Weather Project

Task Description

Students gather temperature and rainfall data over a period of two weeks. These data are summarised and presented in differing graphical representations, both hand-drawn and computer generated. The students calculate averages and compare local data with the Bureau of Meteorology data for Melbourne.

Students present their graphs to the class, providing an interpretation and critique of the data.

This task is a summary of the mathematics concepts developed throughout the data unit of work.

Length of Task

2 weeks x 5 minutes and 2 x 100 minutes lessons

Materials

- School weather station, newspaper and Bureau of Meteorology data.
- Butcher's paper
- Excel computer program

Using the Activity

Pre-lesson

At the commencement of the *data unit of work* the teacher explains that the students will record weather information each day over a two week period. The data gathered are the daily rainfall and the minimum and maximum temperatures at the school and in Melbourne. At the beginning of each lesson these data are gathered from the newspaper, Bureau of Meteorology website and the school weather station.

Introduction

The teacher shares with the students the weather data collected over the previous two weeks. These data are collated and presented in tables in numeric form. The whole class discuss the information provided in the tables, noting the contrast between the rainfall at the school and in Melbourne. The students consider ways to present these data in graphic representation. A list of options is recorded on the board, e.g. line graph for minimum and maximum temperatures, bar graphs for rainfall. The students discuss the amount of information provided on each graph, noting it would not be suitable to record all the data acquired on the one graph.

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Main Activity
In groups of 4 or 5, students select the data they would like to graph, e.g. temperature or rainfall. Students are asked to create their graph on butcher's paper to ensure the graph is large enough for the class to read clearly.
Each group decides how best to present the data and what elements of the graph should be included. Students are asked to consider the mean, mode, median and range of the data. Students could be encouraged to include the mean on the graph to provide a visual comparison between the daily temperature and the overall mean.

When students complete their hand-drawn graphs, they input the numeric data into an Excel spreadsheet. The students use the "insert chart" function to create a graph similar to their hand-drawn graph. Students compare the accuracy of their hand-drawn and computer-generated visual representations. Through the use of the "change chart type" function students create different computer-generated graphs using these data. Students assess the suitability of the various graphs for the weather data.

Students are given 30 minutes to write their interpretations of the data. Students include the mean, mode, median and range of the data. The students note any trends, abnormalities or inconsistencies in the data.

Students may consider the following rainfall questions:
- How much rain fell in a two week period in Melbourne and at our school?
- How much more rain fell in the second week than first week?
- What is the wettest day on the graph?
- Which location had the most rainfall?
- What was the range, mean, mode and median for both locations?

Students consider similar questions for the interpretation of the temperature data.
- What is the least and greatest difference between temperatures on one day? In two weeks?
- What was the range, mean, mode and median for the maximum and minimum temperature?
- What general impressions can we draw from the data?

Presentation: Students present graphs and share their interpretations of the data with the class. Students are encouraged to share their interpretations of other groups' data and critically reflect on the suitability of the visual representation selected for the data.

Key Mathematical Concepts
- Data collection, presentation, analysis, and interpretation.

Prerequisite Knowledge
- Understanding the elements of a graph.
- Understanding of the terminology of range, mean, mode and median.
- Transfer numeric data to a visual representation.

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Links to VELS

Dimension	Standard
Measurement, Chance and Data (Level 4)	Students present data in appropriate displays (for example, a pie chart for eye colour data and a histogram for grouped data of student heights).
Measurement, Chance and Data (Level 4)	Students organise and present grouped and ungrouped data using displays such as simple frequency tables.
Working mathematically (Level 4)	Students develop and test conjectures.
Measurement, Chance and Data (Level 4)	Students calculate and interpret measures of centrality (mean, median, and mode) and data spread (range) for ungrouped data.

Assessment

To be working at level 4, students should be able to:

- Transfer numeric data to a suitable graph.
- Label a graph.
- Calculate the range, mean, mode and median for a set of data.

Extension Suggestions

For students who would benefit from additional challenges:

- Students can write an interpretation of another group's data and compare their conclusions.
- Students can make a comparison between these data and those for previous years in the region http://www.bom.gov.au/cgi-bin/silo/rain_maps.cgi
- Students may wish to source different types of data of personal interest over a defined period, e.g. a favourite football player's possessions, a "Biggest Loser's" weight loss, petrol prices, currency. Students can chart this information and write their interpretation of the data.

Teacher Advice and Feedback

Some of the teachers did not instruct the students on which elements to include in the graph nor the interpretation. These teachers were pleased to note the level of detail some students added without prompting. For example, many students included one or all of the following: mean, mode, median and range. The students appeared to have incorporated a great deal of their knowledge from the unit into this task.
On the other hand, some students did not demonstrate an understanding of/knowledge about basic elements necessary for creating a graph and this was surprising for the teachers given the high level of exposure to data over the previous two weeks.

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The teachers were impressed that students were comparing their graph with other groups' graphs and freely discussing their interpretations of other groups' data. These comparisons revealed the students interest in the overall data.

The students appeared pleased when their hand-drawn graphs matched the computer-generated graphs. The students saw the use of the computer as a way of supporting the accuracy of their original graphs. However, the teachers were concerned that students should be careful to not rely on the computer-generated graph as being the correct version until they have checked the data inputted into the spreadsheet. The graph is only as accurate as the accuracy of the data the students input.

The task can take a long time to complete and some students became restless and bored. It may be best to break the task up over a few sessions depending on your class.

Some students were dominating the task and the teachers encouraged those that did not contribute to the graph design to take on the task of interpreting or presenting the data. In some groups, each child was encouraged to take on a specific role.

Potential Student Difficulties

Some students had difficulty creating a graph that could accommodate suitably the data. Providing a clear focus on the usefulness of understanding the range when configuring the graph would be beneficial for these students. The range assists in providing the students with a guideline on how to scale the graph to the appropriate size for the paper.

References / Acknowledgements

Bureau of Meteorology Website: http://www.bom.gov.au/

Ministry of Education. (1989). *Reality in mathematics education for years 5 & 6 : RIME activity bank.* pp. 37-40. Melbourne: Author.

Thank you to the teachers and students from Timbarra PS, for providing valuable feedback on the use of this activity.

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The weather project in progress.

These students created a very long graph. The bars were fashioned from coloured paper and glued onto the cardboard. With a graph this size, it certainly reduces the time potentially spent on colouring in each bar.

Students presenting and sharing their graphs.

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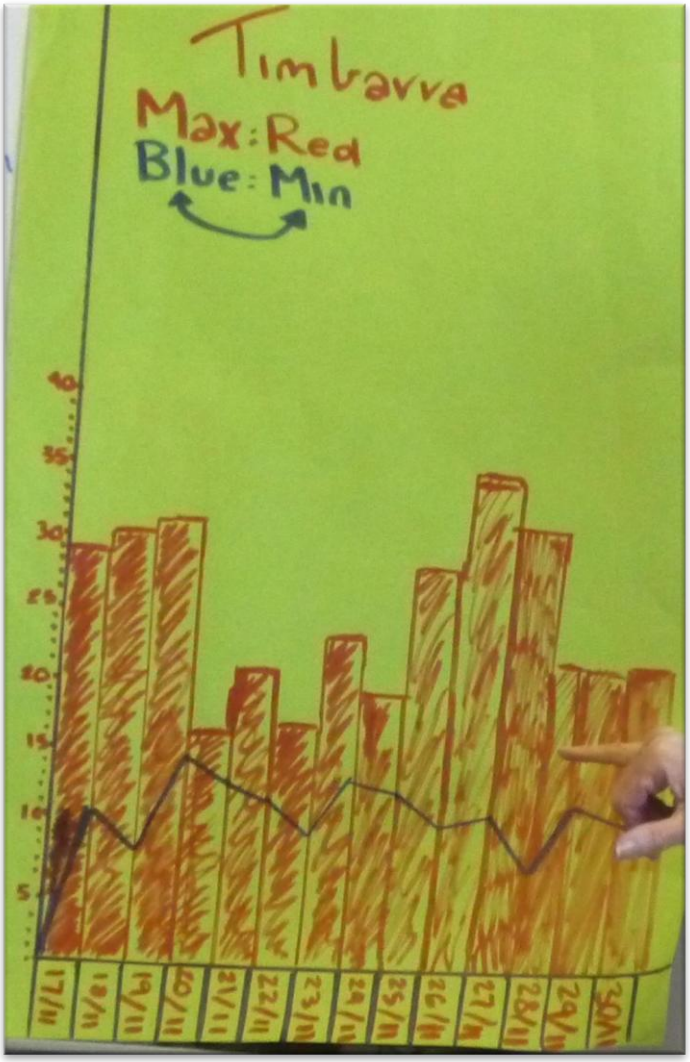
Student work samples

Example 1: Working at Level 4
These students had forgotten to add the minimum temperature into their graph and came up with the idea to include the data through incorporating a line graph with the bar graph.



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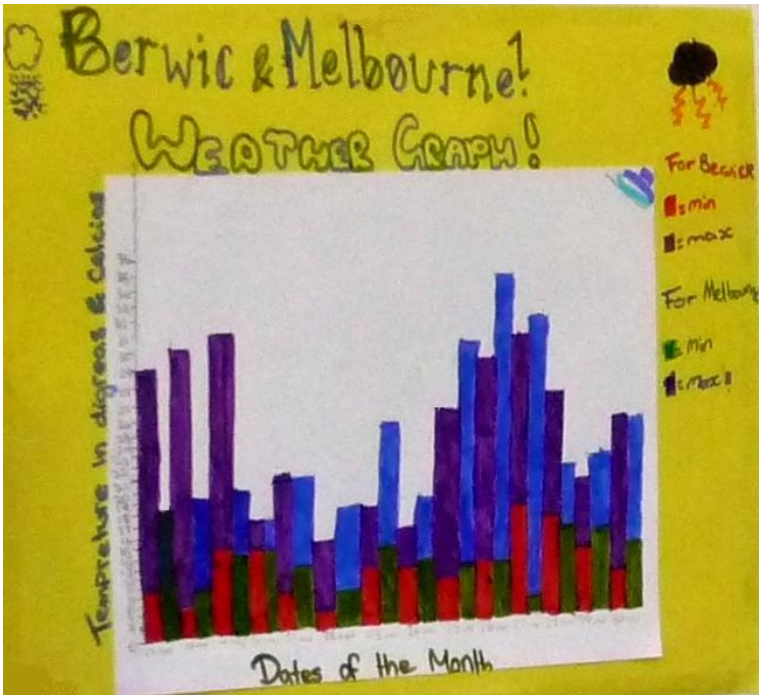
Example 2: Working at Level 4
These students incorporate both the minimum and maximum temperatures for their school through the use of a line graph.

Example 3: Working at Level 5
These students have incorporated a stacked bar graph with a clustered bar graph. This type of graph was highly suitable for displaying minimum and maximum rainfall for two locations. If the task was repeated the students may wish to place a gap between the clusters to ensure that the graph was easy to read.



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