boxplot, and the horizontal line extends from the lowest data value that is not an outlier (11) to the highest data value that is not an outlier (17).

CAUTION Because there is not universal agreement on procedures for finding quartiles, and because modified boxplots are based on quartiles, different technologies may yield different modified boxplots.

Putting It All Together

We have discussed several basic tools commonly used in statistics. When designing an experiment, analyzing data, reading an article in a professional journal, or doing anything else with data, it is important to consider certain key factors, such as:

- Context of the data
- Source of the data
- Sampling method
- Measures of center
- Measures of variation
- Distribution
- Outliers
- Changing patterns over time
- Conclusions
- Practical implications

This is an excellent checklist, but it should not replace *thinking* about any other relevant factors. It is very possible that some application of statistics requires factors not included in the above list, and it is also possible that some of the factors in the list are not relevant for certain applications.

using TECHNOLOGY

Boxplots

STATDISK Enter or open the data in the Data Window, then click on **Data,** then **Boxplot.** Click on the columns that you want to include, then click on either **BoxpPlot** or **Modified Boxplot.**

MINITAB Enter or open the data in columns. With Minitab 16, click on **Assistant,** then select **Graphical Assistant,** then click on the image of a boxplot. With earlier versions of Minitab, select **Graph,** then select **Boxplot.** Select the "Simple" option for one boxplot or the "Simple" option for multiple boxplots. Enter the column names in the Variables box, then click **OK.** Minitab provides modified boxplots as described in Part 2 of this section.

EXCEL Although Excel is not designed to generate boxplots, they can be generated using XLSTAT. First enter the data in column A. Click on **XLSTAT** at the top, select **Describing Data,** then select **Descriptive Statistics.** Enter the range of cells (such as A1:A40) in the "Quantitative Data" box. Check the "Sample labels" box only if the first cell contains the name of the data set. Click on the **Charts** tab, then check the box labelled **Boxplots.** Click **OK** to continue. The result will include descriptive statistics as well as a boxplot.

TI-83/84 PLUS Enter the sample data in list L1 (or enter the data and assign them to a list with a name). Now select **STAT PLOT** by pressing 2ND Y=. Press ENTER, then select the option of ON. For a simple boxplot as described in Part 1 of this section, select the boxplot type that is positioned in the middle of the second row; for a modified boxplot as described in Part 2 of this section, select the boxplot that is positioned at the far left of the second row. The Xlist should indicate L1 (or the assigned list name) and the Freq value should be 1. Now press ZOOM and select option 9 for **ZoomStat.** Press ENTER and the boxplot should be displayed. You can use the arrow keys to move right or left so that values can be read from the horizontal scale.