

Statistical Investigation Worksheet

PROBLEM

PLAN/DATA

ANALYSIS (Attach your plot here)

Middle 50% (Description of the sample distributions)

Shift: From the samples I notice...

Overlap: From the samples I notice ...

Anything unusual: (Clusters, outliers, groups)
From the samples I notice...

I worry or think that ...

Shape: (Describe the shape of each sample distribution, compare the shapes of the two sample distributions):
From the samples I notice...

Back in the two populations I wonder if ...

Spread: (Describe the spread of each sample distribution, compare the spreads of the two sample distributions)
From the samples I notice...

Back in the two populations I wonder if ...

CONCLUSION (This is dealt with in Workshop 2)

Answer the problem:

I would claim that . . .

Explain why you have made this conclusion:

Statistical Investigation Exemplar

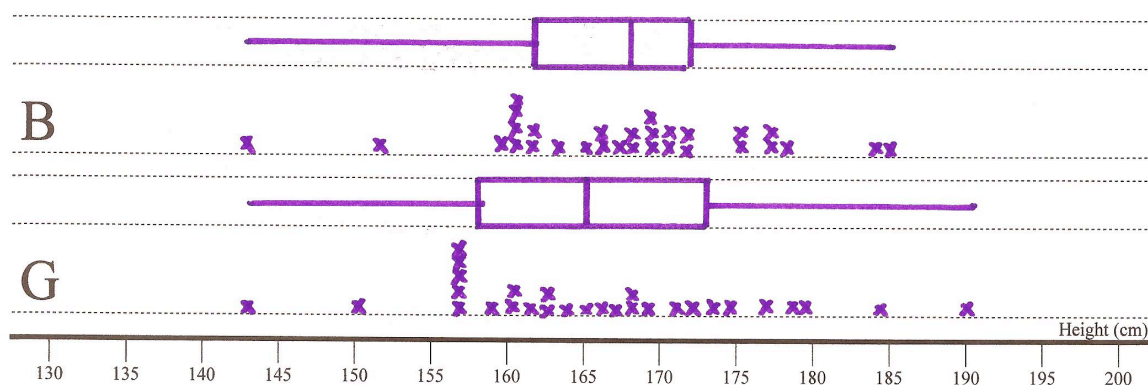
PROBLEM

Do the heights of Karekare College boys tend to be greater than the heights of Karekare College girls?

PLAN/DATA

Take a sample of 30 boys and 30 girls from the Karekare College population.

ANALYSIS



Middle 50%:

Shift: From the samples I notice...

that heights of these boys are shifted slightly further up the scale than heights of these girls.

Overlap: From the samples I notice ...

that the heights of these girls completely overlaps the heights of these boys.

Anything unusual:

From the samples I notice... *nothing unusual*

I worry or think that ...

Shape:

- Describe the shape of each sample distribution, compare the shapes of the two sample distributions
- Description of the sample distribution shape is what we see and also guided by what we suspect is the shape of the population/underlying distribution. We tend to ignore any features which may just be due to sampling variability. For shape we describe symmetry (e.g. symmetrical or skewed) and modality (e.g. unimodal, bimodal etc).
- Sometimes a re-scaling of axis is required to see the shape

From the samples I notice...

- *that the heights of both these groups are a mound shape. The mound for these boys and girls is around 165cm.* (Imagine making 5cm class intervals.)
- *that the heights for girls are symmetrical and the heights for boys are roughly symmetrical.*

Back in the two populations I wonder if ...

the shapes will be like these. I expect so.

(From my contextual knowledge what I would expect population distributions to look like)

Spread:

- Describe the spread of each sample distribution, compare the spreads of the two sample distributions
- Use the spread of the middle 50% (IQR) – don't use range

From the samples I notice...

- *that the middle 50% of these girls heights is slightly more spread out than the middle 50% of these boys heights.*
- *these girls' heights IQR = 174 - 158 = 16 cm*
- *these boys' heights IQR = 172 - 162 = 10 cm*

Back in the two populations I wonder if ...

the spreads will be like these. I would expect the population spreads to be similar. (From my contextual knowledge and what I would expect population distributions to look like)

CONCLUSION (This is dealt with in Workshop 2)

Answer the problem:

“Do the heights of Karekare College boys tend to be greater than the heights of Karekare College girls?”

I would claim that . . .

Explain why you have made this conclusion.

Workshop 1 Information

Students should be familiar with:

- Posing investigative questions for summary and comparison situations
- Writing full descriptions for summary and comparison situations from dot plots
- Population and its meaning within the statistics curriculum
- Collecting data, especially using the CensusAtSchool survey 2009 questionnaire and making measures for the CensusAtSchool survey
- Cleaning data, particularly familiar with body measurement data, possible sources of error, sensible ranges of values

Concept	Level 4	Level 5	Level 6
Posing investigative questions	About the specific group or sample of data given	About the population	About the population
Sampling	Growing samples leading to population idea	Sampling variability	Sample size
Type of data analysis	Dot plots	Dot plots Box plots Summary statistics	Dot plots Box plots Summary statistics
Description <i>I notice</i>	Of the data given (group or sample)	Sample	Sample
Inferential thoughts <i>I wonder</i>		About the populations	About the populations
Contextual thoughts <i>I expect, I worry</i>		Eg measurement issues, data quality, shape of population distributions	Is there an alternative explanation?

Curriculum Achievement Objectives

Statistical investigations:

S4-1 Plan and conduct investigations using the statistical enquiry cycle: A determining appropriate variables and data collection methods B gathering, sorting, and displaying multivariate category, measurement, and time-series data to detect patterns, variations, relationships, and trends C comparing distributions visually D communicating findings, using appropriate displays.
S5-1 Plan and conduct surveys and experiments using the statistical enquiry cycle: A determining appropriate variables and measures B considering sources of variation C gathering and cleaning data D using multiple displays, and re-categorising data to find patterns, variations, relationships, and trends in multivariate data sets E comparing sample distributions visually, using measures of centre, spread, and proportion F presenting a report of findings.
S6-1 Plan and conduct investigations using the statistical enquiry cycle: A justifying the variables and measures used B managing sources of variation, including through the use of random sampling C identifying and communicating features in context (trends, relationships between variables, and differences within and between distributions), using multiple displays D making informal inferences about populations from sample data E justifying findings, using displays and measures.

Key Ideas from Workshop One:

1. Link between sample and population.
2. Students need to experience the need to sample.
3. Describe sample distributions and think about the population distributions.
4. Predict population distributions.
5. Care with language, these boys, these girls.

All handouts and classroom materials are located on CensusAtSchool.

<http://www.censusatschool.org.nz/>

Click on new curriculum and then informal inference.