Research Methods

Data Analysis

Overview

- The starting point – what data we have
- Methods of analysing data
- Presenting data
- Tips for using graphics
- Summary (and checklist)

What data do we have?

- Phrases and sentences as part of interviews with people. These could be stored as a video file, audio file or you may have fully transcribed them so have them in text
- Simple numerical data - yes or no questions, pick an option etc.
- Complex numerical data – scales, ratings, frequency
- Random text data – the “other” option in questions, comments box etc.

LOOKING FOR PATTERNS

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Methods of Analysis

Phrases and sentences	Qualitative: Themes, word association, what you can infer
Simple numerical data	Quantitative: Totals, percentages
Complex numerical data	Quantitative: Averages, frequency
Random text data	Qualitative: Themes

Qualitative Analysis

Themes

- "My Mum was really supportive of my subject choices"
- "My Dad was really good at making things and always wanted me to help him out so I got to enjoy making things myself
- "My Mum encouraged me to explore and try things out"
- "My Aunt used to work a half day on a Saturday in a manufacturing plant and I used to go with her – I found it fascinating"

DISCUSSION: *References other people, specifically family members*

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Qualitative Analysis

Word Usage

- "My Mum was really supportive of my subject choices"
- "My Dad was really good at making things and always wanted me to help him out so I got to enjoy making things myself
- "My Mum encouraged me to explore and try things out"
- "My Aunt used to work a half day on a Saturday in a manufacturing plant and I used to go with her – I found it fascinating"

Behaviour of others

Respondent's feelings

DISCUSSION: *Positive words describing other people's behaviour*
Positive words about respondent's feelings or views

Qualitative Analysis

Inference

- "My Mum was really supportive of my subject choices"
- "My Dad was really good at making things and always wanted me to help him out so I got to enjoy making things myself
- "My Mum encouraged me to explore and try things out"
- "My Aunt used to work a half day on a Saturday in a manufacturing plant and I used to go with her – I found it fascinating"

DISCUSSION: *Everyone had an interested adult in their life*
Adult is a family member – more regular contact?
They got attention and support/encouragement?

Quantitative - Totals

We asked 240 people: Do you like the colour orange?

Sampling: Equal split male / female, equal split under 20 / 20-29 / 30-39 / 40-49

A total of 99 respondents liked the colour orange

70 males compared to 29 females liked the colour orange

	Men	Women
Under 20	22	2
20-29	9	5
30-39	14	8
40-49	25	14
TOTAL	**70**	**29**

Quantitative - Percentages

We asked 240 people: Do you like the colour orange?

Sampling: Equal split male / female, equal split under 20 / 20-29 / 30-39 / 40-49

40% of respondents like the colour orange.

58% of males compared to 24% females liked the colour orange

	Men	Women
Under 20	73%	7%
20-29	30%	17%
30-39	47%	27%
40-49	83%	47%
TOTAL	**58%**	**24%**

Quantitative – Comparisons

We asked 240 people: Do you like the colour orange?

Sampling: Equal split male / female, equal split under 20 / 20-29 / 30-39 / 40-49

	Men	Women
Under 20	22	2
20-29	9	5
30-39	14	8
40-49	25	14
TOTAL	**70**	**29**

DISCUSSION:

Compare totals for age groups

Compare change in gender and age groups

Compare totals for gender group

Quantitative – Complex Numeric

Company X pays it's staff the following salaries (thousands):

£90, £24, £18, £27, £27, £160, £21,

£24, £48, £24, £82, £52, £23, £36

Step one: order by size

£18, £21, £23, £24, £24, £24, £27,

£27, £36, £48, £52, £82, £90, £160

Quantitative – Complex Numeric

Mean

Average

Add all the values together and divide by the number of values you have

Total = £637

£637 ÷ 14

= £45.5

£18
£21
£23
£24
£24
£24
£27
£27
£36
£48
£52
£82
£90
£160

Mode

Common

The most common value

£24

Median

Middle

The middle number in the ordered list

£27

Quantitative – Complex Numeric

Resp	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1					●
2			●		
3					
4				●	
5	●				
6		●			
7	●				
8				●	
9					●
10				●	
11			●		
12					●
13		●			
14			●		
15				●	
16		●			
17					●
18				●	
19				●	
20			●		

Average

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Disagree

Allocate values 1-5, add up all values and divide the total by the number of values

Average = 3.2

Frequency

How many times each option is picked

2 = Strongly Disagree
3 = Disagree
4 = Neutral
6 = Agree
4 = Strongly Disagree

Presenting Data

- Within the Text
- Tables
- Graphs
- Pictograms

You can use ANY of these for ANY type of data

What works best to present your data and support your argument

Must be useful and easy to interpret and understand

Within the Text - Qualitative

Fleur notes that ‘My dad is a design and technology teacher and for as long as I can remember I didn’t play with dolls and things like that, I was always hammering bits of wood and playing with Meccano sets and things like that. I think it was following him that made me want to do it’.

Emma also notes her father’s influence although this was more direct than in the case of Fleur as Emma’s father said ‘if you like science and maths you could do engineering’. Emma notes that this conversation probably occurred around the age of fourteen and that she’d never heard of engineering other than as a mechanic and that did not appeal. She notes however that she looked into it further and decided it was right for her.

Within the Text - Quantitative

As with the Loughborough mechanical and manufacturing engineers, the respondents from civil engineering preference for building blocks (e.g. Lego) as a child is very common, with significantly high results from both men and women (81% and 89% respectively).

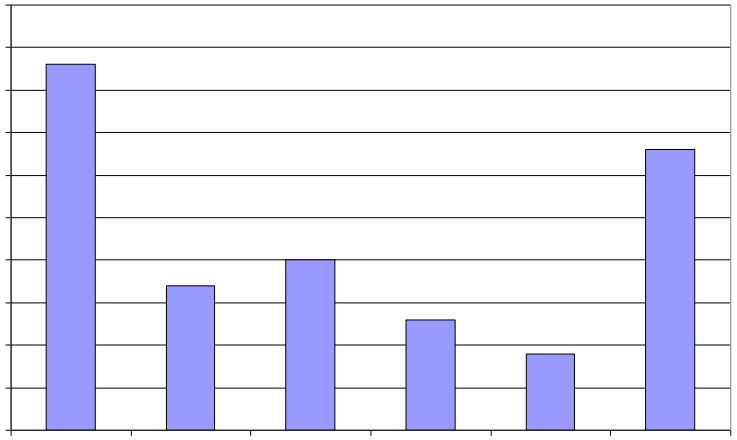
Tables

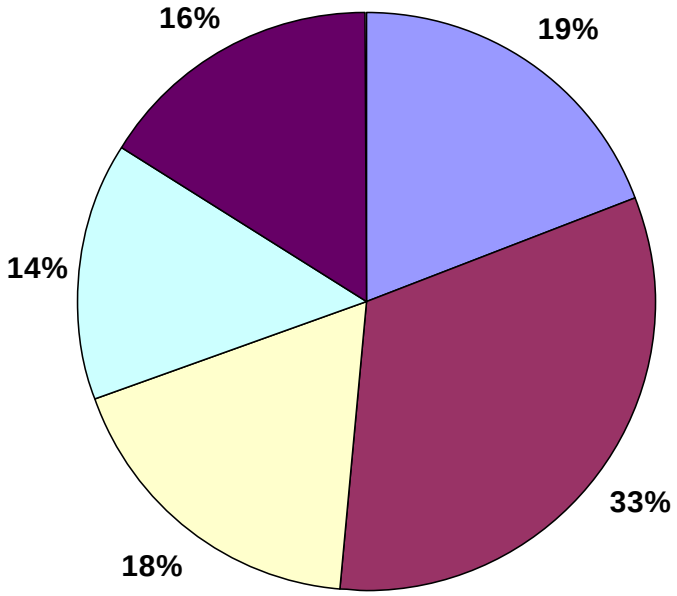
Table 1: Regional Differences in the Percentage of Adults Taking a Holiday in 1998
Source: Regional Trends 35

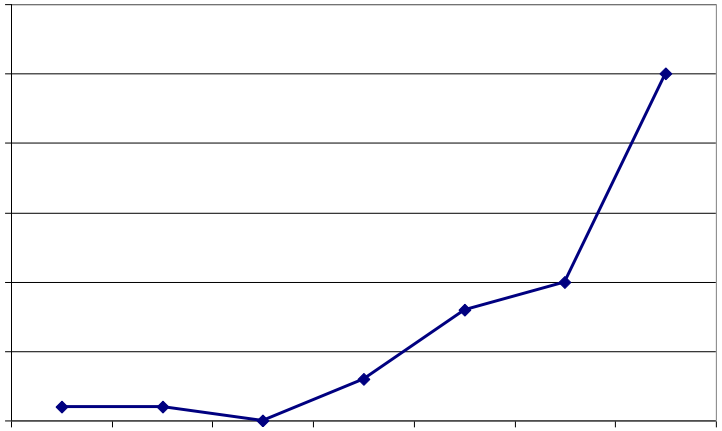
Region	%
East Midlands	64
Humberside & Yorks.	64
South West	61
South East	60
North West	59
Greater London	56
West Midlands	56
North	54
East Anglia	50

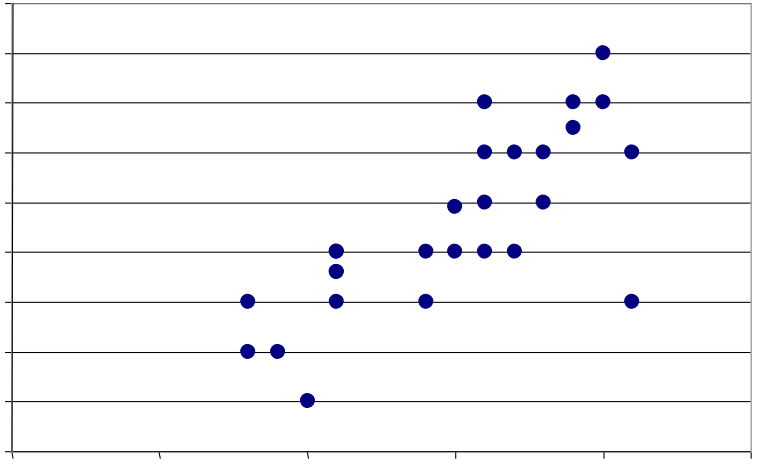
- Ok to use when you don't have lots of numbers to display
- Offers the opportunity to focus on the numbers
- Order list by the results (the values), not what is being compared (the counties)
- Message = Values

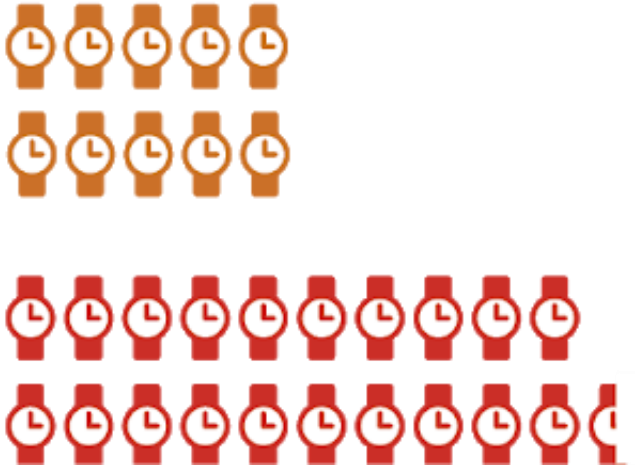
Graphs



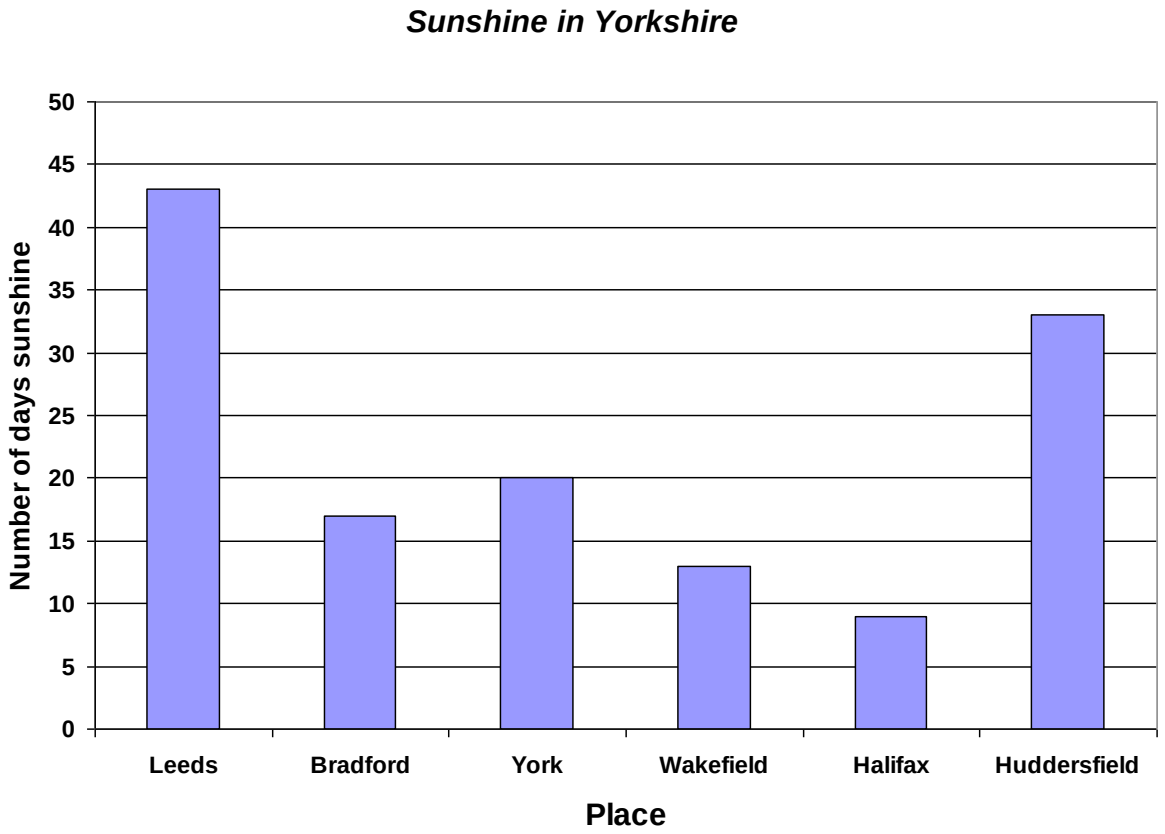






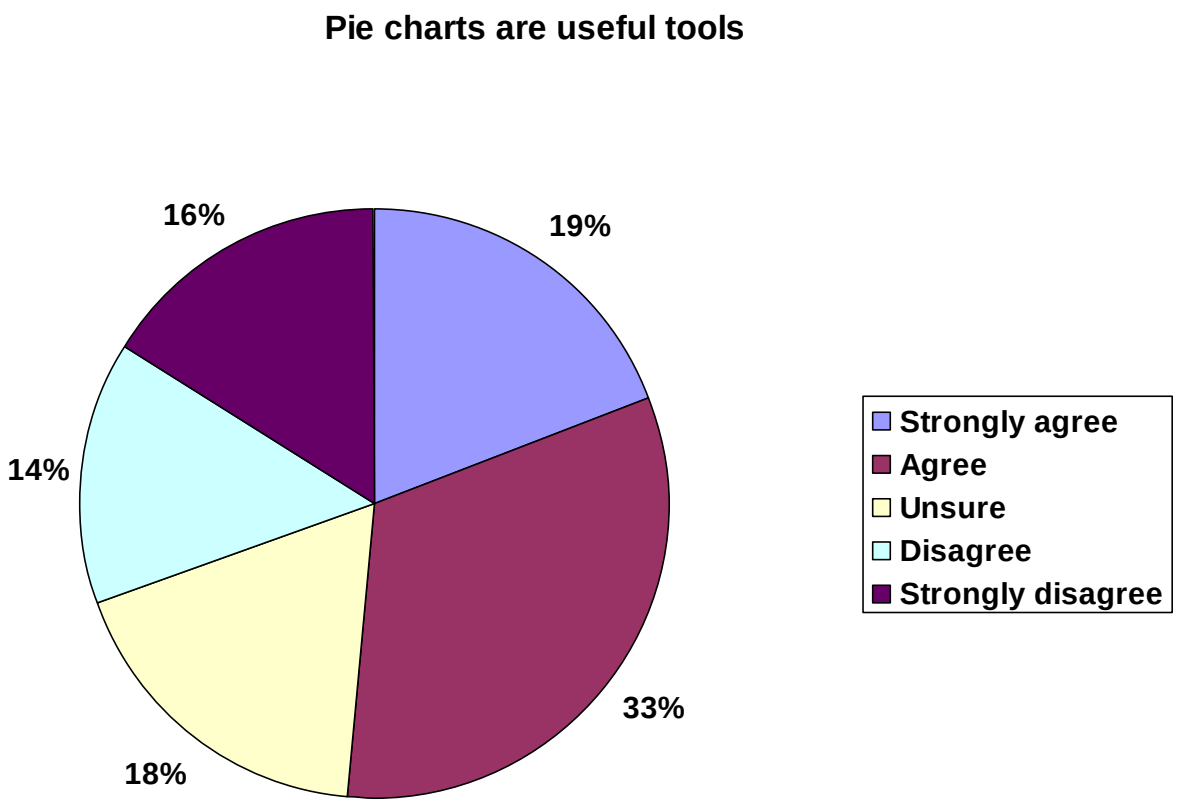


Graphs – Bar Chart



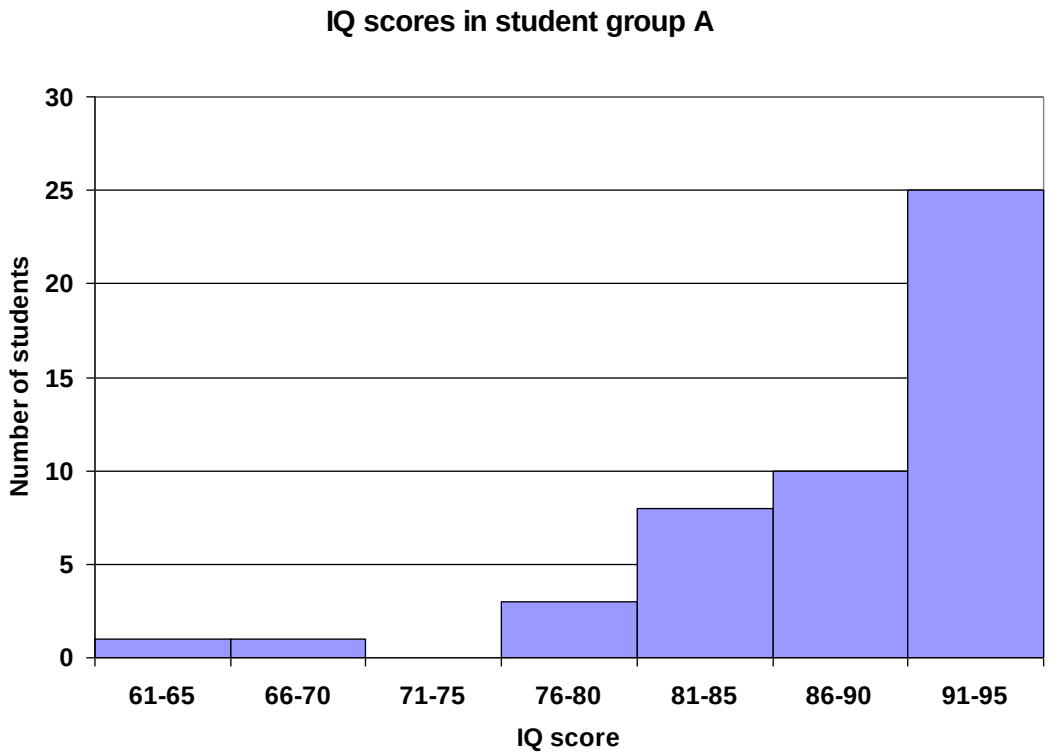
- One variable
- Used for categories that are not related. They are discrete options
- Height of bar represents the value
- Message = height of bars

Graphs – Pie Chart



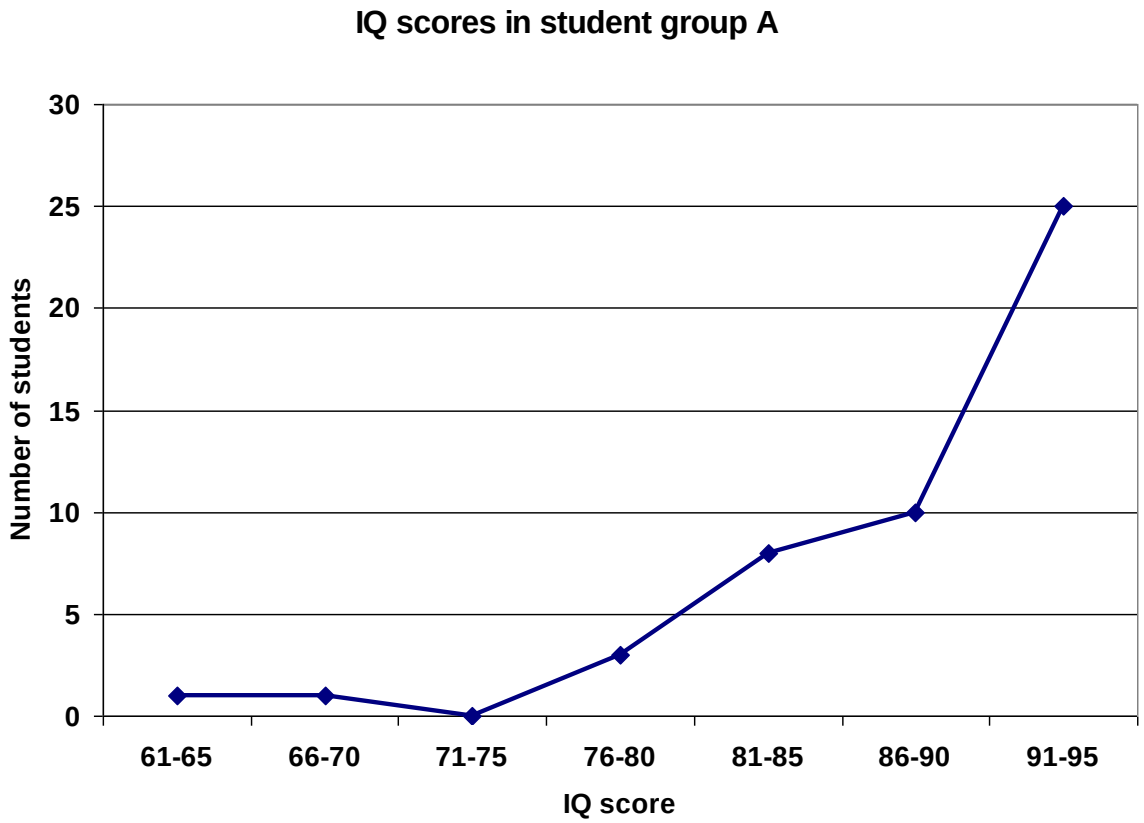
- One variable
- Used for categories that are not related.
- May not show observable difference in segment size
- May need more details (e.g. percentage doesn't give actual values)
- Message = size of segments

Graphs - Histogram



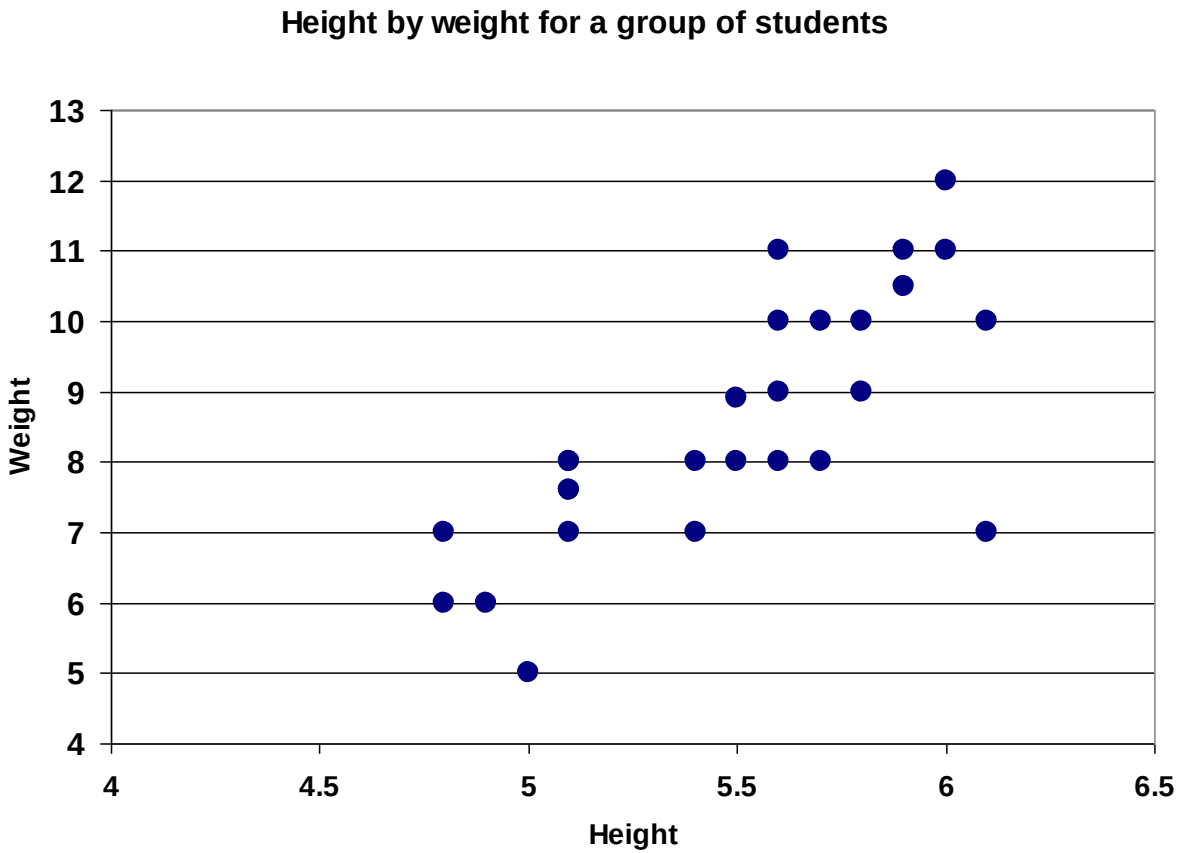
- One variable
- Categories that are related shown by the touching bars
- Intervals may or may not be equal (need clear labelling)
- Height of bar represents the value
- Message = height of bars

Graphs – Frequency Polygon



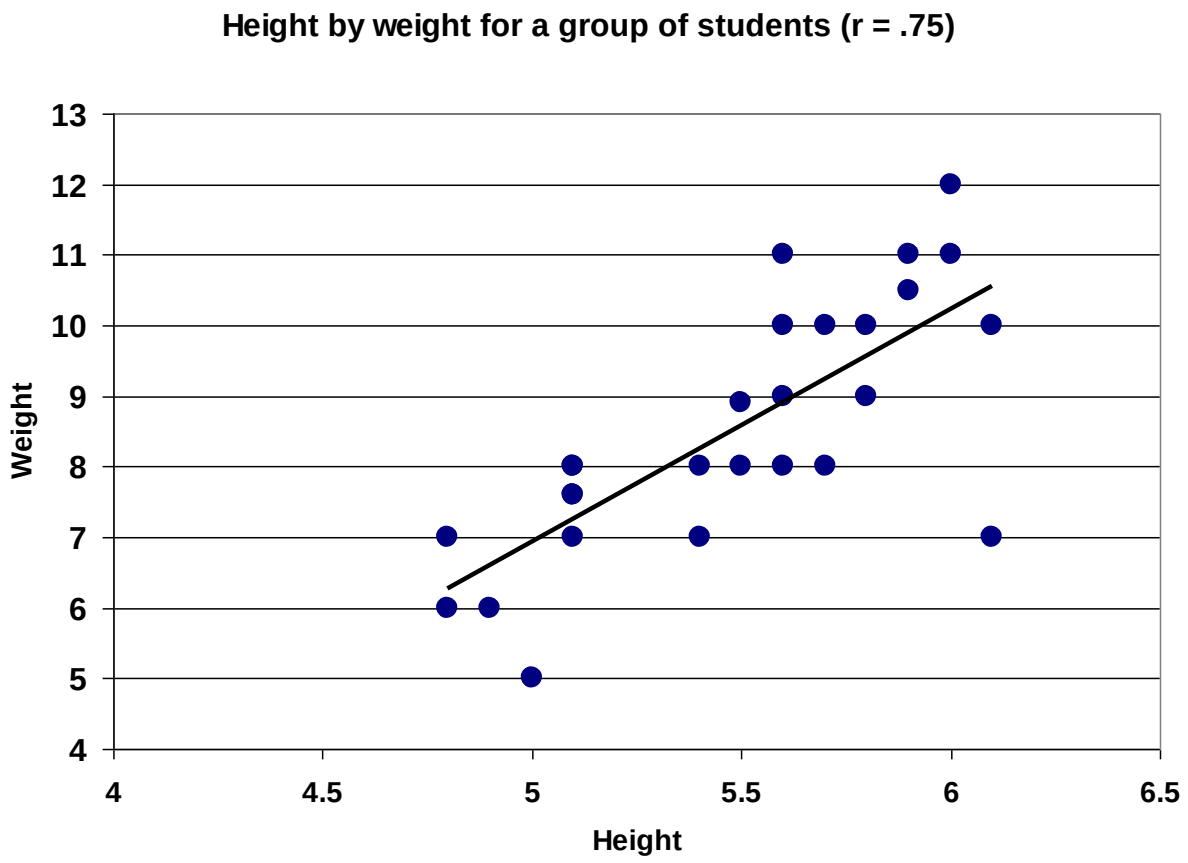
- One variable
- Related categories
- Histogram minus the bars, instead there is a dot where the top of the bar would be
- Height of dot represents value
- Message = height of dots AND the shape of the line

Graphs - Correlation



- Two variables
- Related categories
- Position of dot represents two values
- Message = position of dots AND their proximity

Graphs - Correlation



- Best fit line shows a relationship/correlation between the two variables
- If dots are scattered all over then there is no correlation
- Correlation does not mean cause and effect. It may however suggest the possibility of a relationship

Pictograms

- Number of variables included depends on look of image – is it understandable
- Uses pictures or icons to represent data in a more interesting, engaging or memorable way

Using Graphics

Point	Helpful, support the argument, easy to interpret and understand
Type	Appropriate use of graphic type
Layout	The important data should take up the whole of the graphic space
Scale	Scale should be appropriate and intervals (if needed) generally equal
Colours	Colour differentiation or gradients of colour Colour consistency – if using red and blue for gender keep red and blue for all other gender usage
Labelling	Each axis needs a label, graphic needs a title and if from another source the source needs to be stated

Summary (and checklist)

Data Type	Qualitative or quantitative or both
Analysis Type	Themes and word type, simple numeric, complex numeric, combination of more than one
Presentation Type	Text, tables, graphs, pictograms, combination
Clarity	Data presented clearly, consistent colours, layout etc.
AIM	***FIND THE PATTERNS (and discuss them)***

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Interview Write Up Example

The first question asked of all the interviewees was that of their reasons for choosing to study engineering, why, in their own opinion, they had followed this particular route. This question was included, and used as the initial question, so as to afford the respondents an opportunity to state their own beliefs concerning the decision and also as it made an excellent base from which to set the remainder of the interview questions.

The why

In answer to this question, the female interviewees responses covered three main areas – academic and subject abilities, school staff and family members, most prominently their fathers. Anna stated simply that engineering "matched my A Levels" while Beth expanded on a similar theme noting "I've always been good at creative stuff and science, and I've always enjoyed the technical side of things, so, it was sort of the logical thing to come into really, and I like a challenge so I thought it would be quite an interesting thing to study". For Jeni the decision related to subject choice also in that she really enjoyed physics but wanted a degree that was more than just physics and engineering had both physics and a practical side to it so seemed like the ideal choice.

State the themes

Provide examples of themes

With quote

Without quote

Questionnaire Write Up Example

Question		Female (%)	Male (%)	Total (%)
Toys and Games:	Board Games	69	39	**44**
Toys and Games:	Sports	69	83	**81**
Toys and Games:	Computer Games	38	70	**65**
Toys and Games:	Dress-Up	29	4	**8**
Toys and Games:	Figures	44	12	**17**
Toys and Games:	Building Blocks	83	87	**86**

Provide data

Table title

Table 18.03 Loughborough MMED questionnaire results – toys and games

Another significant aspect is the liking for building blocks (e.g. Lego) as a child. This was seen amongst female and male respondents and while it cannot be said that playing with such toys will lead to engineering, it does suggest that engineering activities and skills can be seen at an early age and could be developed to attract more people to the industry. With reference to the other toys and games enjoyed, gender differences can be seen in the enjoyment of board games and computer games and also the relatively low enjoyment of playing with figures and dressing-up amongst the male respondents, possibly to be expected, and females which is surprising as these are generally considered to be feminine past times.

Discussion

Sources

Baker	PhD, Loughborough University, 2005
Browne	Sociology for AQA Volume 1, 2015
Cohen et al	Research Methods in Education, 2011 (7th Edition)
Cohen et al	Research Methods in Education, 2000 (5th Edition)
Davis	Business Research Methods Study Guide 2, ICS Ltd, 2005