn't this what we are trying to achieve when we "think geographically"?

Based on 'Open Data in a Day' by Dave Tarrant (Open Data Institute)

“Maths” skills 2016 GCSEs Geography

1

Numerical skills:

- demonstrate an understanding of number, area and scale and the quantitative relationships between units
- design fieldwork data collection sheets and collect data with an understanding of accuracy, sample size and procedures, control groups and reliability
- understand and correctly use proportion and ratio, magnitude and frequency (e.g. 1:200 flood; and logarithmic scales such as the Richter scale, in orders of magnitude)
- draw informed conclusions from numerical data

2

Statistical skills:

- use appropriate measures of central tendency, spread and cumulative frequency (median, mean, range, quartiles and inter-quartile range, mode and modal class)
- calculate percentage increase or decrease and understand the use of percentiles
- describe relationships in bivariate data: sketch trend lines through scatter plots; draw estimated lines of best fit; make predictions; interpolate and extrapolate trends
- be able to identify weaknesses in selective statistical presentation of data

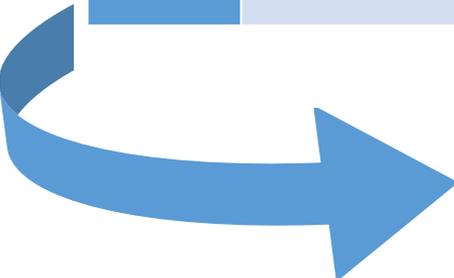
A reminder of the Assessment Objectives GCSE

Students must:		% in GCSE			
AO1	Demonstrate knowledge of locations, places, processes, environments and different scales.	15			
AO2	Demonstrate geographical understanding of: <ul style="list-style-type: none"> concepts and how they are used in relation to places and environments the interrelationships between places and processes 	25			
		AO4: Select, adapt and use a variety of skills and techniques to investigate questions and issues and communicate findings.			
		<i>25% (5% used to respond to fieldwork data and context(s))</i>			
		Strands	Interpretations and definitions		
AO3	Apply knowledge and evaluate to make judgements	Elements n/a	Coverage Full coverage in each set of assessments (but not every assessment).	<ul style="list-style-type: none"> Skills and techniques are aspects of subject content. Awarding organisations should explain their approach to targeting them in their assessment strategy. Questions are geographical matters requiring resolution or discussion. Issues mean topics about which there can be debate or discussion. The emphasis in this assessment objective should be on the use of skills and techniques – and the weighting of element 1c should reflect this emphasis. Element 1d should be assessed in combination with one or more of the other elements. There are different ways in which findings can be communicated. This may include written responses or data responses. We do not expect individual tasks/questions to cover a variety of skills and techniques. We do not expect individual tasks/questions to cover both questions and issues. 	
AO4	Select, investigate and communicate findings				1a – Select a variety of skills and techniques to investigate questions and issues.
					1b – Adapt a variety of skills and techniques to investigate questions and issues.
					1c – Use a variety of skills and techniques to investigate questions and issues.
		1d – Communicate findings.			

A quick reminder of the Assessment Objectives

	Students must:	AS Level	A-Level
AO1	Demonstrate knowledge and understanding of places, environments, concepts, processes, interactions and change, at a variety of scale	40%	34%
AO2	Apply knowledge and understanding in different contexts to interpret, analyse and evaluate geographical information and issues	35%	40%
AO3	Use a variety of relevant fieldwork skills to: <ul style="list-style-type: none"> investigate geographical issues interpret, analyse and evaluate fieldwork data construct arguments 		

Mark tariff	1	2	3
Define	*		
Identify/State/Name	*	*	
Calculate	*	*	
Complete	*	*	
Draw/Plot		*	*



An early quantitative skills progression map

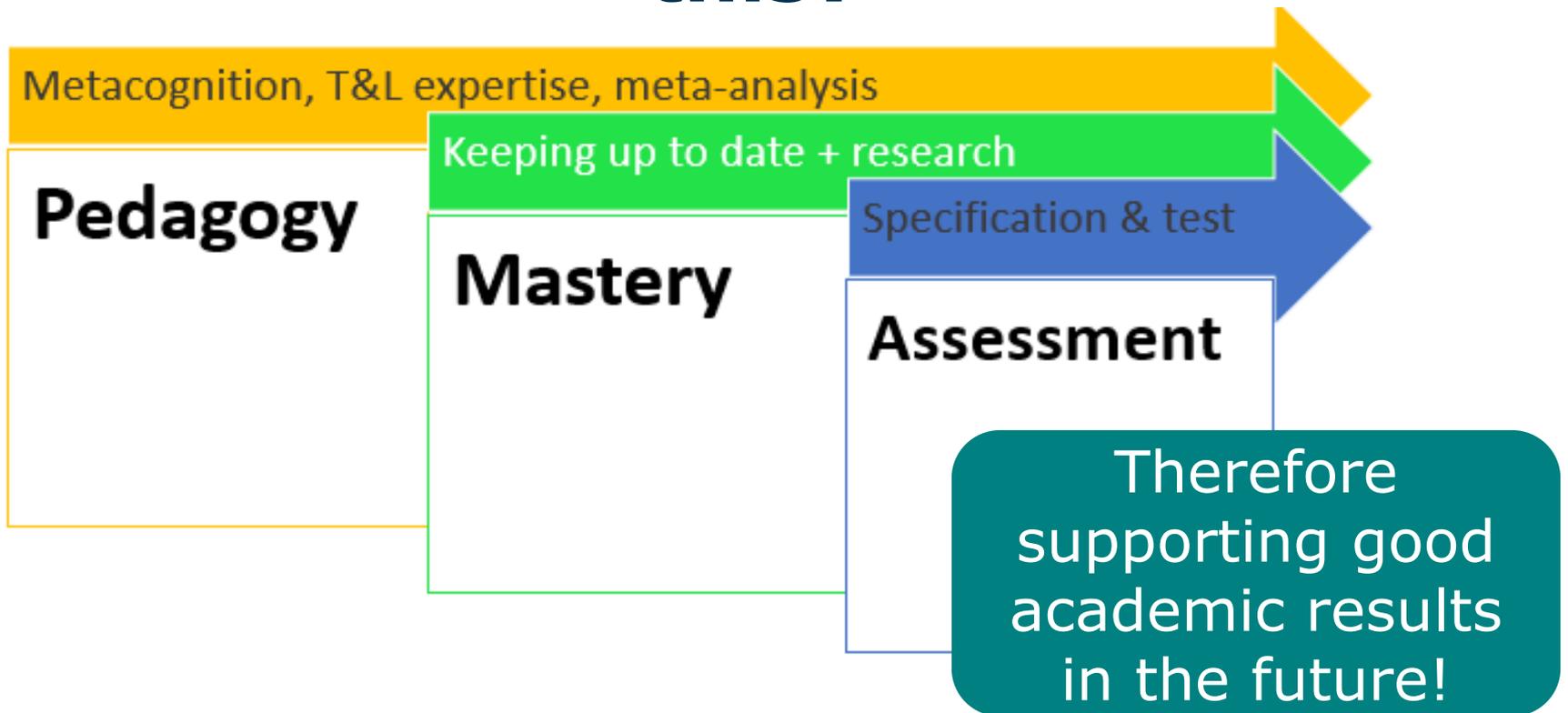
A possible quantitative, mathematical and geographical skills progression map: KS3 - GCE

General data and information skills, spatial and geospatial, data analysis and specific skills

	KS3	+ KS4 Context and detail	+ GCE
Seeing significance in data	Recognising that facts information and statistics can be analysed in order to develop new knowledge. Know how to access open data. Understating different types of numerical data: pdf, .xls, .csv, http/.... Etc.		Being able to critically reflect on the provenance of open and other source data sets. Recognising the need for ethical treatment of data, information the owners of such information.
Basic data manipulation and management	Handling small data sets (1-20 items). Sorting and ordering, manually and using a spreadsheet. Begin to ask geographical questions linked to meaning in the data	Large data set management (>100 rows downloaded) and use of spreadsheet tools to manage, filter, sort and identify anomalies. Being able to contextualise "big numbers" relevant to geography, include concepts around magnitude	Manage large complex data sets. Estimations and predictions; using knowledge to explore and understand data and information in unfamiliar circumstances.
Data visualisation	Collaborative searching and understanding of different types of visualisation	Individual searching and understanding through creative exploration. Recognising limitations of visualisation	Individual searching, referencing, understanding and critical reflection of published information.
Graphical skills	Present data and information using different techniques. The importance of scales and to be able to summarise meaning from data presented	Recognising limitations of different graphical techniques, and the ability to introduce bias (deliberately or not). Analyse graphical information to explore rates of change, including linear vs log scales.	Explore data "correctness" as an idea, evaluate different presentation techniques using technical language.
GIS mapping	Measure distances, scales, areas, routes. Create own simple content and links to other resources, e.g. images	Import data from other sources, make layers and use mapping tools to present complex data in a meaningful way	Understand different types of map, e.g. vector vs raster, import big data, carry out basic analysis, filter, experiment with different types of map.
Cartographical skills (including digital visions)	General map and atlas skills, distances, area, scale, gradient etc. Different types of key maps understood. Be able to describe information from the map using appropriate geographical language and terminology.	Moving between different scales, areas and different map projections. Make reasonable estimations in different units.	Critical reflection on map presentation, representation, identity. Develop own criteria and scale for judging reliability of data and information. Recognising limitations and bias in infographics
General Data analysis	The language and basic tools of data analysis, e.g. indexes and indices, frequencies, percentages, ratios, fractions, proportions etc. Use of specific plots to represent data, e.g. scatter as precursor to other understanding.	Calculate measures of central tendency: standard deviation, interquartile, and critical reflection on approach. Precision and accuracy in data. Categorical, ordinal, interval data. Limitations of models in respect of geographical understanding and data analysis	Data uncertainty, problems of data sampling (representativeness, population context). Critique of the scientific route to enquiry ("data cycle") as a process to generate geographical answers.
Specific qualitative and quantitative skills (including fieldwork)		Understand the need for some statistical tools to extract meaning from data and information, but recognise limitations. Explaining common landscapes, mental maps, participant observation, high quality photography (including self-directed) and analysis, e.g. coding	Undertake inferential statistics, evaluating different approaches to hypothesis testing, Chi, Lorenz curves, Gini, Nearest Neighbour, Mann Whitney* "Reading landscapes" in novel contexts and situations. Being cautious and sceptical of outcomes from different people and organisations

*will be different demands according to different specifications.

Where do quantitative skills fit into this?



Framing the 'statistics problem'

- Statistics is not maths, it's logical thinking. Most people can solve problems using logic and understanding.
- If you can add, subtract, multiply, divide and tell whether one number is bigger than another, you can do all the maths necessary for different GCEs when it is required.
- "Decision making in the face of uncertainty" sounds a lot more interesting than "statistics" even though that's essentially what statistics is about.

Statistical vs. non-statistical questions

1. How old are you?
2. How old are the people who live in Manchester?
3. Do dogs run faster than cats?
4. Does Cromer get less sunshine than Brighton?
5. How many “legs” are there in this room?
6. What was the difference in rainfall between Swanage and Taunton in 2014?
7. Do you get paid more working as a teacher or for the FSC?

Make sure it helps with the exam

Which of the following are the correct units used for cross-sectional area in Figure 1b.

(1)

- A m^2
- B m^3
- C cm^2
- D mm^2

How ill FSC be using this in GCSE and AS follow-ups?

Can you devise similar question(s) to check a student's understanding?

(iii) Using Figure 1b, explain **one** reason why a student might choose to use the results from the median, rather than the mean.

(2)

Session 2

Secondary data in coursework and NEA

David Holmes

@dave905947

david@david-holmes-geography.co.uk

Session outline

1. What is the range of secondary data?
2. Secondary data and research literature
– links to the MS and criteria
3. Framing the context from an FSC perspective

Reminder

Collect **FSC**



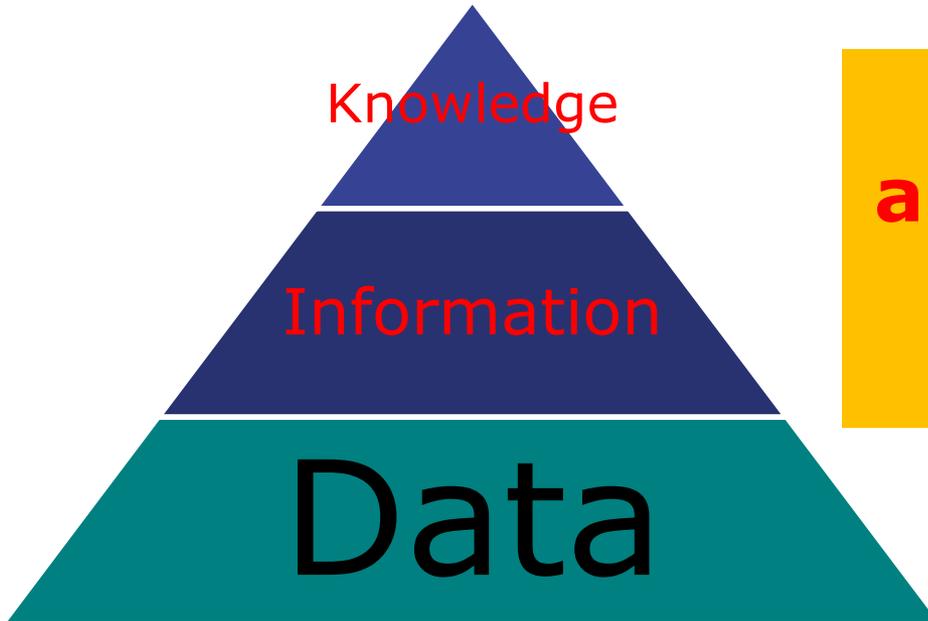
Manage



Visualise



Understand



Isn't this what we are trying to achieve when we "think geographically"?

Based on 'Open Data in a Day' by Dave Tarrant (Open Data Institute)

Section 1: Planning, purpose and introduction. (8 marks)

Level 3	<p>6–8 marks</p> <ul style="list-style-type: none"> • There is a clear, well focused plan, appropriately designed to include aims or questions or hypotheses linked to the geographic purpose of the investigation. • The plan is based on an individual geographical topic or issue, which is accurately and appropriately defined and within a research framework. • There is a justification for the investigation provided in the introduction and valid contextualisation of fieldwork and research. • The location is precise and geo-located, using geo-spatial techniques, at appropriately different scales. • There is clear evidence of valid and individual literature research that defines and contextualises the investigation through an appropriate combination of wider geographical links, comparisons, models and theory.
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Assessment criteria	Level 4 10–9 marks
To define the research questions which underpin field investigations. (AO3)	A research question(s) is effectively identified and is completely referenced to the specification.
To research relevant literature sources and understand and write up the theoretical or comparative context for a research question. (AO3)	<p>Well-supported by thorough use of relevant literature sources.</p> <p>Theoretical and comparative contexts are well-understood and well-stated.</p>

Purpose of the Independent Investigation (12 marks) (AO1: 4 marks, AO2: 4 marks and AO 3: 4 marks)		
Level	Mark	Descriptor
Level 3	9–12	<ul style="list-style-type: none"> • Demonstrates accurate and relevant geographical knowledge and understanding of location, geographical theory and comparative context throughout. (AO1) • Applies understanding to find coherent and relevant links between the investigation's context and a broader geographical context. (AO2) • Investigates a wide range of relevant geographical sources in order to identify/obtain accurate geographical information and data that support the investigation; research information is used to construct a justified aim, question or hypothesis that provides an appropriate framework for investigation at a manageable scale; planned enquiry process is logically structured and comprehensive. (AO3)

Secondary data linkages

Geo-located data

Geo-spatial

Literature research

Research framework

Ethical and socio-political
dimensions

Non-numerical analysis

Validity and reliability

Work in a
pair to
discuss the
meaning,
and how it
can be
supported

Types of secondary research

Secondary data sources		
Statistical	Graphical	Written
Weather data River discharge Census data Crime statistics Deprivation data	Plans and maps Photographs and paintings Satellite images Graphs and charts	Newspapers Blogs and social media Diaries Radio, TV and DVD Internet sites

Table 1 types of secondary data source

Tertiary and hybrid data

The methodology used to collect the opinions is similar to primary data collection

The data itself is 'raw', it has not been collated and analysed before you collect it – again similar to primary data

The opinions were pre-existing and where not generated as part of your investigation, and so are a secondary source

Secondary data: Blurred meanings

Purple WiFi follows

Cambridge BID @CambridgeBID · Sep 8

Looking to pick up a morning drink? #Cambridge has an incredible selection of café's & coffee shops on every corner!



2

Cambridge BID @CambridgeBID · Sep 6

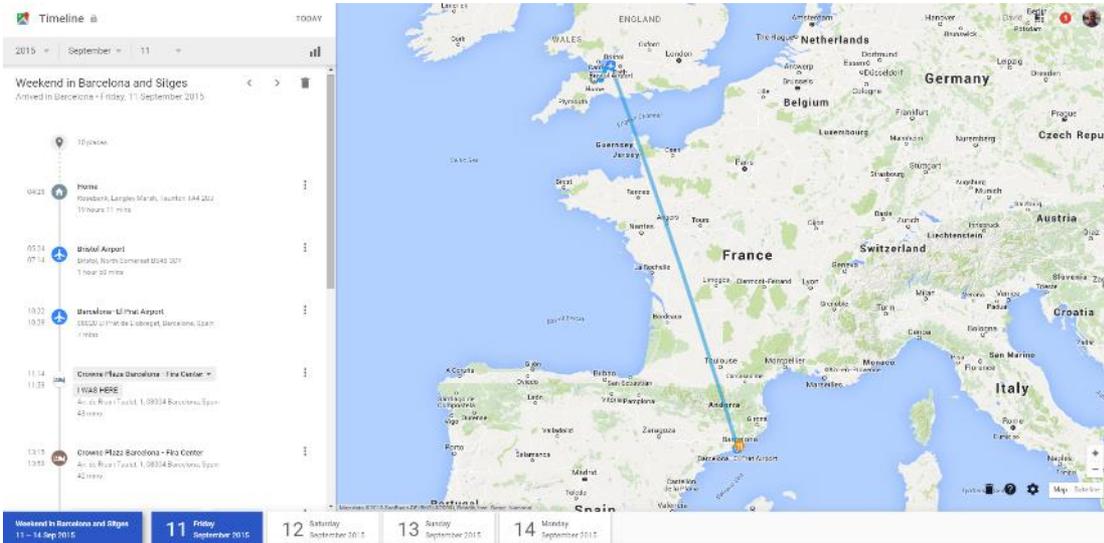
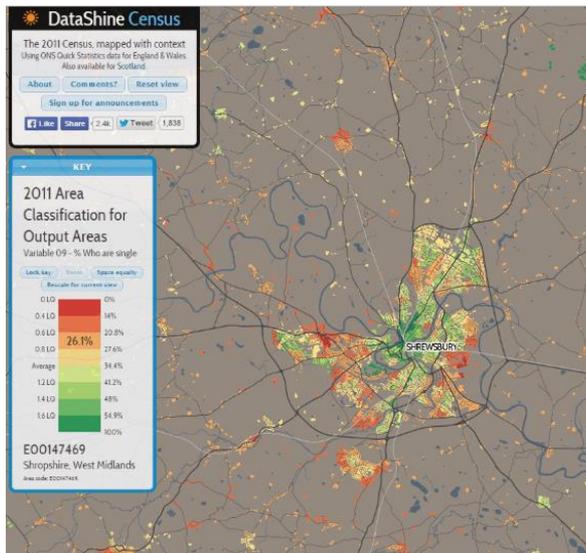
Looking for somewhere to do some shopping this weekend? Fitzroy Street has a fantastic variety of shops #Cambridge



3

Nicola Bailey @nicolab03 · Sep 5

Lovely afternoon in Cambridge. Shopping, lunch and book shops. Perfect. #cambridge

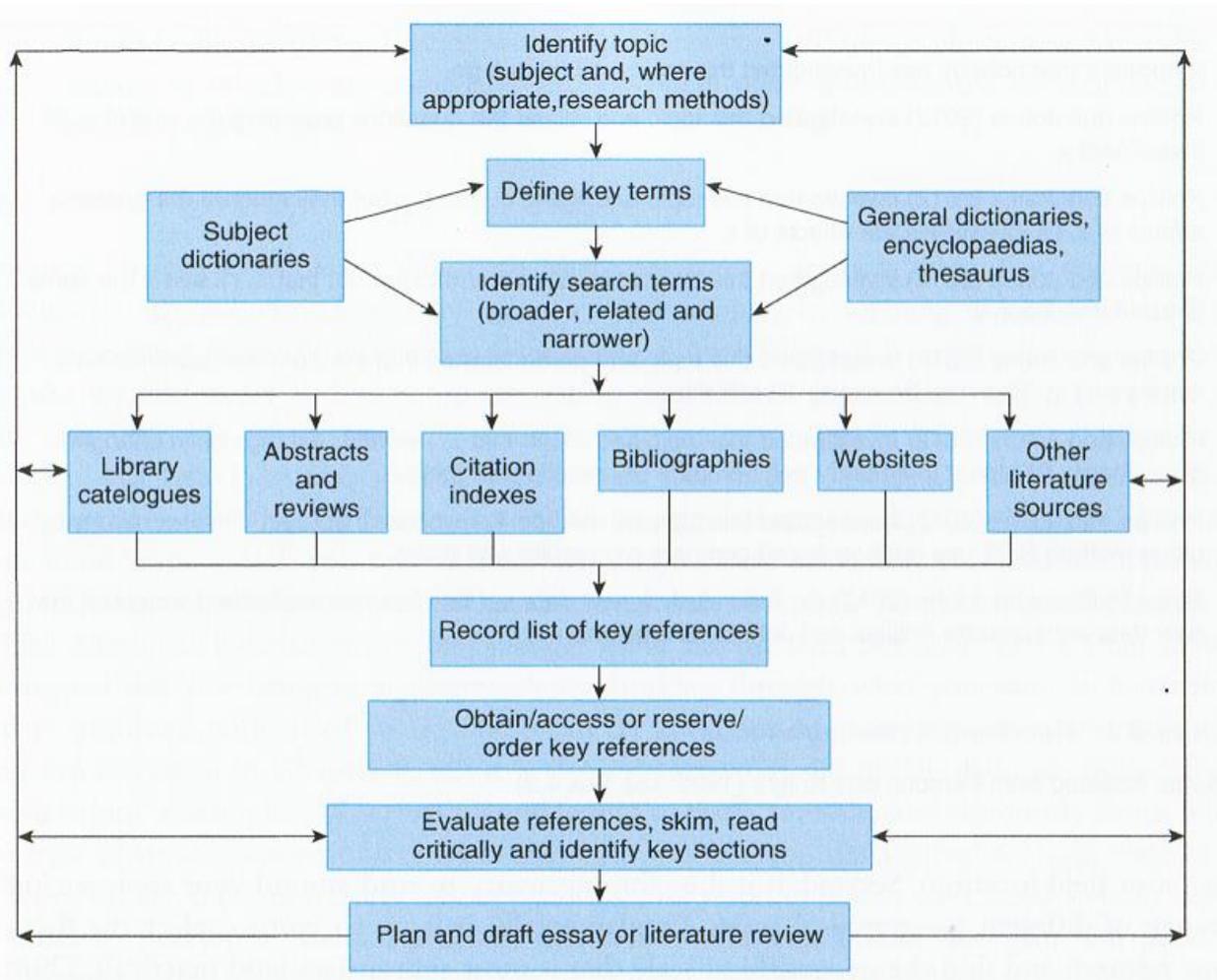


What does HE expect?

"Seven Pillars" of information literacy

1. **IDENTIFY** – identify personal need for information
2. **SCOPE** – assess current knowledge and identify gaps
3. **PLAN** – devise strategy for location information and data
4. **GATHER** – locate and access information and data required
5. **EVALUATE** – compare and evaluate information and data
6. **MANAGE** – organise information professionally and ethically
7. **PRESENT** – effective application of knowledge gained

A framework for literature research



Healey and Healey 2010

Research skills and “literacy”

Avoiding plagiarism

Developing appropriate search strategies

Referencing skills

Constructing appropriate search terms

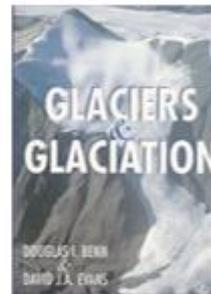
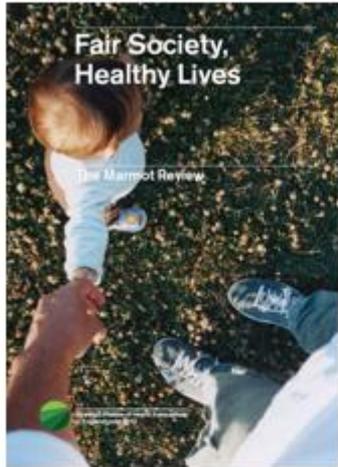
Using online complex data

Evaluating the reliability of sources

Distinguishing between primary, secondary and tertiary sources

Managing your literature research

Research framework - literature

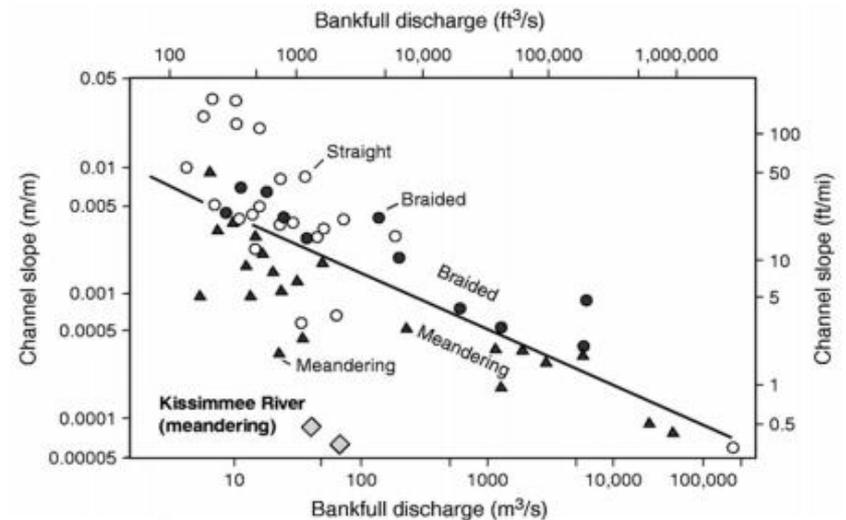
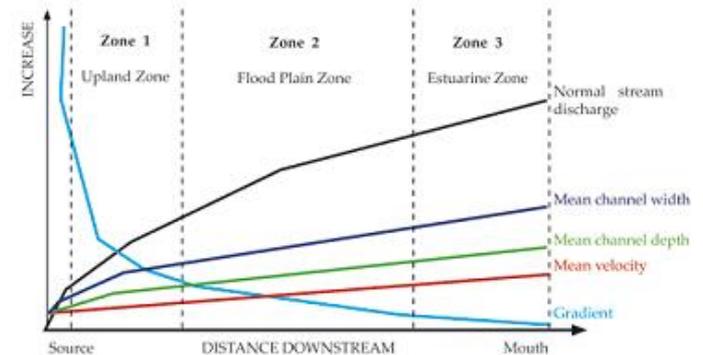


To what extent should FSC support the literature research: pre and post?

A question of provenance

For a concept, idea or theory that you regularly use, trace back its theoretical provenance.

Bradshaw's Model?



Could you help with these (for example)?

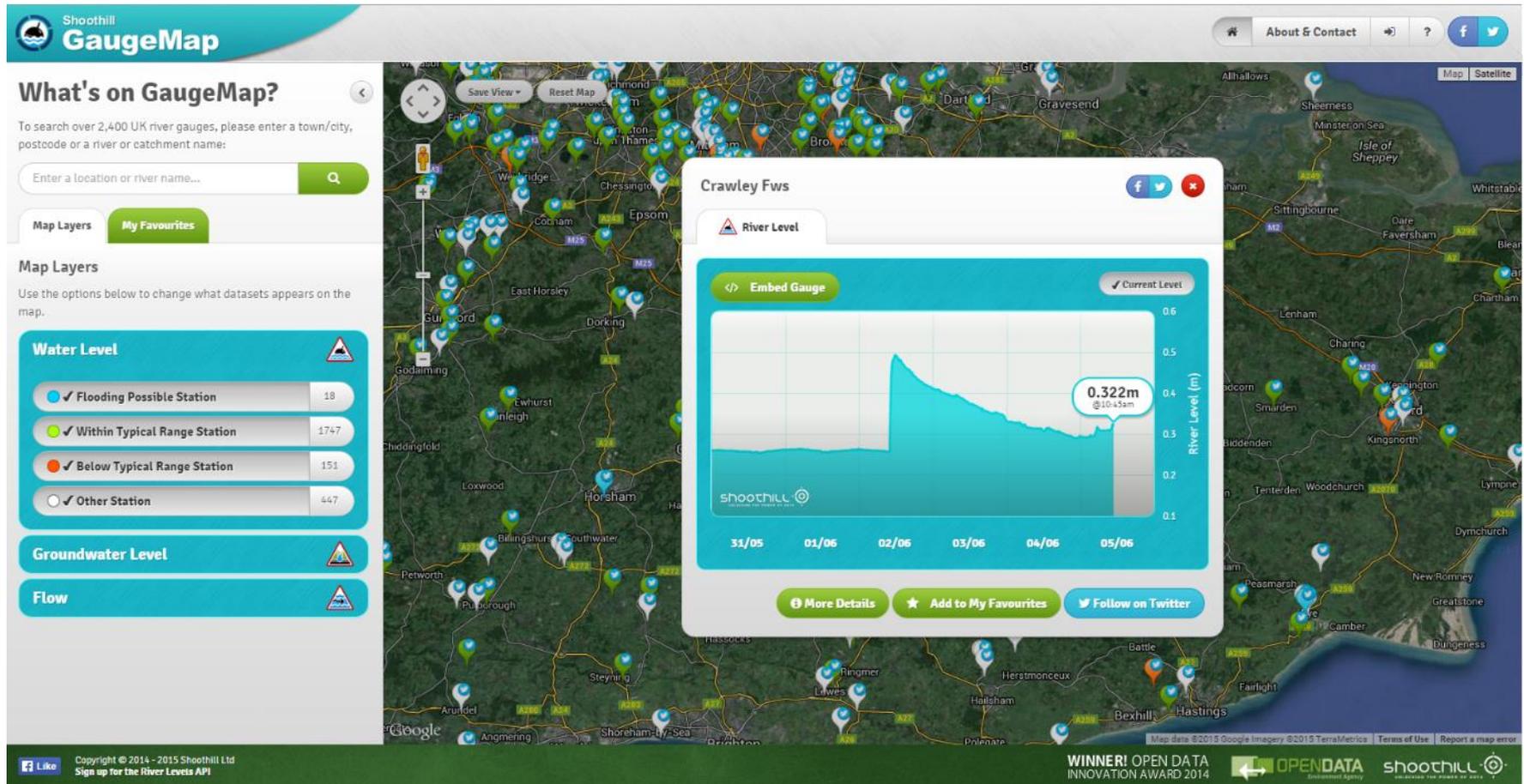
Data.gov.uk

wikidata

Eurostat

UNdata portal

A good source of data to begin to ask questions (1)?



Source: GaugeMap www.gaugemap.co.uk

A good source of data to begin to ask questions? (2)



Source: Oliver O'Brien / ONS data.

life.mappinglondon.co.uk

• "Big data" may become a much more important part of the individual investigation

Deep approach – how can FSC facilitate?

DEEP APPROACH: intention to understand	SURFACE APPROACH: intention to complete task
Focus on what is signified (i.e. argument in a text)	Focus on signs (i.e. text)
Relate and distinguish new ideas and previous knowledge	Focus on discrete elements
Relate concepts to everyday experience	Unreflectively associate concepts and facts
Relate and distinguish argument and fact	Fail to distinguish principles from evidence, new information from old
Organise structure and content	Memorise information and procedures for assessment; treat task as an external imposition
Internal emphasis: a window through which aspects of reality become visible, and more intelligible	External emphasis: demands of assessment, knowledge cut off from everyday experience