'How do I analyse my data?': Some suggestions for qualitative and quantitative analysis

Anne Burns

University of NSW, Sydney

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Congratulations EVO 2021 organisers!

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14/01/2021
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How do I analyse my data? Some suggestions for qualitative and quantitative analysis
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Teachers research! Innovative, international sharing and mentoring
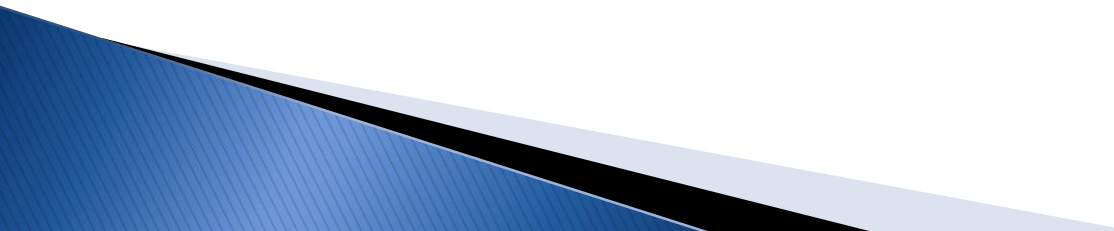13/02/2021
Richard Smith

Action research group 2019

Overview

1. Ways to collect data
2. General considerations when preparing for data analysis
3. Deductive and inductive approaches
4. Qualitative data analysis
5. Quantitative data analysis

Collecting data to explore your plan of action

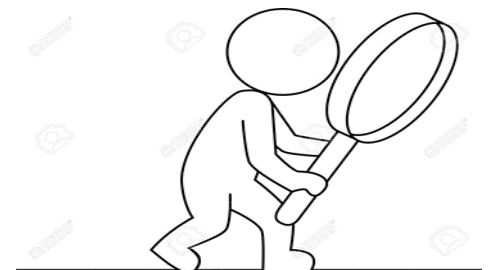Two main forms of data collection:

Observational (what people do)

Non-observational (what people think)

Collecting observational data

- observation (watching in a social situation)
- observation notes (factual accounts of events)
- recordings (audio/video)
- transcripts (documenting interactions)
- photographs (shots/images of context)
- maps/diagrams (layout/interactions)
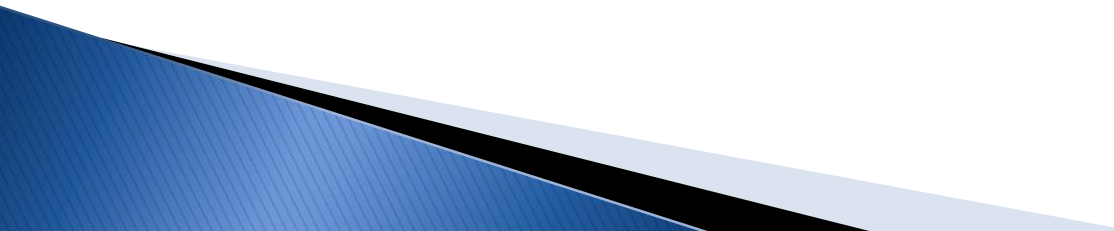- documents (teacher/student texts or materials from the context)

Collecting non-observational data

- journal/diary (recording ideas/thoughts)
- "jottings" (memory aids, brief notes)
- surveys/questionnaires (closed, rank option, open questions)
- interviews (structured, semi/unstructured)
- discussions (conversations/focus groups)
- narratives (autobiography/life history/professional accounts of practice)

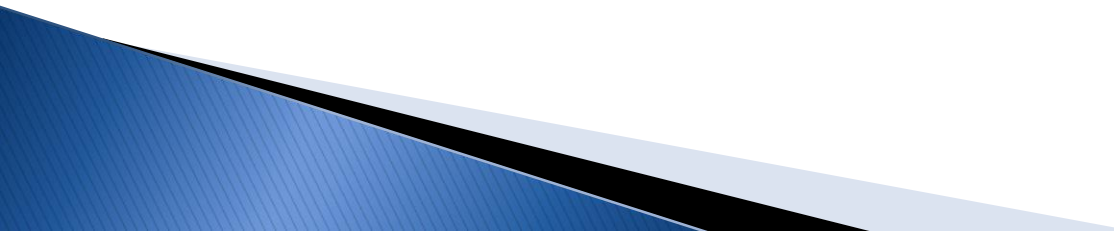# Reflection: Deciding on your data

Consider your research topic/issue, focus and questions:

▸ What are the main actions/interventions you want to put in place?

▸ What data do you need to keep track of the actions and answer your main question(s)?

Data analysis in AR

Action research is a *systematic* and *documented* research process. Good data are important to support your claims. Research…

…depends on the presentation of solid descriptive data, so that the researcher leads a reader to an understanding of the meanings of the experience under study. (Janesick, 1998:48)

The importance of context in AR

Action research analysis relates particularly to rich description that takes account of the context. Any or all of these aspects could be important:

- geographical location
- type of class, course, level
- participants
- educational background and experiences of students and teacher
- physical conditions
- material resources
- affective/psychological conditions
- policy conditions

A common cry in qual/action research!

A key challenge I faced in this project was the sheer mountain of data I had collected. I had discussion list posts, private emails, phone conversation transcripts, theory memos and site user statistics to crunch. I remember printing everything out at one point, laying it on the floor of an entire room in my house. In the end I was grateful to have a good amount of quantitative data, and I appreciated the opportunity to blend it with the qualitative sources.
(Jerry Talandis)

The experience of data analysis

"Analysing data is a bit like drinking a glass of champagne. At first, all you can see is just a whole lot of liquid until the bubbles start rising to the top!" (Carol, USA)
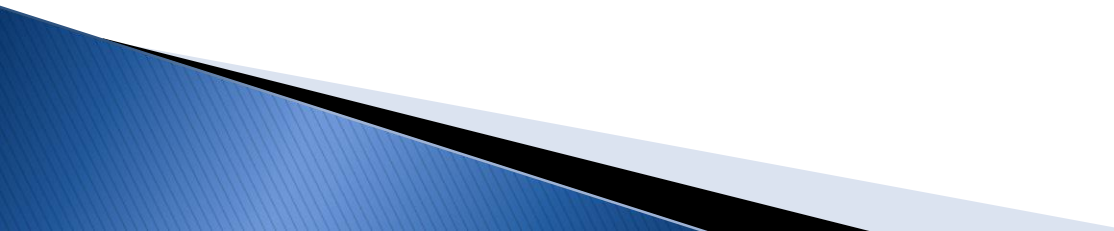
"It's a bit like "wallowing" in a data swamp. You begin to feel like a hippopotamus!" (Jenny, Australia)

Reflection: Beginning the analysis

▶ What are your experiences so far, if any, of data analysis?

▶ What challenges have you found/do you expect in analysing your data?

Analysing the data in AR – key steps

1. Assemble the data – *collect and reflect*
2. Code the data – *categorise and quantify*
3. Compare your data – *describe, compare, and contrast*
4. Build meanings and interpretations – *look, think and refine*
5. Report the outcomes – *organise and present the research "story"*

1. Assembling your data

◦ Collect all the data you have as well as any ongoing reflections you have made about your data.

◦ Review your initial and/or your revised questions.

◦ Start going though your data and start categorizing/quantifying the broad patterns, ideas or themes that seem to answer your questions.

2. Coding the data

◦ Based on the broad picture you have developed, start refining it.

◦ Take the categories or themes you've identified and give them labels.

◦ Identify which of your data you can code qualitatively (e.g. journal entries) and which you can code quantitatively (e.g. questionnaires)

3. Comparing the data

◦ Once your analysis is complete, compare the main themes or patterns across your different sets of data (e.g. interviews compared with surveys).

◦ Identify whether they say the same thing or whether there are contradictions you can highlight

◦ Also identify whether there are cases that don't fit the overall patterns (outliers)

◦ Develop tables, bar/pie-charts or sets of quotes to display the data in a concise form.

APPLES vs. ORANGES

4. Building meanings and interpretations

◦ Think deeply about what the data are saying by reflecting beyond the immediate surface details.

◦ Look for more abstract 'big picture' concepts and not just step–by–step descriptions of what you have found.

◦ Pose questions, identify connections, and develop explanations about what the research means at the broadest level of your understanding of it.

◦ Articulate your own 'personal professional theories' about what your research means.

5. Reporting the outcomes

◦ Think about various ways you could present what you have found to tell other teachers.

◦ Think about where you want to present the research and which audiences are your main target.

◦ In the light of the above, consider how you will organise the whole 'story' of your research from beginning to end and not just the analysis and findings.

Synthesising data

The critical task in qualitative research is not to accumulate all the data you can, but to "can" (get rid of) most of the data you accumulate. This requires constant "winnowing". (Wolcott, 1990:35)

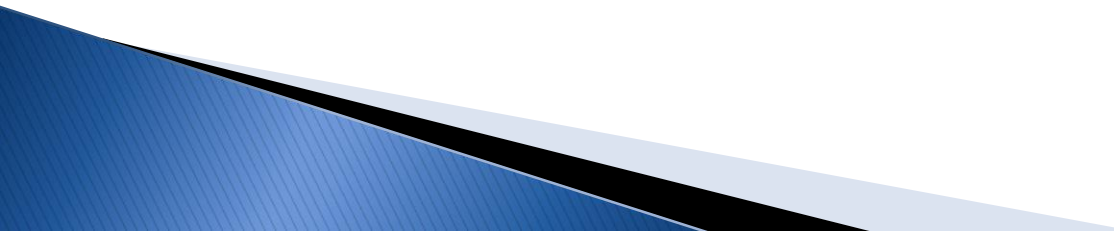In other words, data analysis means

crunching

squashing

squeezing

Some options for qualitative data analysis

- Inductive coding – coding from your data (grounded coding/content analysis)

- Deductive coding – coding from existing theoretical concepts (*a priori* categories)

- Text analysis – analysis from linguistic theory (e.g, genre theory)

- Discourse analysis – analysis from theoretical approaches (e.g. CA, CDA, Pragmatics)

Categorising

Involves bringing things together than have similar features, themes or characteristics.

Imagine a room in which a large number of toys have been left lying around and it is your job to create order. You will probably begin by walking round and having a look at things. According to your interests and the characteristics of the toys, features will come to mind which help you to order them: for example, colour, size, shape, state of repair, the age group for which they are suitable, and so on. Then you will choose two or more features by which to begin to sort them. Something similar happens when a researcher wants to create order from a quantity of data.   (Altrichter et al, 1993)

Categorising manually

Researchers tend to develop their own personal toolkit for analysing semi-structured interview data This may include coloured pencils, text-highlighters, scissors or a craft knife, glue or sticky tape, large sheets of paper, or other devices for marking, separating and reassembling the data.

(Drever, 1995: 65)

Coding

Once you have grouped things or concepts that go together you can code them.

This involves giving generic labels to categories and sub-categories, e.g.

Students:
motivation
engagement
anxiety

Coding

Write a paraphrase, phrase, heading, or label that describes what you are seeing in that passage or chunk or quote that is the most important.

The label doesn't have to be very precise at this time – it's just a general indicator. Label the coded material with labels that don't just come from the literature review or the research question. New observations and insights should produce new labels. (Foss & Waters, 2003)
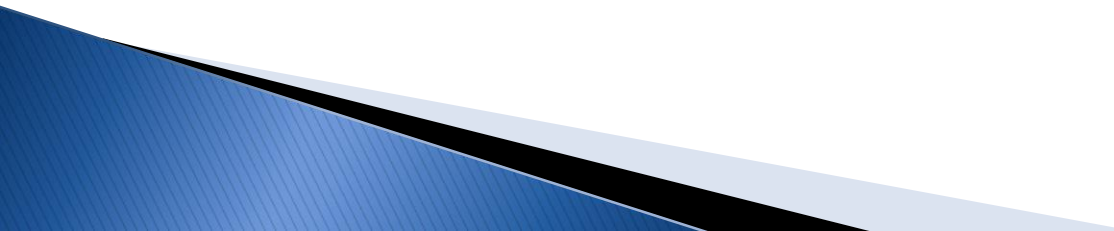
Rebecca and Jennifer's categories
(Matteson & West, forthcoming, 2021)

[anon1]Really nice helpful table here!

Table 1: Frequency of themes in our qualitative data

Theme	Examples of key words	total	initial questionnaire	focus groups
pedagogy	attendance, classroom management, comparison online vs classroom, feedback, monitoring, student attention/engagement, etc	156	59	97
emotion	anxious, challenge, comparison online vs classroom, confidence, easy, excited, exhausting, isolating, job security, positive, possible, stress, tolerate, etc	118	78	40
technology	breakout rooms, camera, comparison online vs classroom, internet, mistakes, new skills, support, etc	82	32	50
physical	eye contact, comparison online vs classroom, monitoring, physical distance, physical location, time, etc	44	27	17
development	comparison online vs classroom, new skills, learning	25	25	0

Reflection: Categorising and coding

- Have you had any experiences so far of categorising and coding your data?

- What kinds of approaches/tools did you use?
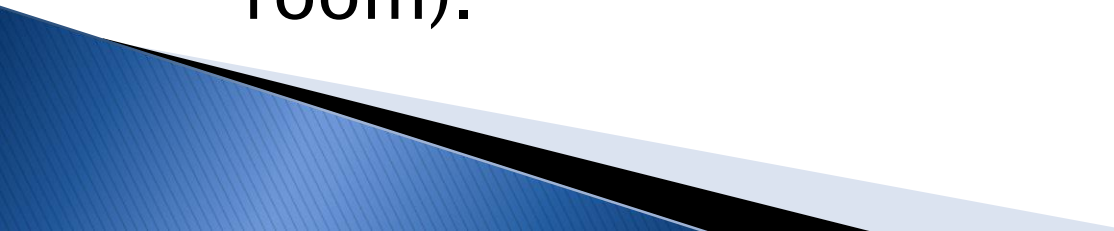
- What was the most challenging aspect?

Transcripts
(Shenton, 2004)

▸ Appropriate for open-ended answers [and classroom interaction] as in focus groups, observations, individual interviews, etc.

▸ Use identifiers that anonymize participant but still reveal information to researcher e. g. Y10/B-3/II/83 or "Mary"

Three parts to transcription
(Shenton, 2004)

1. Background information, eg. time, date, organizations involved, participants.

2. Verbatim transcription (if possible, participants should check for accuracy).

3. Observations made by researcher after session (e.g. diagram showing seating, intonation of speakers, description of room).

Linda's transcript

1   Right, good morning everybody, **we'll make a start**

2   cos [because] you have three teachers this morning, then Pete, so four altogether

3 OK

4 **so we need to start now**

5 *did you go to Cambridge at the weekend* (ST) *anybody else* (ST) *yeah* (ST)

6 *you went to Cambridge*

(latecomer enters)

7 morning

8 **OK first of all**

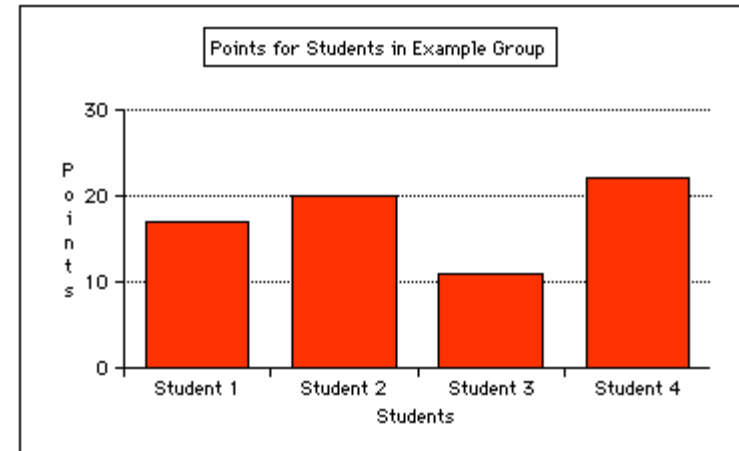9 because it's Monday morning and we all feel a bit sleepy…tired

ST= student response

Some options for quantitative data analysis

▸ Descriptive statistics – two main forms usually used in AR

Measures of central tendancy – a single value given to the set of quantitative data. The number shows where the set of data collects around a central point.
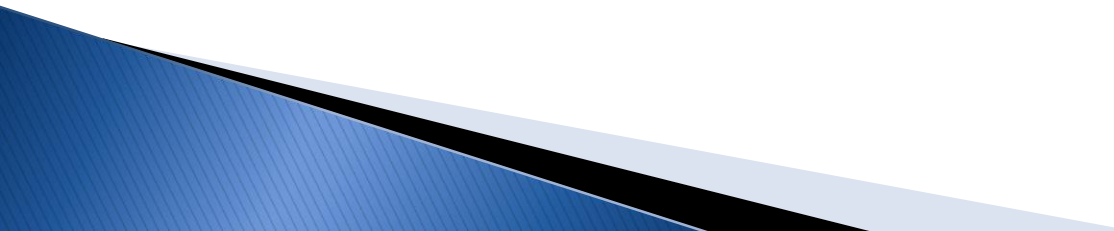
- Mean (average)
- Median (middle point)
- Mode (most frequent score)

Points for Students in Example Group

Some options for quantitative data analysis

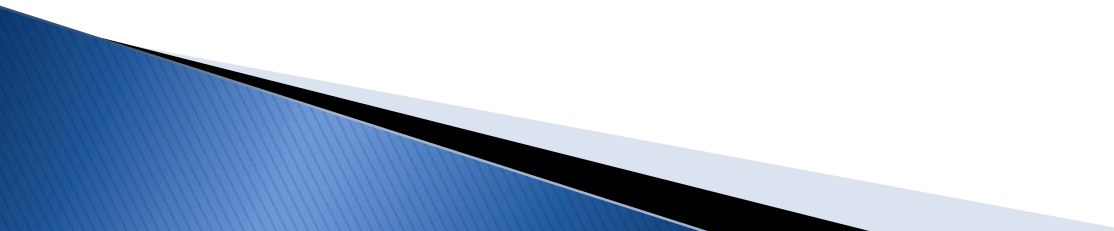▸ Descriptive statistics – two main forms usually used in AR

Measures of variability – how numbers spread (or disperse) across the data set. When a measure of variability is used with an average score, we get a concise description of the distribution.

- Range (spread across all numbers)
- Standard deviation (average of the distance of each score from the mean or average)
- Mode (most frequent score)

A quantitative AR study

Philip O'Gara decided "to explore the effects of drama techniques on understanding and use of verb tenses and compare them with the effects of the present traditional methods being employed at the school" (p. 159).

Two Year 4 classes of 19 students each were involved in the research. The two groups were given a simple pre-test to examine their understanding/ability to use past, present and future tenses.
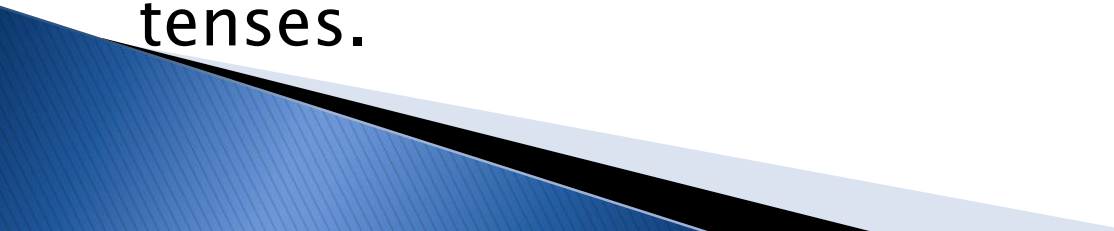
Philip's data collection

The research was carried out during two 45 minute classes per week over three weeks. The lessons were held the same day/same time for both groups.

In one group, students were taught using traditional teaching methods (e.g cloze, conversion tables paired reading). In the other group the teacher used a variety of drama exercises (role-play, hot seating, freeze framing and improvisation).

At the end of the three weeks, both groups were tested using the same test to measure their progress in understanding and applying the tenses.

Philip's analysis

Philip used a simple worksheet marked out of 10 for the tests. He calculated the mean (average score), median (middle point score), mode (most frequent score) and standard deviation (av of distance of score from mean) to compare the pre and post-tests.
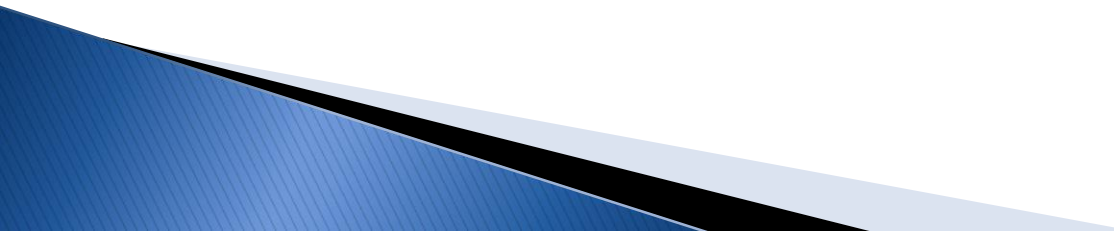
Table 1: Comparison of test results

| | Intervention Group | | Comparison Group | |
	Pretest	Posttest	Pretest	Posttest
Mean	5.947	8.571	5.526	6.526
Median	6	9	4	7
Mode	6	10	4	4
Standard Dev.	.870	1.228	.896	2.899

...we can see that the mean, median and mode all show greater improvement for the intervention group. Calculating the standard deviation provided the spread of the data from the mean and enabled Philip to do other tests to calculate the statistical significance of the results.

O'Gara (2008, p. 156-166)

Reflection: Analysing your data

Think about your research so far:

▶ What kinds of data have you collected?

▶ How are you organising the data?
  ◦ Have you developed any categories or themes?
  ◦ Have you calculated any quantities or measurements?

Reflection and writing

During the research I have become more aware of the "strength" that resides in writing. Writing has been for me an effective means for fixing ideas that were occurring to my mind and to make them clearer. Vague ideas would take the form of concepts with definite contours. (Giancarlo, Italy)

Meet Heather

Doing action research has completely changed the way I approach a critical part of what I teach… Every time I complete a new cycle there are new ideas to think about and explore, and discuss with other teachers. Without the discipline of the research I would have missed many of these insights.

(Heather Denny, EAP teacher, Auckland)

Meet Zeke and Damien

Action research has pushed us both out of our comfort zones and made us try new methods and resources and overcome weaknesses in our teaching.

(Zeke Pottage and Damien Herhily, ELICOS teachers, Melbourne)

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