Notes on Statistics and the Scientific Method:
Theories, lead to Research, which lead to Hypotheses

Operational Definition: A statement of the procedures used to define research variables. For example, Human intelligence may be operationally defined as what an intelligence test measures.

Case study: The study of ONE individual in great depth.
Survey: A method that looks at many cases in less depth.
Random sampling can lead to a **FALSE CONSENSUS** Effect: We think MORE people agree with us than actually do.

Naturalistic Observation: Watching people or animals in their native environments.

Correlation:
Correlation coefficient is a statistical measure of a relationship. It reveals how closely two things vary together and thus how well either one predicts the other. For example, knowing how much aptitude test scores correlate with school success tells us how well scores predict school success.

A correlation can be positive or negative. If both variables go up it is a positive correlation, if one variable goes down and the other goes up it is a negative correlation.

Some real world examples:

The more TV is on in the homes of young children, the less time they spend on reading (negative correlation)

The more sexual content teens see on TV, the more likely they are to have sex. (positive correlation)

The longer children are breast fed, the greater their academic achievement (positive correlation)

The more income rose among a sample of poor families, the fewer psychiatric symptoms they experience (negative correlation)

A scatterplot establishes the relationship between two variables.

Correlation DOES NOT MEAN CAUSATION.

Descriptive Statistics and measures of central tendency
Mode: most frequently occurring score or value
Mean The arithmetic average
Median: the midpoint of any set of numbers, or the 50^{th} percentile.

A perfectly balanced distribution of numbers produces a bell curve on a graph and is called a NORMAL DISTRIBUTION.

If the curve is skewed to the right it means that there are more exceptionally small values than large values, if the

curve is skewed to the left, it means that there are more exceptionally large values than small values.

THE PEARSON correlation coefficient describes this pattern. A Pearson coefficient of -1 is a perfect negative correlation and a Pearson coefficient of 1 is a perfect positive correlation.

Standard Deviation measures variability:

In a typical distribution: 68 percent of all scores are within 1 standard deviation above or below the mean, and about 95 percent of all scores are 2 standard deviations above or below the mean.

To calculate the STANDARD DEVIATION DO THE FOLLOWING: p. 42 in book, p. 44 in the Module:

1. Take a group of numbers and calculate their average
2. Record how far each number is from the average. For example if the mean or average of a group is 15, a value of 20 is +5 from the mean. A value of 10 is -5 from the mean.
3. Add these values up. Keep them as positive or negative integers. Square this sum.
4. Divide this result by the number of scores or values in the sample.
5. Then take the square root of this result.
6. This number is the Standard Deviation for a sample.