Mathematics

Pedestrian Count

Year Level(s): 10

Activity Objective:

To undertake a commercially sensitive count of pedestrians (shoppers) in the Richmond shopping areas of Queen Street and Richmond Mall and analyse the collected data using statistical calculations and displays.

The Learning Context:

For 40 years a pedestrian count has been carried out at the same time and in the same places around the Richmond shopping district (Queen Street and the Richmond Mall). The 'foot traffic' data collected is used to identify shopping trends in the area and has a significant role in determining retail property values and appropriate leasing and rental levels.

In order to preserve the consistency and integrity of the data it is vital that the counts take place at the precise time and at the exact venues specified, and that care is taken to follow the guidelines as to who should and should not be counted.

The context provides a real situation for students to collect and analyse statistical data and be informed by a business person who uses mathematics as an integral part of their job.

Curriculum Reference:

Mathematics in the New Zealand Curriculum (Level 5)

- Plan and conduct statistical investigations of variables associated with different categories within a data set, or variations of variables over time;
- Find, and authenticate by reference to appropriate displays, data measures such as mean, median, mode, inter-quartile range, and range;
- Collect and display comparative samples in appropriate displays such as back-to-back stem-and-leaf, box-and-whisker, and composite bar graphs.
- Use data displays and measures to compare data associated with different categories;
- Make statements about time-related variation as a result of a statistical investigation;
- Report on possible sources of error and limitations of an investigation.

Key competencies and enterprising attributes:

Competencies	Enterprising Attributes	Indicators
Relating to others Using language symbols and texts Managing self Participating and contributing Thinking	1. Collecting, organizing and analyzing information 2. Working with others 3. Negotiating and influencing 4. Monitoring and evaluating 5. Communicating and receiving ideas and information	1. Completing pedestrian count 2. Agreeing allocation of count points and working together to complete the survey 3. Discussing ways to improve project in the future 4. Understanding and implementing instructions given and communicating findings 5. Ensuring accuracy of Pedestrian Count by following instructions correctly.

Learning Outcomes:

Students will be able to:

- Collect appropriate data
- Apply their knowledge of Statistical Analysis to a real and commercially sensitive project
- Critically evaluate their findings

Resource Requirements:

- Guest speakers: a valuer
- Pedestrian Count Instruction folders
- Clicker counters.

Teaching and Learning Sequence

This project is appropriate to apply the statistical enquiry cycle (PPDAC- problem, plan, data, analysis, conclusion)

Problem:

- What is the statistical question being studied?
- What data needs to be collected?

Raise these issues with the students, get them to consider how to deal with them, then to present them to the visiting expert for feedback and evaluation.

Plan:

- How will the data be gathered?

The students plan and try out a small trial data gathering process. They then evaluate the process and develop questions for the visiting expert.
Students then develop an understanding of the 'Pedestrian Count' plan that they will carry out.
The date for the count was established. The count was to be carried out in two stages, from 2.00-2.15pm and 2.15 - 2:30 pm.

Data:

- How is the data managed and organised?

The students need to look at the issues associated with data management. To formulate questions for the visiting expert.

Analysis:

- What does the data show?

Students need to explore ways of displaying data, the reasons behind different display approaches and the ideas of 'cleaning data'. Calculate statistical measures and develop effective data displays which meet the outcomes of the activity. Discuss these with the visiting expert.

Conclusion:

- Use the data to make statements to answer the statistical questions posed in the count. Present these to the visiting expert.

Following an initial presentation by a valuer, students organize themselves into groups and allocated count points.

Students carry out statistical analysis of the results, for example…

- Comparing shopper numbers over the 2 days (using measures of central tendency and spread, and displays such as Stem & Leaf and Box & Whisker plots)
- Indentifying trends over time (for the overall area and comparative studies of different areas within the Richmond shopping area) using time series graphs and composite bar charts.
- Identifying possible problems, issues and questions that the class would like to ask the professional valuers running the Pedestrian Count

The valuer then made a follow-up visit to enable students to present their findings and discuss the issues and questions identified by the students.

- Why count at the specified times?
- Why use mean rather than median as measure of average?
- Why look at average shopper numbers over 3 years only, and not the entire 40-year span of the data?
- Do you use Maths every day in your job?
- How long did it take to become a valuer?

Reflective Questions:

- What are the things you need to consider when preparing to undertake a statistical investigation?
- What are the issues with gathering data in the community?
- What are the issues in analysing real data?

Possible Assessment Activities:

Students to produce a statistical report as if they are the expert following the PPDAC cycle.
Use a rubric, set up for marking, (peer/self assessment) based on each step of the cycle. Students can use this to critically reflect on what they have done.
In addition they could also reflect on what they have learnt about the cycle itself and from the visiting expert about gathering and analysing statistics in the real world.