

Evidence for Learning (E4L) and The Australian Council for Educational Research (ACER) have developed this resource to support leaders in schools to use data effectively. This is a summary resource to provide you with key concepts, examples and prompts around using data. An FAQs page explores some of the concepts in further detail. You might find that the seven step process outlined in this resource is cyclical in nature, as you apply lessons from your analysis and adapt your approaches. For further resources supporting implementation in schools see E4L.org.au/implementation.

The initial three steps are outlined below. We have not provided further detail of these given the availability of supports and advice elsewhere, however understanding the importance of these is critical.

1. Identify purpose
Clearly articulate your focus.
You might consider an inquiry question, e.g. 'To what extent have literacy outcomes improved since introducing the new literacy intervention program?'

2. Select sources
Consider a range of relevant data sources.
Recognise their strengths and weaknesses.

3. Collect
Gather the data you need.

Once the first three steps have been completed and the data has been collected, it is important to organise and then analyse the data. Data can be broadly considered as either qualitative (descriptive, often in the form of words or images) or quantitative (numerical data that can be analysed statistically). Each has particular strengths and characteristics, and require the use of suitable techniques for organisation and analysis.

4. Organise
Bring the data together into one place.
Arrange it for processing.
If you are working with data sets provided to you, they may already have been through the coding and cleaning process.

Consider privacy and confidentiality.
Are there regulations or processes that you need to follow? Do you need to de-identify the data? How will you manage access?
e.g. student names may need to be replaced with pseudonyms and data stored in a password protected file.

Know your data.
How will you organise the data? Is there irrelevant information that needs to be removed?
e.g. relevant data that will be used in the analysis are arranged into a single spreadsheet.

Prepare the data.
Does the data need to be coded so that it is ready for analysis?
e.g. identifying key words and themes, replacing 'yes' with a 1 and 'no' with a 2.

Clean the data.
Do you need to clean the data and identify errors? Is there value in conducting 'spot checks'?
e.g. 'spot check' data for a number of students to confirm that the data has been collated correctly.

5. Analyse
Analyse the data and present it in a suitable form.

Select appropriate analysis.
What analysis is appropriate for the data type and the purpose?
e.g. if exploring attendance, analysing focus group data for key themes could provide insights into factors impacting attendance.

Consider limitations.
How will the limitations of the data impact on patterns, trends, generalisations and conclusions?
e.g. qualitative data may not have clear themes and is not necessarily representative of a larger group or cohort.

Present in a suitable form.
What forms for presenting the data will best support easy and accurate interpretation?
e.g. a scatter plot can be valuable when exploring the relationship between two variables, such as attendance and achievement.

Once the data has been organised, analysed and is presented in a suitable way, it is then possible to develop plausible interpretations and put the data to use in informing practice.

6. Interpret
Ask questions, develop plausible interpretations and test them.

Consider context.
What are the contextual and environmental factors that have influenced your data?
e.g. explore considerations such as data collection aligning with a cultural event in the community that may have impacted attendance and engagement.

Align with baseline.
Do you have a reliable baseline to compare your data to? How can you ensure it is comparable?
e.g. comparing to the same data set from last year
e.g. matching sample groups so student absences do not impact an achievement baseline.

Triangulate.
Are multiple sources of data telling you the same thing (triangulation)? Does any data contradict your interpretation?
e.g. using data from in-class assessment tasks, classroom observations and student focus groups to check interpretations related to teaching of writing.

Check for biases.
How can you systematically check for biases?
e.g. confirmation bias may lead to focusing on data that confirms pre existing opinions or ideas.

Stress test.
How can you check your interpretations? Who could you test them with?
e.g. analysing a similar data set to see if the methods and interpretations work there too.

7. Use
Ensure data is fit-for-purpose in relation to intended uses.

Consider privacy and confidentiality.
Who will see the summary representations and interpretation? Do you need to de-identify data?
e.g. when sharing class level data, you might use pseudonyms and remove features that allow others to identify a teacher or group of students.

Share your findings.
How will you share what you have found? What story will you tell? Do different audiences need different representations of the data?
e.g. you may wish to share individual student data with that student's parents, but need to de-identify all students if sharing collated data with a parent group

Plan and take action.
How will your data inform teaching and learning?
e.g. use the data you have to address learning gaps of students or cohorts through targeted teaching
How will your data inform implementation?
e.g. you might look at trends in your data when deciding on new programs or initiatives to implement

Frequently Asked Questions

Qualitative data

 What sources of data are qualitative?	Qualitative data is descriptive, often in the form of words or images. You might gather qualitative data through: discussions with individuals or groups, observations, reflections, written survey responses, student work samples and written feedback.
 What are the advantages of qualitative data?	Qualitative data can: • Help answer questions of ‘why’ and ‘how’ different phenomena occur. • Explore themes in depth to build detailed understanding. • Identify unique features and unpack the deep experience of individuals.

Quantitative data

 What sources of data are quantiative?	Quantitative data is numerical and can be analysed statistically. You might gather quantitative data through: assessment tasks, checklist observations, numerical survey responses, demographic information, tracking of internal measures such as attendance.
 What are the advantages of quantitative data?	Quantitative data can: • Help answer questions such as ‘how much’ or ‘how many’. • Provide generalisations, identify overall patterns and trends. • Compare groups.

Organising

 How can I de-identify the data?	De-identifying data is an important step to ensure privacy and confidentiality. This can be done by removing or altering any features that could be used to identify a person, such as names, places or associated features (such as a student from a particular class).
 How can I code my data?	Coding is an important step in preparing data for analysis. It involves assigning names, colours, symbols or numbers to data in order to identify and group similar phenomena.  What does coding of data look like? • Steps for coding qualitative data include: identifying broad themes, identifying key words or phrases, identifying connections and contrasts. • Steps for coding quantitative data include: replacing words with numbers (e.g. yes [1] or no [2]), identifying incorrect or missing data (e.g. missing data [999]).
 How can I clean my data?	Cleaning the data ensures that it is free from errors. This includes removing duplicates, acknowledging missing or incomplete data, and checking for errors in the collation of the data.  What is data cleaning? The cleaning process might also include saving the two sets of data: one as a ‘full set’ of all the data available and the second as a ‘usable set’ of data that is complete enough to analyse. You may conduct ‘spot checks’ by looking up the values for a student and compare it to the document or source where you took the data from to ensure it is properly aligned.

Analysing

 What types of analysis might I use and for what purpose?	There are many types of analysis that can be undertaken. The appropriate type depends on the form of data you have and what you are looking to measure. Examples include:  Example of thematic analysis • Thematic analysis - analysing non-numerical information, such as data from a focus group, to identify themes and patterns. • Discourse analysis - analysing language and how it is used in texts and interactions, including the consequences of the interactions. • Modified Guttman Charts - a way of representing assessment data as 1s and 0s on a spreadsheet that enables teachers to analyse the results visually.  How to create a Guttman Chart • Measures of centrality (mean, median, mode) - statistical values relating to the centre of the data. • Measures of spread (range, standard deviation) - statistical values relating to how spread out the data is. • Effect sizes - statistical values to quantify the extent to which two related groups of data are different.
 What forms could I use to represent my data?	Summarising data into appropriate forms facilitates interpreting and using the data. Examples include:  Choosing a good chart • Summaries of key themes or a word cloud of recurring phrases. • Quotes from discussions or written responses. • Box and whisker plots for representing centrality and spread of numerical data. • Histograms for representing frequencies of data that falls into different categories. • Scatter plots for exploring the relationship between two sets of numerical data. • Tables to summarise numerical data.

Interpreting

 How can I use baseline data?	A baseline is a set of data that can be used for comparison to see if a particular approach has had an impact. This could be previous data for the same cohort, data from a previous year, or another comparable set.
 How do I triangulate data?	Triangulating data involves drawing on three or more sources when providing interpretations. This can involve using additional data, research methods, or input from colleagues to provide additional perspectives or insights on the phenomenon being studied or addressed. Triangulation should reduce bias and increase validity and credibility of the conclusions.
 What types of bias might I need to be aware of?	Types of bias include: • Anecdotal fallacy (e.g. using a specific story to generalise). • Sunk cost fallacy (e.g. we’ve come this far so we need to keep going). • Confirmation bias (e.g. noticing or selecting only the data that confirms pre-existing ideas / opinions).