**Chapter 21- Developing concepts of Data Analysis**

* **Statistics is its own field different from mathematics; one key difference is focus on variability of data in statistical reasoning. Statistics is about numbers… But numbers in context, which is referred to as data.**
* **A critical and unique aspect of statistics comes from variability. Variability should be the focus at the elementary level, and includes:**
  + **Variability within a group**
  + **Variability among groups**
  + **Sampling variability**
  + **Natural and Induced variability**

**\*\*\*When designing an experiment-look at one factor and all other factors should be kept the same.**

* **To engage students *meaningfully* in learning and doing statistics, they should be involved in the full process, from asking and defining questions, to interpreting results. (The Best Vacation Ever by Stuart J. Murphy)**
* **The process of doing statistics: 4 Phases**
  + **Formulate Questions**
  + **Collect Data**
  + **Analyze Data**
  + **Interpret Results**
* **Real World activities produce Real Life interest!**
  + **Let students search for/collect data that is interesting to them.**
    - **Number of T.V. shows they watch each night**
    - **How many songs they listen to coming to and from school**
    - **How many games have the Vols won/lost this year**
    - **What is the number of hours you spend on the computer each week**
    - **How long does it take you to run around the gym**
* **Graphs, Graphs, and MORE Graphs.**
  + **Bar Graphs (Early stages of graphing)**
  + **Tally Charts (Simple and can be used as early as Kindergarten)**
  + **Circle Graphs (Displays ratios rather than quantities)**
  + **Line Plots (Counts on a numeric scale)**
  + **Stem-and Leaf Plots (Displayed as a list)**
  + **Histogram (Bar graph with consecutive equal intervals along a numeric scale)**
  + **Line Graph (Associated with a point)**
  + **Scatter Plot (Demonstrates relationships)**
* **Measures of Central Tendency/ Measures of Center**
  + **Mean, Median, Mode, and Range (spread)**
  + **When teaching the Mean, it is important for students to understand that it is a number that represents what all of the data would be if they were “leveled out.”**
  + **Statisticians prefer to think of the mean as the central balance point.**
  + **Mode occurs most frequently**
  + **Median is the “middle” number in an ordered set of data.**
  + **Range is the spread or difference in the largest data and smallest data.**
* **Our world is inundated with data, from descriptive statistics to different graphs. It is essential that we prepare students to be literate about what can be interpreted from data and what cannot be interpreted from data, what is important to pay attention to and what can be discarded as misleading or poorly designed statistics.**