FIVE NUMBER SUMMARY AND BOX AND WHISKER DIAGRAMS FOR UNGROUPED AND GROUPED DATA

Thanyani Daniel Rambane

Statistics South Africa

TARGET AUDIENCE: Further Education and Training Phase Mathematics

DURATION: 2 hrs

MAXIMUM NO. OF PARTICIPANTS: 30

MOTIVATION FOR WORKSHOP

Grade 10 and 11 learners are expected to learn how to determine the 5 number summary and use these numbers to interpret the spread of data. The learners tend to experience some challenges when asked to determine these numbers if data is grouped into frequency classes. Participants will be guided on how to determine these numbers from both ungrouped and grouped data from frequency tables. Furthermore, an explanation will be done on how to determine whether data points are outliers or not, and finally discussing the effect of outliers on the interpretation of the dispersion of data.

ABSTRACT OF THE WORKSHOP

One of the objectives of analysing data is to determine the spread, distribution or dispersion of data. For this purpose the 5 number summary is used. The box and whisker plot, constructed from the 5 number summary, is a diagrammatical representation of the spread of data. During this training, the box and whisker diagrams from both ungrouped and grouped data will be plotted. From this the dispersion of data will be investigated. The cases where there are outliers are also investigated.
The workshop targets Further Education and Training (FET) educators.

CONTENT OF THE WORKSHOP

1. Given ungrouped data, the steps followed to draw a diagrammatical representation of the spread of data are given below:

    1.1 Sorting data
    1.2 Determine the following:
        1.2.1 the minimum (min),
        1.2.2 maximum (Max),
        1.2.3 median (med or Q2),
        1.2.4 lower quartile (Q1)
        1.2.5 the upper quartile (Q3)
        1.2.6 the inter-quartile range (IQR)

Rambane, T.D. (2013). Five number summary and box and whisker diagrams for ungrouped and grouped data. In Z. Davis & S. Jaffer (Eds.), *Proceedings of the 19th Annual Congress of the Association for Mathematics Education of South Africa*, Vol. 2. (pp. 56 – 57). Cape Town: AMESA.

1.3 Discuss the spread of the data
1.4 Discuss outliers using the formulae
Q1 – 1.5(IQR) and Q3 + 1.5(IQR)
1.4.1 Discuss the effect of the outlier on the spread of data
1.4.2 Determine the range using outliers.

1.5 Draw box and whisker diagram
1.6 Interpret the spread of data using the box and whisker diagram
1.6.1 Whiskers are 25% of the data
1.6.2 The box is 50% of the data
1.6.3 The median cuts the box into two 25% parts of the data.
1.6.4 The outliers are included

1.7 Introduce the concept of skewness
1.7.1 Symmetric data
1.7.2 Positively skewed data (Skewed to the right)
1.7.3 Negatively skewed data (Skewed to the left)
1.7.4 Use of mean and median (Med)

2. Given grouped data in frequency table
2.1 Determine the cumulative frequencies
2.2 Determine the 5 number summary
2.3 Draw box and whisker diagram

PROPOSED TIME ALLOCATION FOR WORKSHOP ACTIVITIES

Activity	Time
1. 5 number summary	15 min
2. Interpretation	20 min
3. Box and Whisker	15 min
4. Interpretation	40 min
5. Grouped data	30 min