AMSP Professional development videos: Statistics

Aims of the session
■ To encourage teachers to reflect on their own practice and explore ways of helping students to become confident in applying statistical techniques to real data. ■ To provide teachers with the opportunity to develop lesson ideas based on the large data set.
Resources needed
■ A projector for showing the videos. ■ The statistics content of AS and A level Mathematics. ■ Access to the large data set used by your awarding body.

Introduction

What is statistics?

- How would you answer this question?
- How do you think your students would answer this question?

Discuss your views with each other.

"*Statistics combines computational activity in a meaningful setting with the exercise of judgment in choosing methods and interpreting results.*"

David Moore in On the Shoulders of Giants

(pdf can be downloaded at *https://www.nap.edu/catalog/1532/on-the-shoulders-of-giants-new-approaches-to-numeracy*)

How well do you think the quote above describes the following?

- The statistics that students will do in work or at university.
- The statistics that students learn in mathematics lessons in school.

Watch the **repeated sampling** video, which shows a teacher and his class exploring weather data.

As you watch the video, make brief notes on the following.

- What students are learning about statistics.
- How they feel about working with real data.

Discuss what you noticed with each other.

How do you feel about the introduction of working with large data sets for the 2017 Mathematics specifications? Why?

The following concerns may arise from the discussion:

- The data set is large and unwieldy: It will be important to break the set down and begin to expose students to it in a piecemeal way. Over time they will hopefully become less daunted by consideration of the data set as a whole.
- The data set is not very interesting: It will be important to ask questions which will get students thinking about the data and what it shows – any set of real data has interesting features.
- There is not time to teach the concepts and look at the large data set: The data set should not be seen as a separate part of the course but can be integrated when teaching the statistical content. When a teaching example is required, reference to the large data set could become the default option. Regular exposure will help students to become familiar with the data set, so that it is not seen as an extra thing to learn.
- The data are too raw and do not produce 'pleasing' or simplified results: This is very different to traditional examination questions which are designed to work out 'nicely'. But exposure to the messiness of real data will encourage students to think more deeply and learn statistics more effectively.
- The data can take time to manipulate: Software such as Excel and GeoGebra can help with analysis of large data and allow students to compare multiple sets of data quickly. A combination of both teacher-led and student use of software will increase student confidence in engaging with the data.

Pair work

Think about which statistics topics in A level are closely related to the data set for your A level specification.

Choose one topic and think of a question which would start students thinking about the data. Here are some possible sources of ideas to adapt.

- The other videos in this section.
- Integral resources.
- Your awarding organisation's resources.

Consider how the initial question will lead into learning of statistical ideas. When will students work with the data set – in the lesson or outside of the lesson? How will you make the data set available to them?

Will the data set be used for a short focused activity or as the start of a longer investigation?

Will it be used as a starting point, leading into more traditional practice of the ideas or towards the end of a topic to apply the ideas which have been learnt?

Do you need to prepare any resources?

Next steps

Teach a lesson which makes use of the large data set. Discuss with each other how it went and how you might do things differently next time.