Average Height of Class

Task Description

In pairs, students measure their height and record on streamers. These data are collated and the mean, median and mode are calculated to obtain the average height of the class.

Length of Task

100 minutes

Materials

- Tape measures, streamers, coloured markers, calculators, MS excel program and data projector or Interactive whiteboard (if available).

Using the Activity

Introduction

The teacher explains that in this task the students are going to find out the average height of our class. The teacher asks, 'What does average mean?'
The students brainstorm definitions of average. Students may consult a mathematics dictionary. At the end of the discussion definitions of mean, median and mode are displayed (or written into students' journals).
The teacher poses the question to the students, 'How might we find out the "average" height of our class?'
Students brainstorm methods for collecting data to answer this question effectively.

Main Activity

In pairs, the students use a tape measure and streamer to measure the height of their partner. Students may either measure using the tape measure and cut the right length from the streamer or match the streamer to the height of the student and measure the streamer length afterwards. The height and name of the student is recorded on the streamer.

In a large open area, the students organise the streamers to be laid on the floor in order of height. The teacher and students gather around the streamers.

The small group of streamers are used to model the different meanings of average discussed in the introduction. In the case of mean, the teacher demonstrates how you might take a piece off the end of a longer streamer and add it to a shorter stream to create two streamers of the same length, thus finding the mean average of two streamers/heights.

Back in the classroom, these student data are transferred to the board in descending order. The teacher asks the students to work in pairs or a small group to find the mean, median and mode of the height of the class. The students may use calculators if required.

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The teacher roves the classroom and records the different methods students employ to find the answer. These methods may be drawn out in the summary discussion.

The whole class come together to discuss their findings. The students share their results and the methods used to find the average with the class. The teacher asks students to share what they have noticed about the relationship between the mean, median and mode. This may be an opportunity to introduce the term 'range'. The teacher asks the students to consider, 'Why are there differences in the results? Which result would they use to describe the average height of their class? Why?'

At the conclusion of the lesson, the teacher demonstrates how to find the mean, median and mode in excel through the use of formulas built-in to the program. The excel program will be employed and explored further in the following task, 'Average Height of the School'.

Key Mathematical Concepts

- Introducing mean, median, mode and range.
- Data analysis.

Prerequisite Knowledge

- Understanding of how to gather and record data.

Links to VELS

Dimension	Standard
Measurement, Chance and Data (Level 4)	Students calculate and interpret measures of centrality (mean, median, and mode) and data spread (range) for ungrouped data.
Measurement, Chance and Data (Level 4)	Students organise and present grouped and ungrouped data using displays such as simple frequency tables.

Assessment

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

- Appropriately calculate the mean, median and mode of a set of data.

Extension Suggestions

For students who would benefit from additional challenges:

- Estimate and calculate the mean of different body parts, e.g. arms, head circumference.
- Students pose the problem that they would like to join or support a local sporting team (e.g. basketball, football) and want to examine the statistics of the teams to pick a high goal scoring team. Students gather data from local teams and based on the mean mode and median of the goals scored justify which would team they would join and

why based on the ‘average’ they selected? Data from local teams may be collected over a few weeks prior to this activity for authenticity.

Teacher Advice and Feedback

If you have a data projector or interactive whiteboard available it would be useful to place all the names of the students into an excel spreadsheet ahead of time and add the heights later. Once the height data is inputted, you can sort these data in excel to order the students from smallest to tallest using the built in formulas.

A bimodal or multimodal distribution may appear within the class height data. Bimodal distribution occurs when the data have two modes; multimodal distribution occurs when there is more than two modes. The terms bimodal and multimodal distribution might be introduced to the students and may be simple to grasp for some students as a result of the straightforward use of the prefixes ‘bi’ and ‘multi’. An in-depth discussion or knowledge of these terms is not necessary for completion of this task.

Potential Student Difficulties

Teachers undertaking this lesson found that the students had difficulty with the practical task of ordering the streamers. A few students took the lead and ordered smaller sets of streamers, and then the sets were moved closer together. This process took more time than expected.

Sources

Andrini, B. (2006) *Cooperative Learning and Mathematics.* Heatherton, Victoria: Hawker Brownlow Education.

Acknowledgements

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

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Students collecting data

This student is comparing her streamer against a tape measure to measure her height.

These students are organising the streamers into height order.

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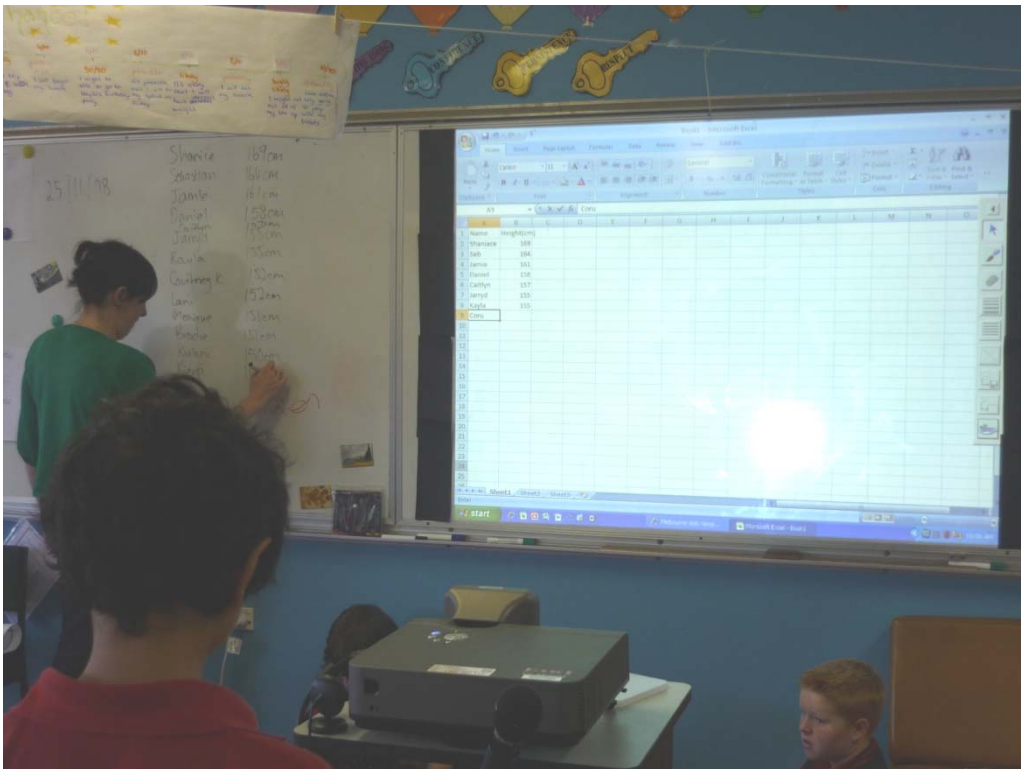
The teacher records these data on the board and then transferred to an excel spreadsheet by a student.



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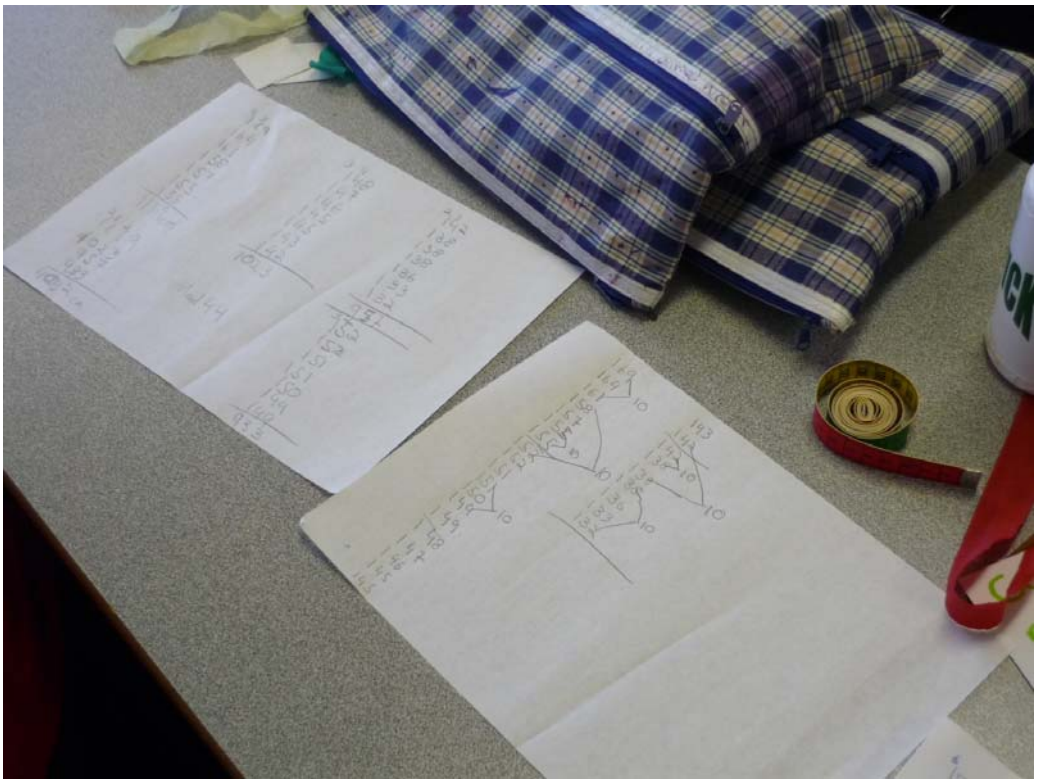
Student Work Samples

Example 1: Working at Level 4

These students are calculating the mean through adding a smaller set of numbers from the data and later adding these totals to find one overall total. The final sum was divided by the number of students in the class to calculate the mean.



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These students have organised the heights in ascending order and calculated the mean and median ('medium', sic). They are working on the mode, which appears to be multimodal in this example. It is pleasing to note that the students have added the word average after each word, thus emphasising the point that mean, median and mode are all examples of average.