



Data collection and analysis: Task-based activities

Activity 1: Exploring the use of data analysis

Activity 2: Exploring the research question

Activity 3: Exploring terms and concepts encountered in introductory data analysis texts

Activity 4: Interpreting data in a research paper or report

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Activity 1: Exploring the use of data analysis

Task:

Pick a challenge-based question, such as 'How is wealth distributed?', and ask students to work in pairs to come up with ideas for the following questions (10-15mins):

- What sorts of data might we want **to gather** to answer this question?
- What sorts of data are **already available** that we could analyse to answer this question?
- What do **we want** these data to tell us?
- What might these data **not** be able to tell us?

After this paired discussion, return to the group for a facilitated discussion with a teacher/tutor.

Facilitated discussion:

- A focus on how different research questions require a variety of different research methods; emphasising that different methods will give us different types of data, and specific methods will be better suited to answer different questions.
- Highlight how individuals have different preferences/assumptions /tools to collect data through how they view the world.
- Talk about the value of secondary data sets, where the data collection has already been done for you.
- Highlight the power of story-telling through data analysis, and how the research question will determine which sections of the data will be more useful to focus on.
- Raise the issue about 'othering' – that is, whatever data collection and analysis method is chosen, it is important to consider what is excluded, made absent, or othered', for example, a specific demographic group.

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Activity 2:

Exploring the research question

Task:

Ask students to consider a challenge-led question, such as '**How is wealth distributed?**', and ask students to work in pairs to come up with ideas for the following questions (10-15mins):

- What sort of sub-questions might you ask around this main question?
- How would different disciplines approach these questions?
- What methods of data collection would be appropriate to answer these questions?

After this paired discussion, return to the group for a facilitated discussion with a teacher/tutor.

Facilitated discussion:

This is a chance for students to talk about their previous experiences in data collection, perhaps sharing different data collection methods they have already tried at school (often these are surveys). Use this space to discuss how disciplines have different 'signature pedagogies'¹ (ways of teaching that are unique to the discipline and prepare the student for a specific profession) and methodologies. Stress that in interdisciplinary teaching and learning the best methods of data collection should be directed by the research question and the purpose of the research; not necessarily the researcher's (in this case, student's) own disciplinary background.

¹ Lee S. Shulman; Signature pedagogies in the professions. *Daedalus* 2005; 134 (3): 5259.

doi: <https://doi.org/10.1162/0011526054622015>



Activity 3:

Exploring terms and concepts encountered in introductory data analysis texts

Task:

Set required reading for introductory texts to data analysis before class, asking them to note any terms or concepts they are not familiar with or would like further explained. Often, simple terms like 'empirical' are used without explanation, and in interdisciplinary teaching it is important to continuously translate or explain what concepts, jargon, or acronyms mean to each other.

For example,

1. Introduction (pp.1-5), and Chapter 1: How numbers can mislead (pp.7-13), in **How to read numbers: a guide to statistics in the news (and knowing when to trust them)**, by Tom Chivers and David Chivers.
2. Chapter 14: 14.1 Introduction (pp. 358), 14.2 Kick-starting Data Analysis (pp. 359-367), in **Doing qualitative research**, by David Silverman.
- 3.

In class, ask the students to get in pairs and look over the readings together, discussing and noting terms or concepts they would like further help with understanding (10 mins).

After this paired discussion, return to the group for a facilitated discussion with a teacher/tutor.

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Facilitated discussion:

At this point, the teacher facilitating the discussion should have done some prep by reading the texts and noting any terms or concepts that they think likely the students will raise in class. It is then prudent to note down their definitions so they can be given succinctly in class to the students.

For example, in the suggested readings, these were some terms that may need further explanation to students:

- **Empirical data:** Data that has been collected and held up to rigorous scrutiny through experimentation and/or observation.
- **Evidence-based data:** Data is just data and has no intrinsic meaning on its own. Evidence has to be evidence for or of something; an argument, an opinion, a viewpoint or a hypothesis. It is evidence generated from the analysis of real-world data; objective “hard” data. [This could prompt a debate about the parity of esteem between qualitative and quantitative data, with quantitative often being seen as more reliable, “hard” data]
- **Exponential curves:** A graph that shows how a quantity changes at a constant rate over time.
- **Uncertainty intervals:** The confidence interval describes the uncertainty inherent in this estimate, and describes a range of values within which we can be reasonably sure that the true effect actually lies.²
- **Ecological Fallacy:** A formal fallacy in the interpretation of statistical data that occurs when inferences about the nature of individuals are deduced from inferences about the group to which those individuals belong.

² Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). *Cochrane Handbook for Systematic Reviews of Interventions* version 6.4 (updated August 2023). Cochrane, 2023. Available from www.training.cochrane.org/handbook.

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- **Simpson's paradox:** A phenomenon in probability and statistics in which a trend appears in several groups of data but disappears or reverses when the groups are combined.
- **False positives:** A type I error where the test is checking a single condition, and wrongly gives an affirmative (positive) decision
- **False negatives:** A test result which wrongly indicates that a condition does not hold.
- **Cherry-picked:** To choose only the best or most suitable from a group of people or things/data
- **Variables:** Factors which are isolated from one another in order to measure their relationship; usually described in quantitative research.
- **Causation:** Describes an association between types of variables: when one variable changes, so does the other.
- **Correlations:** A statistical indicator of the relationship between variables. These variables change together: they covary. But this covariation isn't necessarily due to a direct or indirect causal link.

This activity can also be done focusing on introductory texts to **data collection**, such as: Chapter Two: What You Can (And Can't) Do With Qualitative Research. In, *Doing qualitative research* by David Silverman (pp.7-25)

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Activity 4:

Interpreting data in a research paper or report

Task

Locate a research paper or report, for example, the WID World Inequality Report 2022: <https://wid.world/document/world-inequality-report-2022/> Find a few small sections of the report that contain graphs, tables, or descriptive data for the students to focus on, and give them these details as pre-class reading e.g., "Read through the Forward (p.3), and Executive Summary (pp. 9-21) and look at their website to find out who WID are". In class, ask them to break into groups of 2-3, discuss and to note their reactions to some of these questions:

1. What data analysis tools and techniques are being used?
2. Are any figures easier to interpret than others?
3. What questions are they trying to answer?
4. What's the purpose of their analysis?
5. Can we trust this analysis?

Then ask them to read the methodology section: <https://wid.world/methodology/>, and reflect on the following questions:

- What kind of data has informed this report?
- What limitations have they mentioned?
- Does their justification and honesty reassure you?

After this paired discussion, return to the group for a facilitated discussion with a teacher/tutor.

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Facilitated discussion:

- Highlight that the report starts with a textual summary to set the scene.
- Note the different types of graphs – some have less variables than others.
- Discuss what makes a good table or chart, e.g., appropriately labelled axis, clear signposting, right type of chart for data used.
- Probe the background story of how the report came to be created: who wrote the report; who were they funded by; what is their aim or purpose in creating it; do they have any political affiliations?
- The importance of stating any known limitations to the study, and any affiliations or funders.

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