PDST
Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

An Roinn Oideachais agus Scileanna
Department of Education and Skills

National Workshop 3

LEAVING CERTIFICATE
COMPUTER SCIENCE

Schedule

Session 1	Introduction to Data Analytics and ALT2
11.00 – 11.30	Tea/Coffee
Session 2	ALT2: Project Design (investigate/plan) and Presentations
13.00 – 14.00	Lunch
Session 3	Curriculum Planning LCCS Promotion

Key Messages

- Leaving Certificate Computer Science aims to develop and foster the learner's creativity and problem solving, along with their ability to work both independently and collaboratively.
- Computing technology presents new ways to address problems and computational thinking is an approach to analyse problems, design, develop and evaluate solutions.
- The ALTs provide opportunities for students to develop their theoretical and procedural understanding of the course.
- The externally assessed coursework will be based on all learning outcomes, with those of strand 3 being particularly relevant.
- Digital technologies can be used to enhance collaboration, learning and reflection.

Recap on National Workshop 2

Main topics…

Teaching and Learning Programming:

Challenges and Pedagogies

Scaffolded Learning: Use→Modify→Create

Computational Thinking CT Pedagogies

Pillars of Computational Thinking **Unplugged Activities**

Number System Conversions **Problem Solving**

ALT4 Embedded Systems

The Design Process LCCS Resources

Curriculum Planning

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Session 1

Data Analytics and ALT2

“Data is the new oil”

Mentimeter

Go to www.menti.com and use the code 59 580 587

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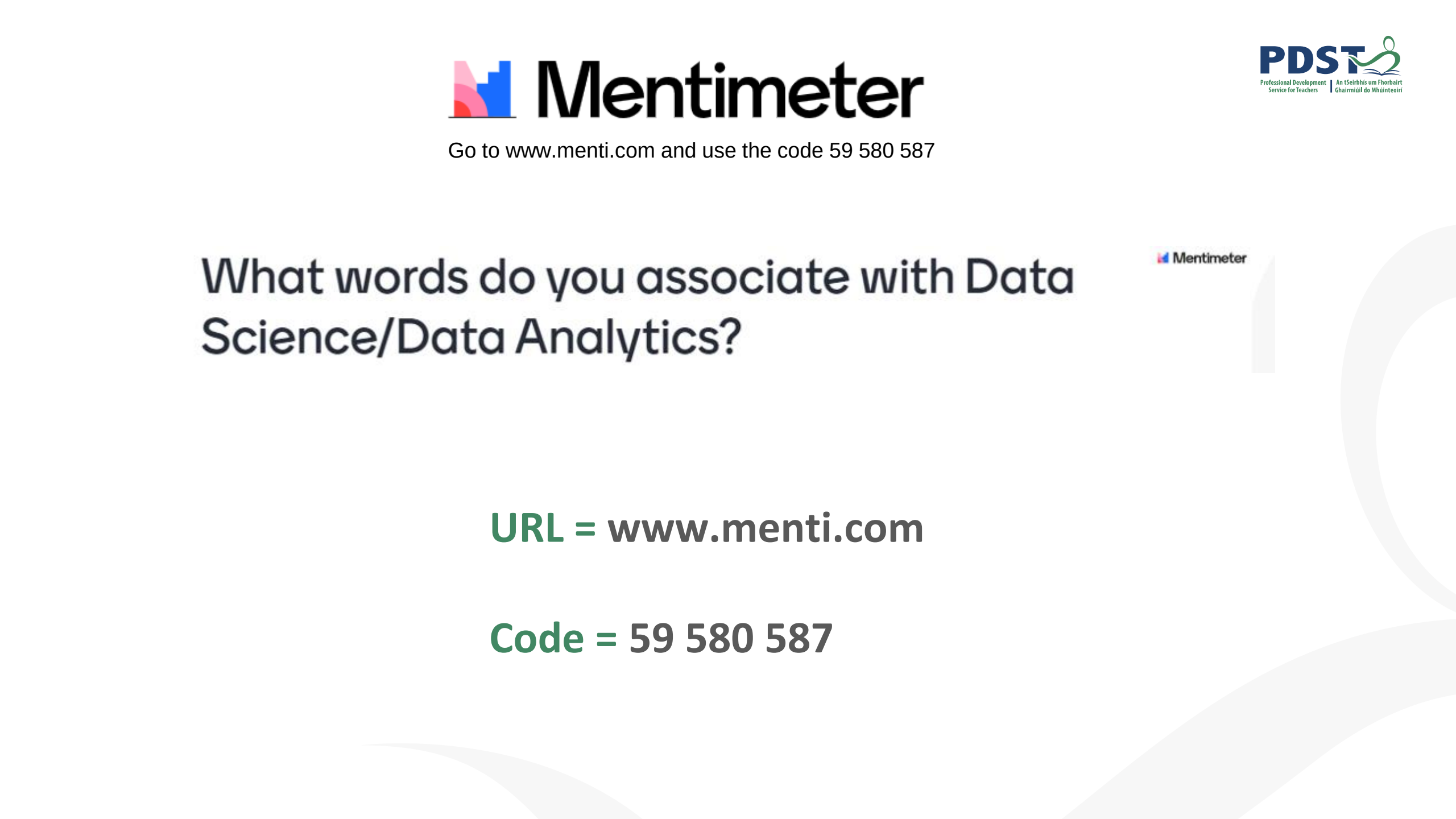

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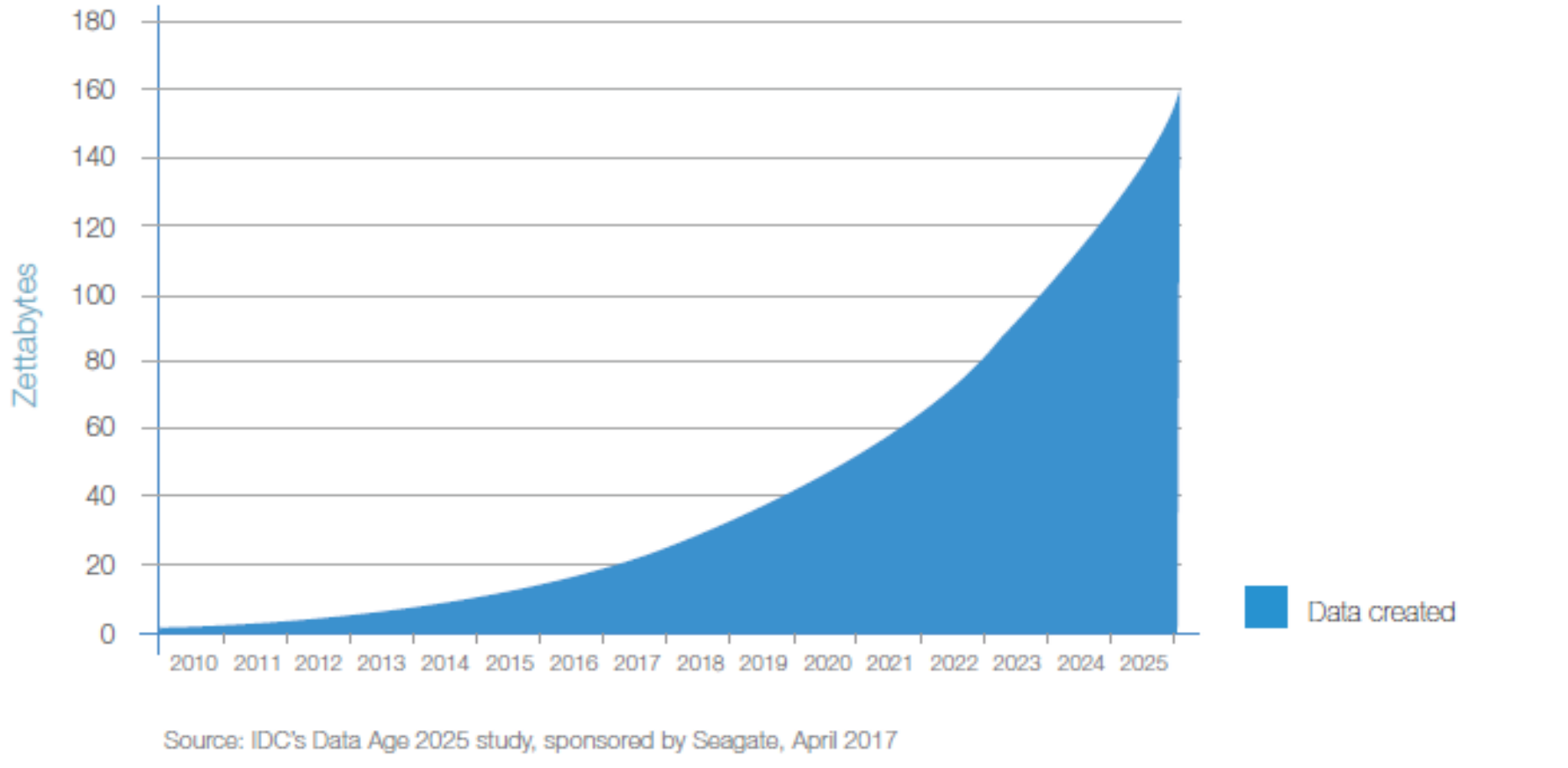
Annual Size of the Global Datasphere



Data Capacity / Information Representation

A single bit can be used to encode (represent) two pieces of information

3 bits 8 things – 7 colours of the rainbow

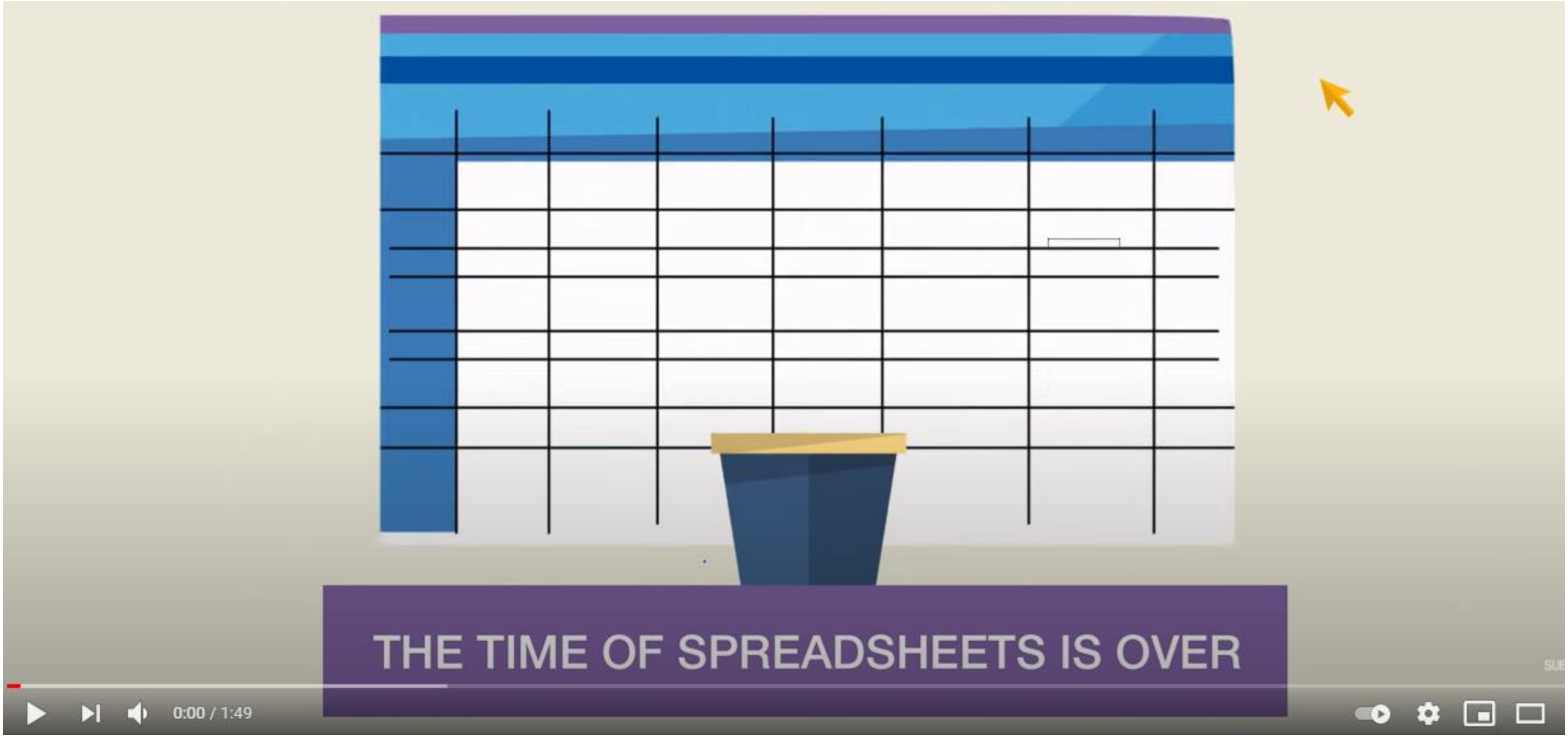
7 bits can represent 128 ASCII values

8 bits == 1 Byte

Q. How many bytes would it take to store your name?

Unit	Symbol	Powers of 2	Decimal
Kilobyte	1KB	2^{10} (1024) Bytes	10^3 bytes
Megabyte	1MB	2^{20} (1024) KB	10^6 bytes
Gigabyte	1GB	2^{30} (1024) MB	10^9 bytes
Terabyte	1TB	2^{40} (1024) GB	10^{12} bytes
Petabyte	1PB	2^{50} (1024) TB	10^{15} bytes

World Economic Forum Video



https://www.youtube.com/watch?v=eVSfJhssXUA

Mentimeter

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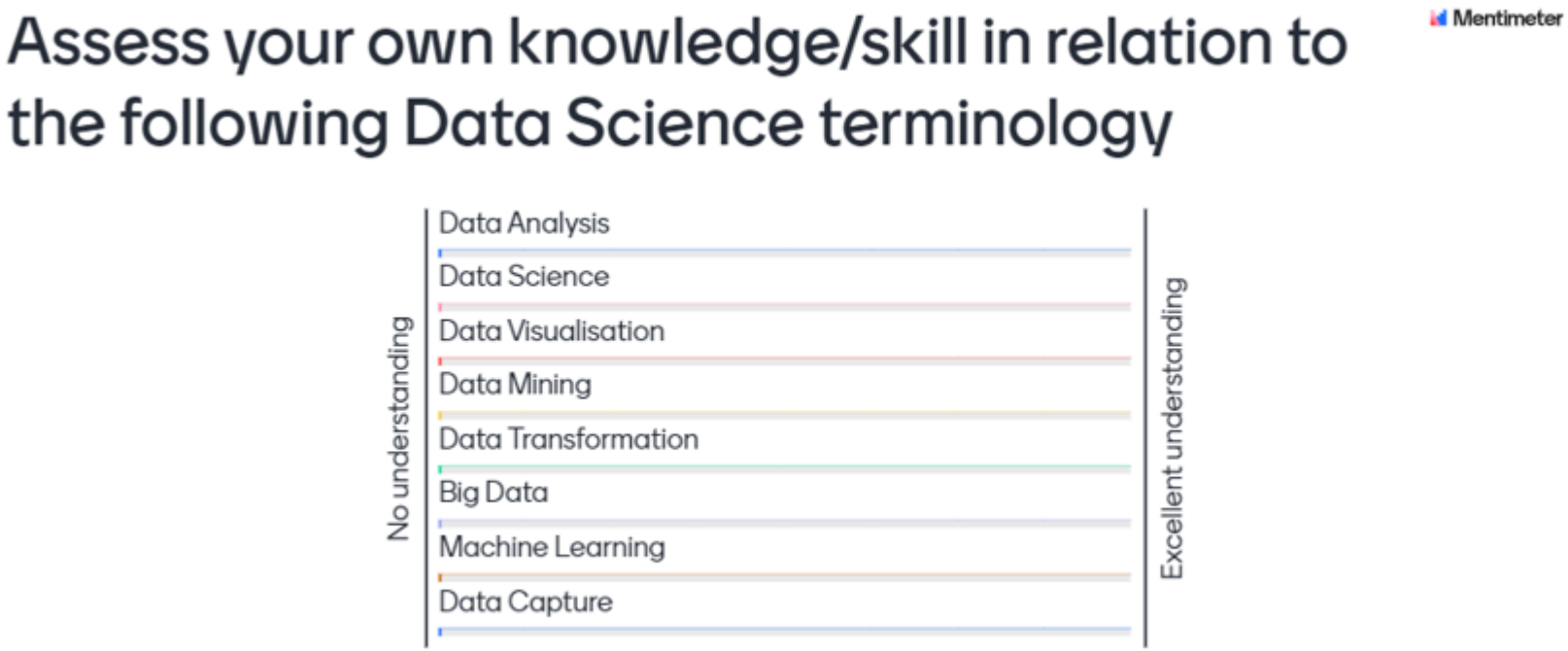

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Data Science … Analysis … Big Data

Data Science is an interdisciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from data in various forms, both structured and unstructured, similar to data mining.

Data Analysis is a process of inspecting, cleansing, transforming, and modelling data with the goal of discovering useful information, informing conclusions, and supporting decision-making

Big Data is extremely large data sets that may be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.

Data mining is the practice of examining large pre-existing databases in order to generate new information.

Machine Learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.

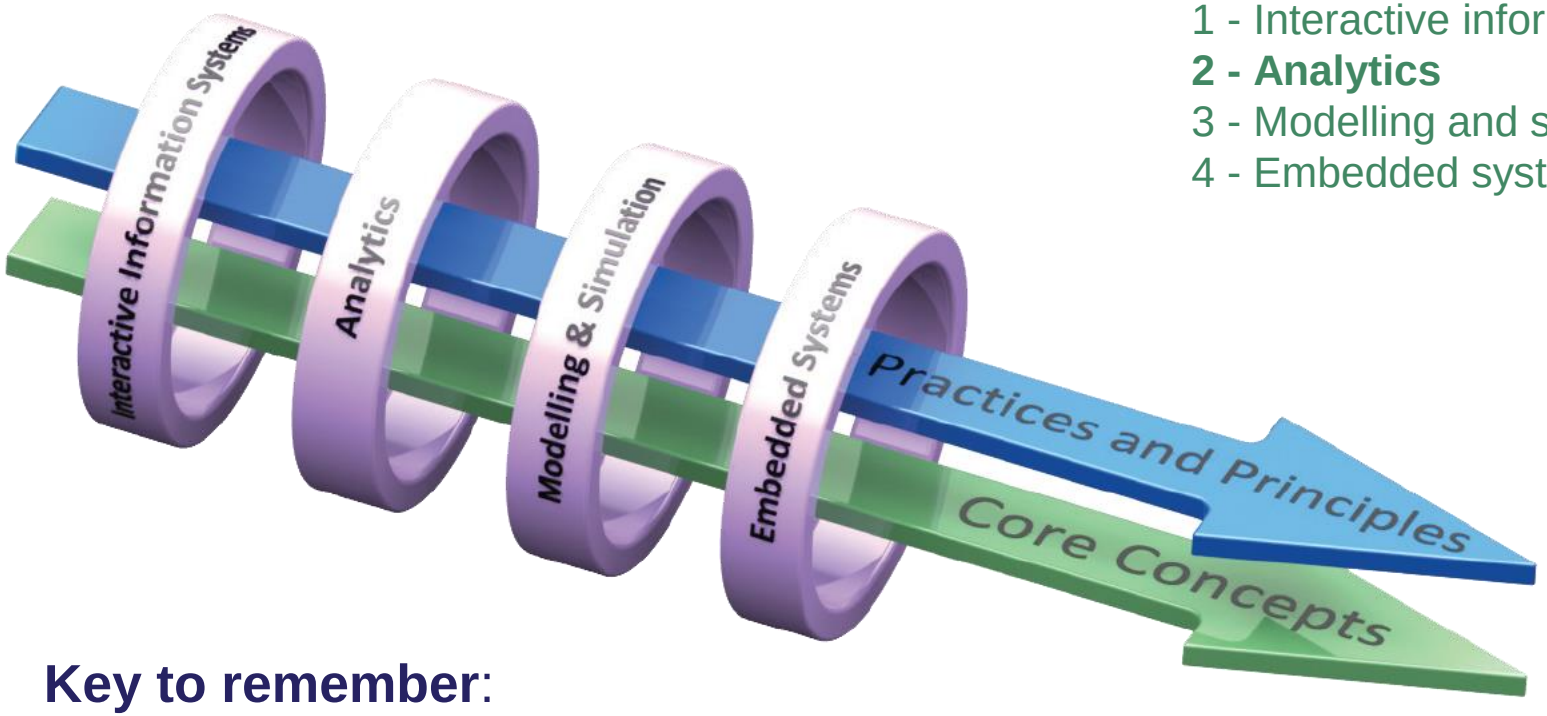
5 minute stretch break

Applied Learning Task 2

LCCS Interwoven

The four applied learning tasks explore the four following contexts:

1 - Interactive information systems
2 - Analytics
3 - Modelling and simulation
4 - Embedded systems.



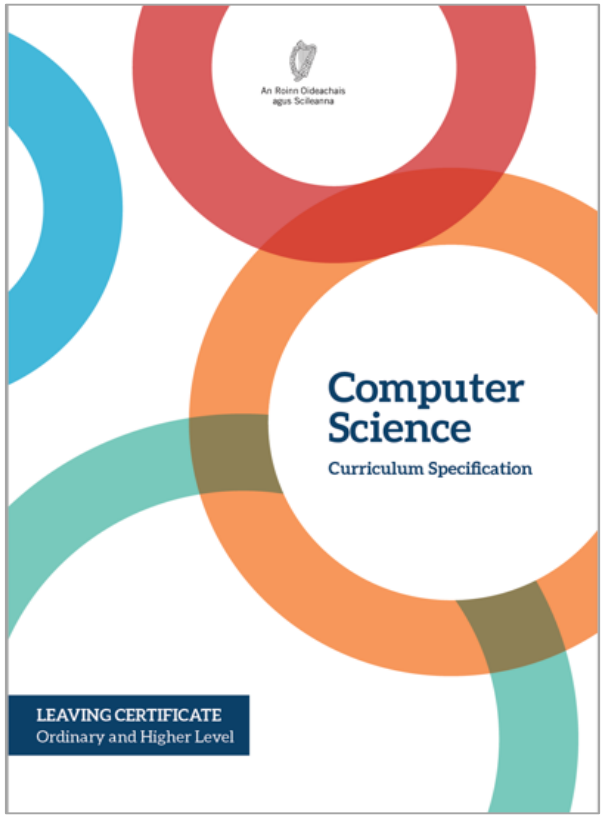
Key to remember:

Explore and teach the LOs through the lens of ALTs.

Applied Learning Tasks (ALTs)

‘Each of which results in the creation of a real or virtual computational artefact and a report.’

‘Where possible, the artefacts should be beneficial to the community and society in general.’



‘These artefacts should relate to the students’ lives and interests.’

‘Examples of computational artefacts include programs, games, web pages, simulations, visualisations, digital animations, robotic systems, and apps.’

'Students work in teams to carry out four applied learning tasks over the duration of the course.'

Applied Learning Task 2: Analytics

"Hypothesising, making predictions, examining evidence, recognising patterns and reaching conclusions are at the heart of computer science"

"Students will identify an interdisciplinary topic, develop a hypothesis and utilise existing resources to highlight the salient information and inform future decisions"

"By identifying, analysing, and deconstructing a problem, students will deepen their understanding of the practices and principles of computer science"

LCCS Specification: p22

ALT2 Learning Outcomes

3.4. Develop algorithms that can find the frequency, mean, median and mode of a data set.

3.5. Structure and transform **raw** data to prepare it for analysis.

3.6. Represent data to effectively communicate in a graphical form.

3.7. Use algorithms to analyse and interpret data in a way that informs decision-making.

Data Science Arc

Microsoft

aka.ms/HackingStem

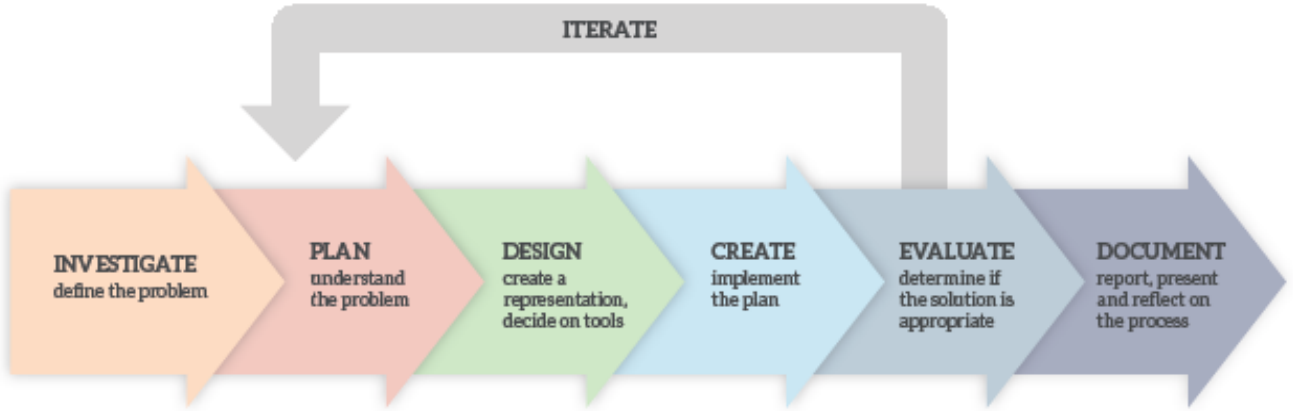


Figure 3: Overview of a design process

ASK – The Question that starts the journey

PREPARE – Sketch out, think through ideas to organise work.

GET DATA – Collect, enter, reuse or repurpose.

CLEAN – Format, layout, organise.

ANALYSE – Format, layout, organise, sort, filter, summarize, triangulate.

VISUALISE – Format charts, tables, add logos, branding, colours.

REVIEW – Gather feedback, find errors, check interpretations.

PUBLISH – Secure and share within or outside the team.

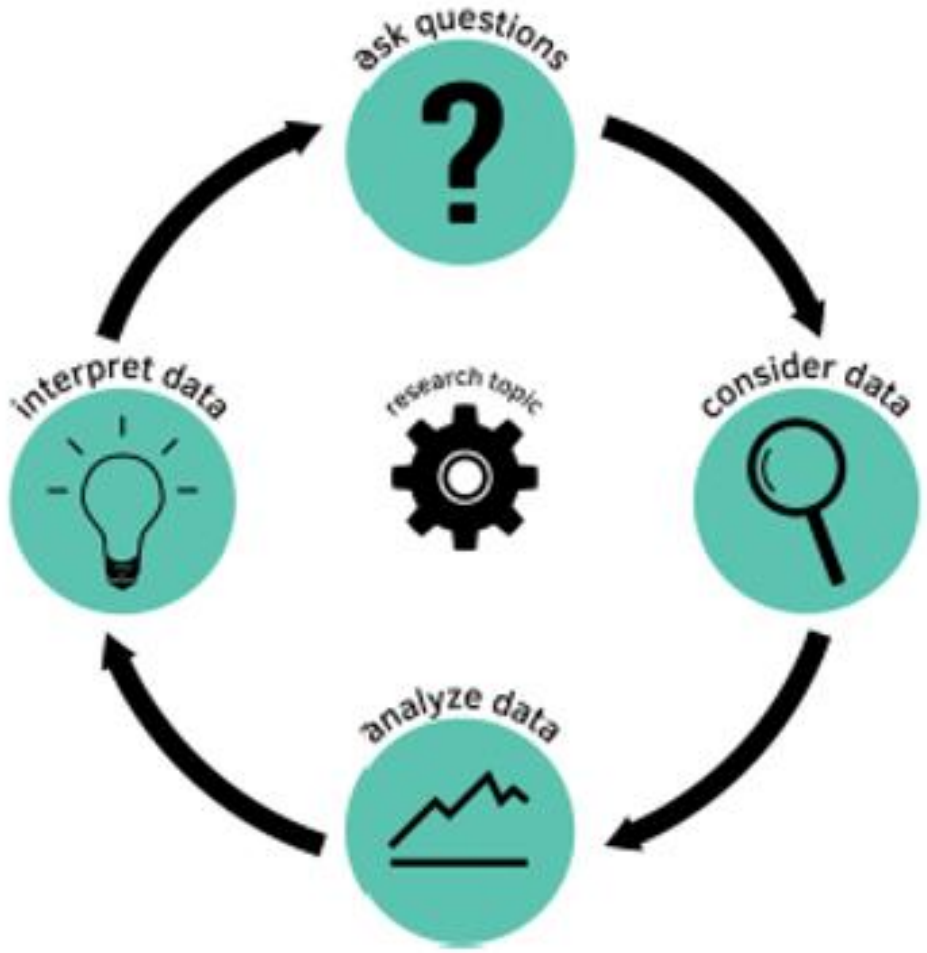
Data Cleansing

The data set below shows the raw data collected from the result of a 100m school race.

Surname	Gender	Age	Time
Murphy	M	17	13,12
Ogene	M	16	12.14
Ogene	M	16	12.14
Mc Intyre	F.	17	12.87
Lopez	F	-18	14.01
	F	17	1 329
McCarthy	M	77	13.65
Ó Brádaigh	f	16	13.09

Problems?

The Data Cycle – an alternative framework



Group Activity / Breakout

Questions to discuss

1. **What prior knowledge will students have that is relevant to ALT2?**

2. **What may challenge students in dealing with ALT2?**

3. **What approach could you take to introduce ALT2 to your students and support their progress?**

Part III

NCCA Resources

Demonstration of Samples

Tea/Coffee

An Roinn Oideachais
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