Teaching Data

Stage 3: Dot plots

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Stage 3: Dot plots

Welcome

Welcome to *Teaching data Stage 3: Dot plots* resource.

This resource is designed to assist you to introduce dot plots in your Stage 3 classroom. It provides background information essential to developing students' understanding of the features and appropriate use of the dot plot graph. It also provides teaching ideas to address syllabus outcomes and Stage 3 content for the data substrand.

Teachers may use this resource individually or in teams.

Overview

This resource explores the teaching of data concepts through the provision of lesson plans and practical teaching ideas. It focuses on activities which engage students in:

- constructing dot plots
- collecting and analysing data
- identifying features of different graph types
- posing questions for investigation
- conducting surveys
- reflecting, discussing and reasoning.

The resource is organised into three main sections:

Characteristics of dot plots

This section describes the features and advantages of using dot plots.

Teaching ideas

This section contains two full lesson plans and a set of lesson starters.

Where to next?

The section contains ideas and reflection activities.

Rationale

Constructing dot plots with and without the use of digital technologies and interpreting information presented in dot plots is new to the Stage 3 content of the *Mathematics K-10 syllabus* (2012). The intent of this resource is to support teachers' understanding of the content and to provide examples of teaching ideas and lessons.

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Characteristics of dot plots

What is a dot plot?

A dot plot is a way of visually representing whole number counts of data. It can be used as an alternative to a column graph. It relies on sorting and plotting data along an axis and is usually used for small data collections.

A dot plot is best used for displaying categorical data, that is, data that can be separated into distinct groups or categories such as colour or modes of transport.

Dot plots are sometimes called 'stacked dot plots' and can resemble a picture graph where one picture or symbol represents a single piece of data. Dot plots can be created using digital technology, or as a simple paper display using resources such as dot stickers. If creating dot plots by hand, grid paper is useful to ensure good alignment of the data values.

Features of a stacked dot plot:

- Only one axis. The axis is usually horizontal and labelled.

- A dot (or symbol such as x) to represent each count or piece of data from the data set, with each dot placed above the corresponding category on the axis.

- When there is more than one piece of data relating to a particular category, the dots are stacked to represent the frequency of data. The dots should be aligned and spaced evenly.

- Careful consideration will need to be given to the construction of the axis. The axis will need to display all the possible categories for the data set.

Dot plot of 5K's school shoe size
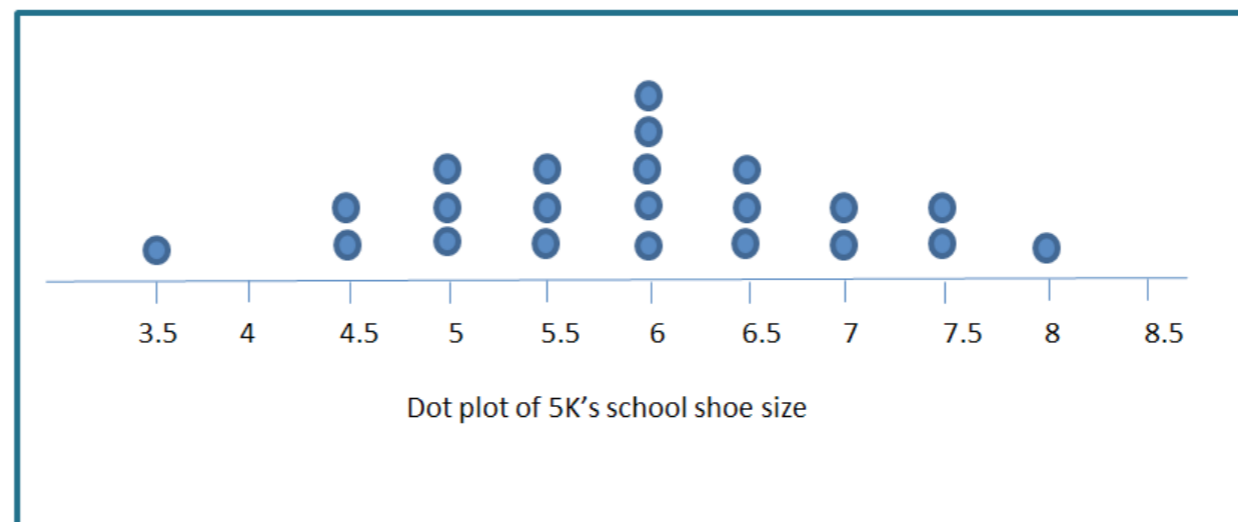
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Advantages of a dot plot:

- Easy to construct and understand

- Easy identification of the range and highlighting of extreme values

- Reveals peaks in the data

- Stacked dot plots can be used to make comparisons between sets of data values, for example: comparing the test scores of one class to those of another class. To do this, two (or more) plots need to be made using the same scale and the plots can then be lined up and compared.

In their basic form, these plots are a quick and efficient means of displaying and summarising data. They are easy to construct, and can be created by most students. Stacked dot plots make interpreting and constructing graphs accessible to a wide range of students, enabling data analysis to become manageable from a young age. They give students the ability to familiarise themselves quickly with a data set, to identify the concentration of data such as in clumps, to acknowledge the absence of data, and to pinpoint unusual data and outliers.

Watson, JM, Kelly, BA, 2002 'School students' understanding of stacked dot (or line) plots', University of Tasmania, ref: wat02243, AARE the association for active educational researchers, viewed 20 August 2012, *www.aare.edu.au/02pap/wat02243.htm*

Related syllabus outcomes

The following syllabus outcomes relate to the teaching of dot plots in Stage 3.

A student:

- describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions (MA3-1WM)

- selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations (MA3-2WM)

- gives a valid reason for supporting one possible solution over another (MA3-3WM)

- uses appropriate methods to collect data, constructs and interprets data displays and analyses sets of data (MA3-18SP).

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Explore

Graphs play a highly significant role across the mathematics curriculum, providing visual means of presenting information or a data set. Download the following report which explores the application of graphs for portraying data, and their potential as instruments for reasoning about quantitative information.

[The development of graph understanding in the mathematics curriculum](#)

In chapter 3 of this report, 'Graphing and technology', Watson puts forward a view that students should have the option of creating graphs with or without technology with the understanding that the students can explain what they have created and the conclusions they can draw from the representations. She goes on to explain how the software package TinkerPlots™, can be used to provide students with opportunities to create stacked dot plots and creatively display the data in various forms to assist data analysis.

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Teaching ideas

Download

This lesson plan, *Introducing dot plots*, is designed to familiarise students with the key features of a stacked dot plot.

Download

This lesson plan, *App choice* aims to support students to develop a process for collecting data for display as a dot plot.

Explore

Explore this *Collection of lesson ideas* designed to help teachers plan practical and meaningful lessons to support the teaching of dot plots.

Where to next?

Reflection

After you have read through the sections of this resource, try out the two lesson plans included in the teaching ideas section with your class.

- Reflect upon the effectiveness of each of the lessons.
- Did the lessons achieve their intended purpose?
- What observations were you able to make regarding student understanding?
- Did your students find using dot plots easier or harder than using column graphs? Why?

Explore

You may also like to:

- Choose one of the activities from the collection of lesson ideas. Expand the lesson idea to develop a full lesson plan. This could be done using a *Lesson study* process with a small team of teachers.
- As part of the development of the lesson plan, consider when and how student assessment will occur.
- Develop a unit of learning based on the remaining teaching ideas.