



# TICE3 Workshop 2: Data collection

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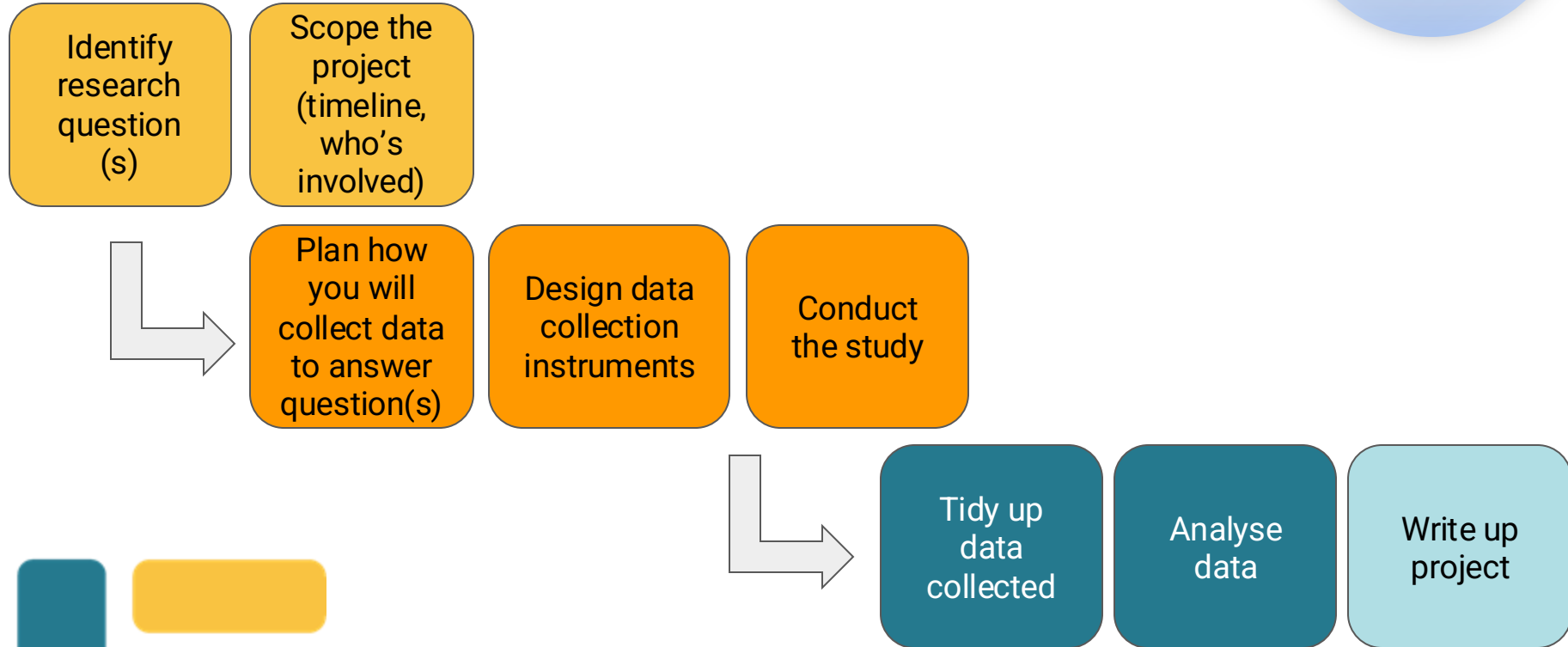
Teacher Inquiry in Computing Education programme (TICE)

# Recap

## Teaching Inquiry in Computing Education project


- You've hopefully all attended an introduction to the project and submitted a research plan!
- This webinar is the second of four:
  - [Research planning](#)
  - Data collection
  - Data analysis
  - Writing up
- There will also be three drop-in surgeries
- All the information you need should be on the web page at <http://bit.ly/tice-resources>
- This presentation will be shared on the web pages

# Conducting a small-scale inquiry (research) project

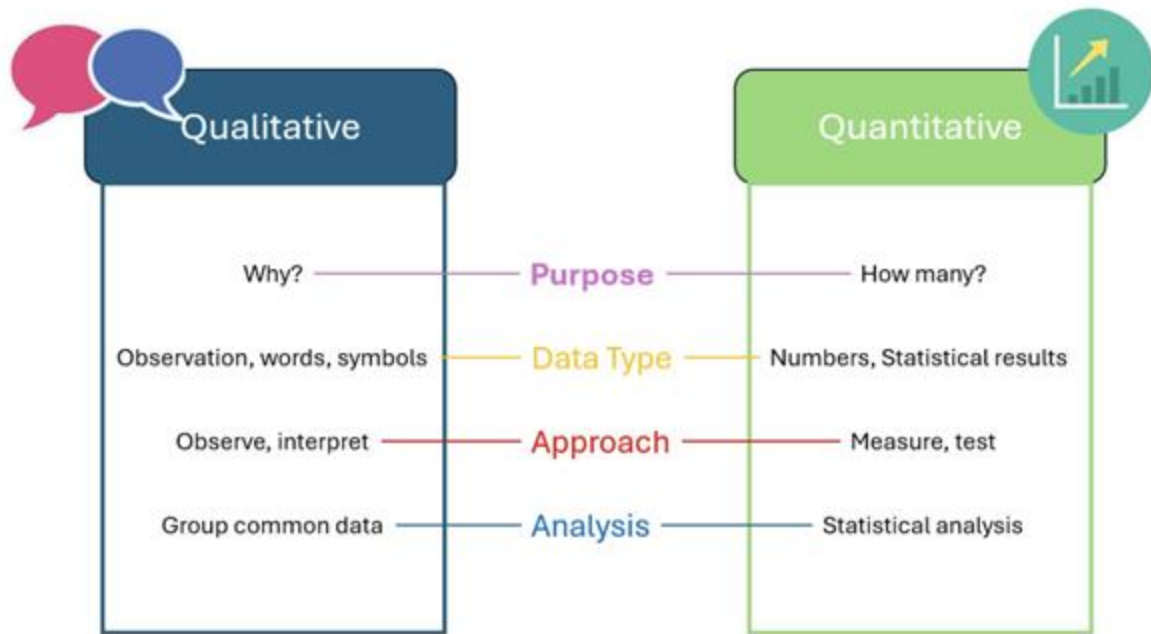




## Overview

- Types of data
  - Qualitative data collection
  - Quantitative data collection
  - Example questionnaires to use
  - Data collection for specific research questions
  - Questions and Discussion
- 

## Quantitative vs quantitative?



## Qualitative data collection

- Interviews
- Focus groups
- Journal/Diary
- Artefacts (projects)
- Observations
- Documents

### **Primary data**

Primary data is something you collect yourself specifically for the research project, for example interviews and focus groups, but might also be asking children to carry out tasks.

### **Secondary data**

Secondary data already exists for another purpose but is useful to your research question - for example student projects, schemes of work, school documentation.

# Planning for interviews and focus groups

## Hints and tips

- Interviews are better with adults / post 16
- Focus groups are generally better for children
- Write out the questions you want to ask and check with somebody else
- Check each question contributes to your research question
- Consider giving some stimulus material/ task to do
- Audio record only with written consent
- Don't ask leading questions

# Examples of interview and focus group planning

## Focus Group with groups of Year 7s (study took place in 2017)

**Research Question:** How do lower secondary school students experience the micro:bit

### Section 1: Introduction and warm up (approx 10 minutes)

- Can you go round and everybody give me their first name? That helps me to know your names!
- Now for this question we will go round the room so that everybody can contribute. Can you each tell me one thing you enjoyed about the micro:bit? (repeat to each student)
- Now going round the room the other way, can you tell me one thing that you wasn't so good about the micro:bit? (repeat to each student)

### Section 2: Imagination, Learning, Programming ... (Approx. 10 Minutes)

For the next questions anybody can speak and you can talk to each other and say if you agree or don't agree with what somebody else has said. I've got five questions about actually using the micro:bit

- Do you have any ideas about other things that you could use the micro:bit for, for example if you could attach it to other devices?
- What do you think you learned while you were using the micro:bit?
- How important is it to understand computer programming (coding) to be able to make interesting projects with the micro:bit?
- ... etc.

## Interview with teachers (example0)

**Research Question:** How do computing teachers use LLMs?

### Section 1: Teachers' Experience with LLMs (Approx. 7 Minutes)

- 1.1 Can you briefly describe your current understanding of LLMs such as ChatGPT?
- 1.2 Have you used any LLMs in your teaching practice? If yes, in what context?

### Section 2: Perceived Benefits and Challenges (Approx. 10 Minutes)

- 2.1 What do you see as the potential advantages of using LLMs in the educational context?
- 2.2 What concerns do you have regarding the use of LLMs in education (e.g., ethical concerns, plagiarism)?
- 2.3 Are there specific challenges you anticipate when implementing LLMs in your subject area?

### Section 3: ....

... etc





# Artefacts and documentation

## Hints and tips

### **Artefacts**

Homework, programs, projects, screenshots, etc. can be useful data

Make sure you anonymise student projects before sharing outside your school.

Check your school policy about whether you can use anonymised projects with/without consent

### **School documentation**

Schemes of work, lesson plans, policies, learning materials, are all useful data

As long as they are anonymised (school name removed), consent not normally needed



## Observations, journals and diaries

### Journals and unstructured observations

These might include:

- Writing (or audio recording) your own reflections after a particular lesson or event
- Observing a colleague's lesson and making notes (or vice versa)
- Writing a journal entry regularly for a period of time

### Structured observations

- Sometimes called systematic observations
- Complete a form during the lesson for specific events at certain times
- Can generate **quantitative** data

	Lesson start	10	20	30	40	Lesson end
Pupil A	On task	On task	Off task	On task	On task	On task
Pupil B	Off task	On task	Off task	On task	On task	On task
Pupil C	On task	On task	On task	On task	Off task	On task
Pupil D	On task	On task	On task	On task	On task	On task



**Activity: what qualitative data do you need for your study?**

# Quantitative data collection

## How to collect numeric data

- Questionnaires (sometimes called surveys)
- Logs from software
- Systematic observations (already discussed)
- Test results

**Questionnaires can be used to collect both quantitative and qualitative data - these will be analysed differently.**

## Types of data

### Types of numeric data

- Discrete (e.g. shoe sizes, ages)
- Continuous (temperature, height)

Discrete data may be ordered or unordered:

- Ordered (age, test score)
- Unordered (eye colour, marital status, type of complaint, etc.)

## Designing a questionnaire (numeric data)

### Types of questions (not all offered in free survey tools)

#### Multiple-choice questions (using radio buttons)

- Users select one from a series of options (drop-down or list)
- If grouping, make sure answers are mutually exclusive (e.g. 11-13, 14-16, 17-19, not 11-13, 13-15 ...)

#### Select as many as apply questions (using check boxes)

- Provide a range of options or sentiments
- Always allow for respondents to add 'other' and type in

#### Ranking questions

- Putting some options in order
- Can be hard to ensure all lines completed on free software

#### Likert scales

- 'I like eggs' - do you strongly agree, agree, disagree, strongly disagree
- Decide whether you need a neutral option (odd number of items) or not (even number of items)

#### Open text

- Avoid for numeric data input

# Questionnaire software

## Several tools available

### Free

- Google Form
- Microsoft Forms
- Typeform (trial)

### Paid for

- Survey Monkey
- Qualtrics
- SurveySparrow
- TypeForm

### Hints and tips for questionnaire design

1. Always bear in mind your research question
2. Avoid ambiguous terms or scales, e.g. 1-5, 5-10 ...
3. Avoid long questions
4. Avoid double-barrelled questions (how often do you go to football and music lessons?)
5. Avoid leading questions (Would you agree that the GCSE computer science course is hard?)
6. Avoid double negatives
7. Avoid long questionnaires!

# Pre-tests and post-tests & experiments

## Designs used in academic studies

### Randomised controlled trial

- Identical pre-test and post-test
- Students allocated to control group randomly
- Only students in experimental group get the intervention

### Quasi experimental study

- Range of varieties of this, usually all pre-post-
- Can have a control group, but not randomly allocated

### Post-test design

- No pre-test
- If using a control group, ensure that they are equivalent before (give test)

### Use historic data (interrupted time-series designs)

- Intervention this year - compare with test results from previous year

### One-shot case study design

- Test after the event with your intervention group
- Seen as a weak design for rigorous academic research but perfectly fine for exploratory action research

In an action research study you do not have to use a rigorous experimental design such as you are not aiming to create generalisable results.

Action research is about finding what works in your specific context.

# What data do I need to collect

## A few examples from teachers' research questions

Need to know	How to measure	Need to know	How to measure
Levels of engagement	Questionnaire (standard ones available) Structured observation Personal reflections	Student performance	Test or quiz
Pupils' ability to recall verbally	Systematic in-lesson observations	Assessment style in programming exams	Secondary data: exam papers
Students' understanding of AI	Questionnaire (standard ones available)	Pupil perseverance	Structured observations Personal teacher reflections
Teacher workload	Workload log	Pupils' pattern seeking skills	Specifically designed data collection instrument (perhaps adaptation of Bebras?)
Pupils' code comprehension	Classroom tasks/ worksheets	Students' creativity	Look at Murcia (2020) - A-E of children's creativity



# Useful site: csedresearch.org

Select Community  
resources/ Survey  
instruments

The screenshot shows the top navigation bar of the website. It includes a search bar with the text "Find Instruments" and a "Clear Filters" button. Below the search bar is a red banner with the text "Survey Instruments".

[csedresearch.org](http://csedresearch.org)

Community  
Resources

Current  
Projects

Our  
News

Our  
Services

DONATE

Find Instruments



Clear Filters

[Survey Instrument Summary Page](#)

## Filters

Results (229 Instruments Found)

Show: 10

Tick 'Computing'

Filter here to find  
relevant surveys

### Focus Area

- Computing
- STEM
- General

### Demographic

### Program Assessment

### Content Knowledge

### [Academic Motivation Scale \(High School\) | 1992](#)

Measure motivation (intrinsic, extrinsic, and amotivation) toward education.

### [Activation Engagement Survey | 2016](#)

Measures student levels of affective, behavioral, and cognitive engagement in activity. Designed for 10-15 year olds, and generally used immediately following a STEM learning activity.

### [Adapted Middle School Students' Attitude to Mathematics, Science and Engineering Survey | 2007](#)

[PDF](#) [MS Word](#)

An adapted version of the Middle School Students' Attitude to Mathematics, Science and Engineering Survey created and tested to be more user-friendly to younger students.

### [Algorithm Analysis Concept Inventory | 2016](#)

Focus Area: Computing x Demographic: 6th - 8th x 9th - 12th x Quantitative/Qualitative: Quantitative x

Student Engagement: Cognition tse-remove-border - Motivation x

## Filters

Results (1 Instruments Found)

Show: 10 v

### Focus Area -

- Computing
- STEM
- General

### Demographic -

- PreK - 5th
- 6th - 8th
- 9th - 12th
- Undergraduate

#### [Attitudes Towards Computing Scale](#) | 2019

[PDF](#) [MS Word](#)

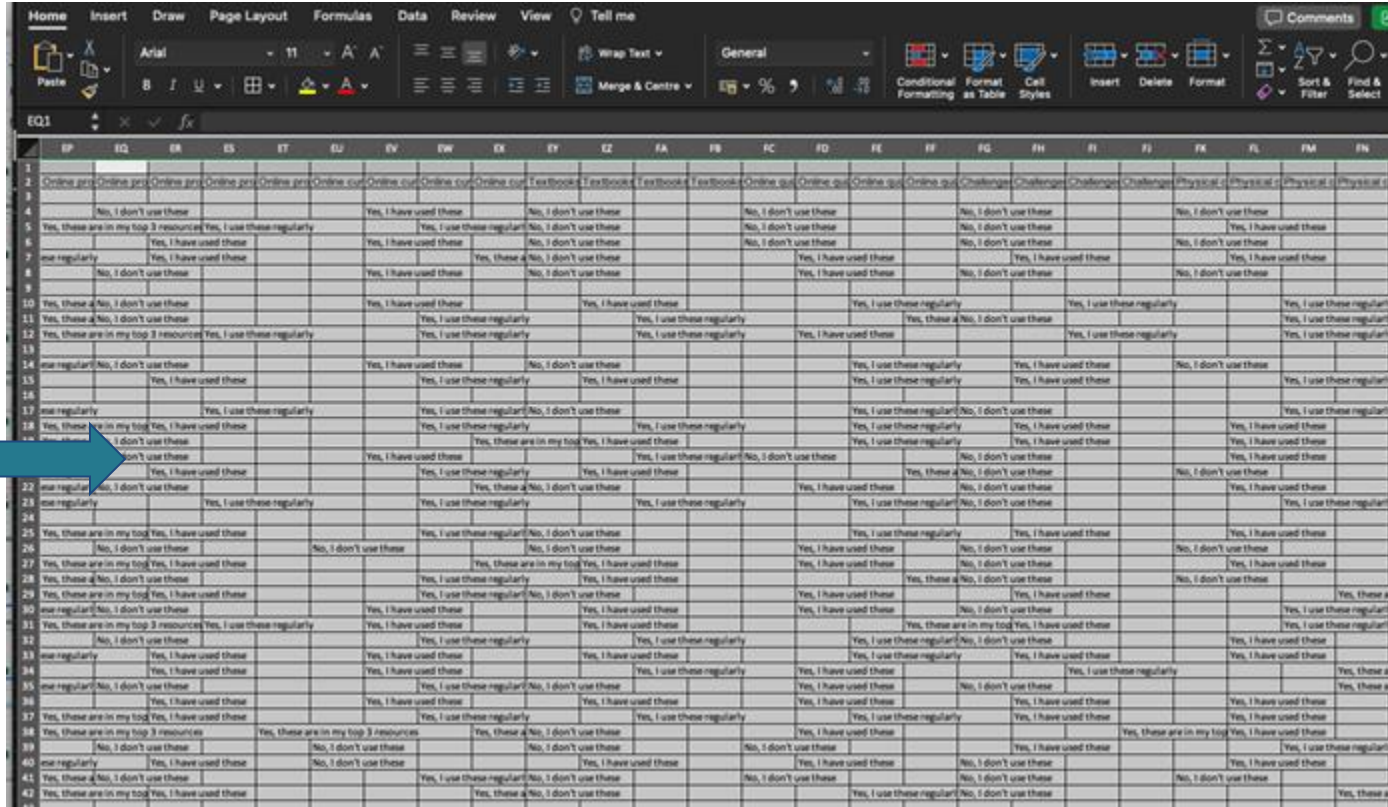
Measures attitudes towards computing among students through scales measuring computing confidence, computing enjoyment, computing importance and perceived usefulness, motivation to succeed in computing, and belongingness.

# Next webinar: data analysis

We will explore how to analyse the data you've collected

Survey data can seem overwhelming before it's processed

4:30pm 13th January



The image shows a screenshot of an Excel spreadsheet with a ribbon at the top. The ribbon includes tabs for Home, Insert, Draw, Page Layout, Formulas, Data, Review, and View. The Home tab is active, showing options for Paste, Font (Arial, size 11), Paragraph (B, I, U, text color, background color), Styles (Merge & Centre, Conditional Formatting, Format as Table, Cell Styles), and Layout (Insert, Delete, Format). The spreadsheet itself has a grid of cells. The columns are labeled with letters from EP to FN, and the rows are numbered from 1 to 42. The data in the cells consists of text responses to survey questions, such as "Online pro", "Yes, these are in my top 3 resources", "No, I don't use these", and "Yes, I have used these". A blue arrow points from the text "Survey data can seem overwhelming before it's processed" to the grid of data.

## Dates for the year

Date	Time	Meeting Topic	Available for
<i>Monday 7th October</i>	4:00 - 6:00 pm	Initial project meeting	Supported only
Thursday 24th /31st October	4:30 - 5:30 pm	Research questions	Supported/ Self-study
<b>Monday 11th November</b>	<b>4:30 - 5:30 pm</b>	<b>Data collection</b>	<b>Supported/ Self-study</b>
Tuesday 10th December	7:00 - 8:00 pm	Drop-in (any questions)	Supported/ Self-study
Monday 13th January	4:30 - 5:30 pm	Data analysis	Supported/ Self-study
Wednesday 5th February	7:00 - 8:00 pm	Drop-in (any questions)	Supported/ Self-study
Monday 3rd March	4:30 - 5:30 pm	Writing up	Supported/ Self-study
Thursday 3rd April	7:00 - 8:00 pm	Drop-in (any questions)	Supported/ Self-study
<i>Monday 12th May</i>	5:00 - 6:00 pm	Final group meeting	Supported only
July tbd	N/A	CAS Conference	Supported/ Self-study



Drop  
in!

Please try to be on time for the topic workshops; for the drop-in come in any time.



## Questions and discussion

Over to you!





**Contact details:**

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Research Centre: <http://computingeducationresearch.org>



## Online webinars & follow-up meeting

Date	Time	Meeting Topic	
27/11/23	4-6pm	Research Design	Mandatory (choose 1)
5/12/23	4-6pm	Research Design	Mandatory (choose 1)
08/01/24	4-5:30pm	Data collection	Optional
XX/01/24 (need to change)	7-8:30pm	Data collection	Optional
19/02/24	4-5:30pm	Data analysis	Optional
21/02/24	7-8:30pm	Data analysis	Optional
18/03/24	4-5:30pm	Writing up	Optional
20/03/24	7-8:30pm	Writing up	Optional
23/5/2023 & 24/5/2023 tbc	4-6pm	Group meeting	Mandatory (choose 1)
13/7/2024	Presentation at teacher conference	CAS Conference	Optional