Statistical Methods
2. Questionnaire Design

Based on materials provided by Coventry University and Loughborough University under a National HE STEM Programme Practice Transfer Adopters grant

National **HE STEM** Programme

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Reviewer: Ellen Marshall
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Summary

We will consider:

❑ What is a questionnaire?

❑ Response rates

❑ Data types and question types

❑ Question design principles

❑ Questionnaire layout

❑ Rating scales

❑ Questionnaire design process

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What is a questionnaire?

❑ A collection of questions given to different people in the same form

❑ Observational or experimental (e.g. observing a class before and after an intervention, or measuring a variable in experimental and control groups)

❑ The focus may be opinions or facts

❑ Can be administered by paper, phone, email or via a website

❑ Completed by the researcher, subject or a third party

❑ Questions can be organised into groups (as often in a standard instrument)

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Comparison with other data collection techniques

Pros:

❑ Cost-effective:

⇒ Large samples can be gathered

⇒ Greater potential of statistically significant results

❑ Can be carried out by different people

Cons:

❑ Honesty of responses may be an issue

❑ Low response rates, especially for email/online

❑ How to deal with 'missing' / 'no opinion' answers?

❑ Free response answers tend to be very short

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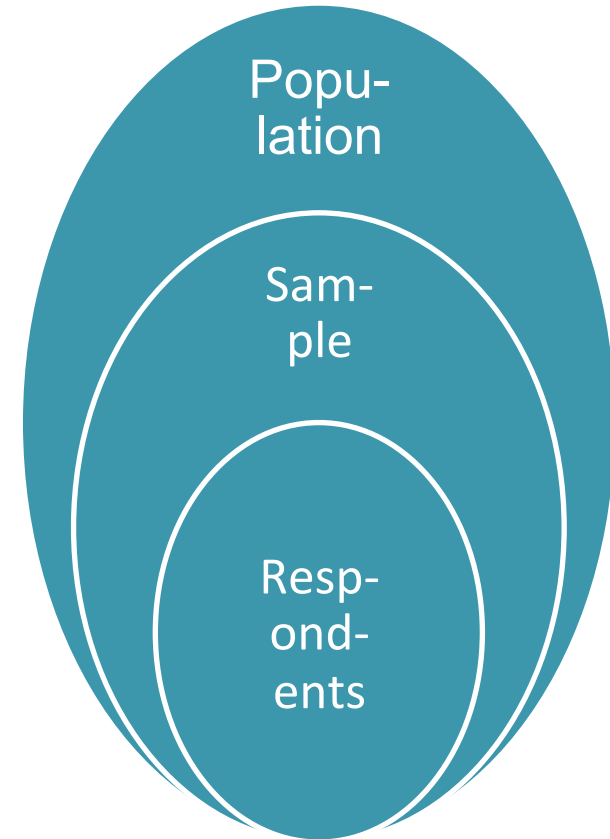Reviewer: Ellen Marshall
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Mode of delivery may affect what is possible

❑ Self-completed or interviewer-led?

❑ Is help/explanation available?

❑ Paper, phone, online or an electronic form via email?

❑ If online, questions can be delivered one at a time, with a progress bar to show level of completion

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Response rates

❑ The proportion of questionnaires given to your sample that are completed

❑ Should be as high as possible in order to minimise possibility of bias (you also need to make sure your sample is representative of the population)

❑ Notorious problem with online and postal questionnaires

Popu-lation

Sam-ple

Resp-ond-ents

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How to maximise your response rate

❑ Try to engage with the respondent as a person, e.g. give out paper-based questionnaires on a clipboard face-to-face while you are waiting or email people who already know you (but watch out for possible bias)

❑ Give your questionnaire a short and meaningful title

❑ Begin by introducing yourself and the purpose of your research

❑ Keep it as short and succinct as possible

❑ Offer incentives for responding, if appropriate

❑ Make it look attractive, e.g. use colour and images

❑ Make it convenient, e.g. enclose a stamped address envelope for a postal questionnaire

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Question types and data types

Question type	Data type	Analysis
Multiple choice	Nominal or ordinal	Quantitative: nonparametric only
Multiple choice scale with words at the ends	Scale	Quantitative: parametric and nonparametric
Multiple answer multiple choice	Multiple binary (e.g. true/false)	Quantitative: treat each value separately – only have a few
Number field	Scale	Quantitative
Ranking	Ordinal	Quantitative: hard to analyse – avoid
Text field	Text	Qualitative

Activity: Question design

In pairs or small groups:

❑ Refer to the Sample Questions handout - this contains a series of poorly written questions – some are real!

❑ Look at each question in turn

❑ State one potential problem with each question

❑ Spend at most 1 minute on each question

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Questions 1-4

1. Smoking in public places should not be abolished.

    Yes ❏   No ❏   Not sure ❏

2. What percentage of your annual salary do you spend on petrol?

3. If students were to receive more discount, where would be most appropriate?

    Restaurants ❏   Supermarkets ❏   Bars ❏

4. How much money do you spend per week on alcohol, if any?

    £0 ❏   £10-20 ❏   £20-30 ❏

    £30-40 ❏   £40-50 ❏   £50+ ❏

Question design principles

❑ Question wording should be clear and unambiguous: avoid double negatives – Q1

❑ Questions should not be too difficult to answer – Q2

❑ Responses should **exhaust** all possible options or have a residual option such as 'Other' – Q3

❑ Responses should be **mutually exclusive** if only one option can be chosen – Q4 (e.g. £20?)

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Questions 5-9

5. Are you thinking of booking a family holiday for this summer?

    Yes ❑ No ❑ Not sure ❑

6. Wouldn't you agree that the government's decision to re-classify Cannabis as a Class B drug is the right one?

    Yes ❑ No ❑ Not sure ❑

7. How would you rate our service?

1	2	3	4	5
Excellent	Very good	Good	Undecided	Poor

8. Have you ever stolen stationery from work for home use?

    Yes ❑ No ❑ Not sure ❑

9. Do you have or have you ever had a health condition which has lasted for over 6 months and has limited the kind of work you can do?

    Yes ❑ No ❑ Not sure ❑

Question design principles (2)

Avoid:

❑ Possible incorrect responses (boxes next to wrong response) – Q5

❑ Leading questions – Q6

❑ Biased scaling – Q7

❑ "Prestige bias" – may not be answered truthfully – Q8

❑ Overly complicated questions – Q9

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Questions 10-11

10. Rank the following television programmes in the order that you watch them, indicating the most watched channel with a 1 and the least watched channel with a 10.

11. Indicate if you agree or disagree: A chemical used in food production that has a negligible cancer risk should be prohibited even though it delays spoilage, prevents rancidity, or prolongs storage time.

Channel	Rank
BBC1	
BBC2	
BBC3	
BBC4	
ITV1	
ITV2	
ITV3	
ITV4	
Channel 4	
Five	
Sky One	
Virgin 1	
Sky Sports 1	
Sky Movies Premier	

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Question design principles (3)

❑ Avoid asking to rank too many items (and numbers don't make sense!) – Q10

❑ In fact, it is better to avoid ranking questions altogether as they are difficult to analyse – ask about each item individually then rank the mean response values

❑ Ensure a questionnaire is the best vehicle for collecting your data – Q11

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Question design principles (4)

❑ Make the first few questions easy, e.g. demographics

❑ Then have your most important questions

❑ Leave open/complex questions to the end

❑ Avoid very similar questions, unless you are constructing scales

❑ Try to minimise bias through:

  ➢ Socially acceptable responses

  ➢ Respondent pleasing the questionnaire setter $\Rightarrow$ mix positively and negatively worded questions

  ➢ Too many or too few answer categories $\Rightarrow$ use 6 or 7 (see later)

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Demographic questions

❑ Good to start with these

❑ Examples are:

➢ Age

➢ Gender

➢ Level of education

➢ Socioeconomic background

➢ Employment

➢ Region

❑ Useful for comparing groups

❑ Only ask what you need

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Questionnaire layout

Good layout can increase response rate and accuracy:

❑ Make the design eye catching

❑ Be clear and succinct

❑ Group questions logically

❑ Sequence the questions sensibly

❑ Use consistent wording and answer formats

❑ Be polite

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Activity: Questionnaire evaluation

❑ 10 minutes

❑ In pairs or small groups, evaluate one of the questionnaires provided according to the principles given on the checksheet:

➢ National Student Survey

➢ Parent questionnaire

➢ Coffee consumption questionnaire

➢ Diabetes questionnaire

❑ Report back your findings to the main group

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Rating scales

❑ A rating scale is an ordered scale of responses

❑ They are commonly used in questionnaires

❑ They typically have 5 or 7 values:

> ➤ Less values reduce data quality
>
> ➤ More values are hard to process mentally (people end up just choosing bottom, middle or top values)

❑ There is an argument to have an even number of values (e.g. 6) to force respondents to make a choice, although most people tend to choose more positive answers anyway

❑ There is also an argument to word some of the questions negatively to stop respondents from giving responses without thinking

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Example 1

Indicate the extent to which you agree or disagree with the statement:

"Staff on this workshop are good at explaining things"

❑   ❑   ❑   ❑   ❑

Strongly disagree   Disagree   Neutral   Agree   Strongly agree

Yields ordinal data:
limited analysis options

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Example 2

Indicate the extent to which you agree or disagree with the statement:

"Staff on this workshop are good at explaining things"

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Strongly
disagree

Strongly
agree

Yields richer scale data:
more analysis options

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Likert scales

❑ Many people refer to rating scales like the previous examples as **Likert scales**

❑ Strictly speaking, a Likert scale is a **series** of numbered rating scale questions which are used to measure responses to a **series** of carefully developed 'attitude statements', e.g. via a focus group

❑ The **Likert scale value** is then the overall sum of the numbered ratings (once negatively worded items have been reversed). However this should not be done without first testing the scale for **reliability** (not recommended for Level 4 or 5 students)

❑ For more information see http://www.socialresearchmethods.net/kb/scallik.php

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Questionnaire design process: Don't let the tail wag the dog!

❑ **Do not start** designing your questionnaire by simply writing questions

❑ **Start** by first considering what your research questions are

❑ Use this to determine what data you need and the analysis you will do

❑ Test your questionnaire in a **pilot survey**

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Carry out a pilot survey

❑ Always pilot your questionnaire with a few friends before carrying out your full survey

❑ This will allow you to:

  ➢ Check the integrity of your questions

  ➢ Identify missing response categories

  ➢ Check for spelling and grammatical mistakes

  ➢ Assess any difficulties

  ➢ Check the analysis you plan to do

Recap

We have looked at:

❑ What is a questionnaire

❑ Maximising response rates

❑ Data types and question types

❑ Question design principles

❑ Questionnaire layout

❑ Rating scales

❑ Questionnaire design process

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