

# Title: Hands, Heights and Histograms

## Objectives:

- 1) Collect data on student heights, hand lengths, and birth dates
- 2) Calculate mean, median and standard deviation of data sets.
- 3) Create graphical representations of each data set.
  - a) histogram
  - b) dot plot
  - c) box-and-whiskers plot
- 4) Analyze data sets for trends

## West Virginia Content Standards and Objectives addressed:

**CM.12** create and interpret data using various methods of displaying numerical data, including frequency distributions, graphs, histograms, stem-and-leaf plots, and box-and-whiskers plots, using technology when appropriate

**CM.13** relate the measures of central tendency and the measures of dispersion to a normal distribution

## Lesson Activities

- 1) Working in pairs students measure and record
  - a. Height in cm
  - b. Hand length in cm (wrist to fingertip)
  - c. Day of the month of their birthdate

This should be done for the individual class first. Then gather a larger data sample by measuring others. (Other classes, parents and siblings, etc.)

- 2) Analyze the mean, median and standard deviation of each data set
  - a. Perform the calculations
  - b. Discuss the implications of each value

Do this both for the class data and for the larger data set. Discuss similarities and differences.

- 3) Create dot plots for the class data. Discuss the shape of the distribution.
- 4) Create a histogram of the large data set. Discuss the approximately normal shape of the distribution. Observe the placement of the mean and median, and the way the standard deviation describes the spread of the data.
- 5) Create a box-and-whiskers plot for the class and the larger data set. Analyze the similarities and differences between the sets.

**Extension Ideas:**

- 1) Create a scatter plot to explore relationships:
  - a) height vs. hand length (should have a positive approximately linear correlation which could be modeled with a regression equation)
  - b) of height vs. birth date (should show no noticeable correlation)
  
- 2) Calculate probabilities of students falling in “short, medium, tall” ranges. This could be done using normal cumulative distributions and applied to a company’s need to estimate the needed stock in various sizes.

**Web References:**

- [www.shodor.org/interactivate/lessons/sm3.html](http://www.shodor.org/interactivate/lessons/sm3.html) (neat interactive histograms)
- [www.RobertNiles.com](http://www.RobertNiles.com) (short introductions to various statistics topics)
- [http://fs.broward.cc.fl.us/~abiggs/05\\_01w/sld009.htm](http://fs.broward.cc.fl.us/~abiggs/05_01w/sld009.htm) (graphs of normal distribution of adult heights)
- <http://ellerbruch.nmu.edu/cs255/jnord/boxplot.html> (explanation of box plots)