

TEACHER NOTES – Tell it like it is!

As students progress through their statistical education, they usually develop very strong graphing skills. They also have a high understanding of measures of central tendency (mean, mode and median) and well as measures of spread (range, inter-quartile range and for senior students, standard deviation).

Students often feel it is enough to state a couple of obvious observations which is fine initially, but insufficient at Level 4+ of the curriculum.

After this lesson students should be able to

- *Use good statistical language in a conclusion*
- *Recognise the need to look at the data & graphs*
- *Think about the story the data tells*

Part A. Introduction: You may wish start this activity by talking about why companies/statisticians etc. take a sample of the population rather than asking every-one in the population (a full census). Some of the main reasons are:

- Time
- Cost (reduces cost)
- Practicality (near impossible to ask population)
- Resources (People and materials)

Tell the students where the data is from (**bolded** below).

The Data: This activity is focussed on writing a conclusion and therefore data has already been collected and presented for writing a conclusion. **The data has been collected from the 2005 CensusAtSchool database using the random sampler. The population is students who participated in the online survey.**

Solutions to Part A.

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| From this particular 1 sample , the 2 table of data suggests that there are 3 slightly more girls than boys in the CensusAtSchool 4 population . The 5 bar graph indicates that 6 Auckland had the most respondents while 7 Southland and 8 West Coast had the least. From this data, it can be seen that the 9 median age of a student was 12. If another sample of 200 students was taken, we could expect the age to be around 10 11-13 years old. Travelling to school by 11 motor car appears to be the most popular method. If another sample was taken, it is likely that the most popular method of travelling to | 1 population/sample 2 table of data/ graph 3 slightly / a lot 4 population /sample 5 histogram / bar graph 6 Auckland / North Island 7 Southland / Canterbury 8 West Cost / Gisborne 9 mean / median |
|--|---|

school would most likely be 12 motor car. The data also showed that cell phone ownership is high for students with the data showing that 13 64% of the 14 sample owning a cell phone. This 15 suggests that more students own a cell phones than don't own a cell phone.

10 9 -11 / 11 – 13
11 motor car / Train
12 motor car / walking
13 36% /64%
14 sample / population
15 proves / suggests

Part B Write your own conclusion.

This section allows students to create their own conclusions. A list of suitable sentence starters has been included to assist students in creating their conclusions.

When writing a conclusion, it is important that students avoid making causality statements in their findings. They should stress that the data is from a sample and that if another sample was taken the results may be different.

Listed below are some useful conclusion statements that may be used in writing conclusion. For a more detailed analysis on writing conclusions, please refer to the BEAR HUGS 1, 2 & 3 support sheets.

From these data...

From this sample...

It appears that...

The sample data collected from... (Name source of data. E.g. CensusAtSchool NZ 2005).

There is evidence to suggest...

From the (type) graph ...

From these data, it is likely that the population may ...(inference)

Resampling the population may result in...

From this sample, the (average value) was... This suggests that...

It appears that... It does not appear that...

The data is...

Based on these data ...

I noticed that ...

Further investigation may assist ...

I wonder if ...

Below is a model answer, students are not expected to be as complete with their conclusions, especially if they have little prior skill at conclusion writing. It is also more difficult to write a conclusion with-out context.

A MODEL ANSWER

It appears that there are similar amounts of boys and girls from this sample. The sample also indicates that around 70% of both boys and girls play sport. Cell phone ownership appears more important to girls than boys, with about 20% more girls (70%) owning a cell phone than boys (50%). Boys, on the other hand are more likely to own their own TV than a girl with 51% of the boys owning their own TV compared to 40% for girls. The table of lunchtime activities indicates that as students get older they get less active during lunchtime. The main activity for Year 5 to year 8 students is running around and playing. For Year 9 and Year 10 students, the most common activity is sitting around and talking.

The bar graph shows cell phone ownership by region as a percentage. All the students from Taranaki own a cell phone in this sample while no students from Southland or the Hawkes Bay regions owned cell phones. A larger sample may give a better view of the population as smaller regions are likely to be misrepresented due to having very few students representing their region.

The scatterplot shows students' heights against age. The height of students is generally increasing as age increases. This is what we would expect. There is an interesting outlier, a student who is 13 years old and has a height of 100 cm. This is much lower than expected for the average 13 year old. I wonder if this is a correct measurement or an error?

A random sampling method was used to obtain this sample. There are 51 boys and 49 girls in the sample. The difference in the group sizes does not affect the conclusion. Samples such as these are subject to sampling variability. Larger samples would give a better understanding of the underlying population distributions. However, similar results should be expected if a new sample of size 100 was taken. The subjects for this research are school age Year 5 to 10 boys and girls from the CensusAtSchool NZ 2005 population.