Correlational studies measure the degree to which a relationship exists between two or more variables (e.g., What is the relationship between years of teaching experience and use of performance-based assessments?). Finally, *causal-comparative* studies (also sometimes referred to as ex post facto studies) compare groups—where group membership is determined by something that occurred in the past—on subsequent data on another variable in such a way that it makes possible drawing potential causal relationships between the two variables (e.g., Do teachers who completed a stand-alone preservice course in classroom assessment use performance-based assessment more than teachers who did not complete such a course?). Notice that based on the sample research questions provided it is quite possible to use any of the various types of nonexperimental research designs to study a given topic—in this case, classroom teachers' use of performance-based assessments.

In **experimental research**, the researcher has control over one or more of the variables included in the study that may somehow influence (or cause) the participants' behavior. The variables over which the researcher has control are known as the **independent variables**; these are the variables that are manipulated by the researcher, meaning that the researcher determines which subjects will receive which condition. For example, if the effectiveness of a new math program was being investigated, those students exposed to the new program would constitute the **experimental** or **treatment group**; their performance would be compared to a **control group** that receives the standard math instruction. The ultimate variable of interest (i.e., the "behavior" variable mentioned above, perhaps "math achievement" in our example) is referred to as the **dependent variable** (since its value depends on the value, or group membership, of the independent variable).

There are a wide variety of experimental research designs, the discussion of which is beyond the scope of this book. However, an illustration of experimental research is likely in order. Suppose a history teacher wanted to determine whether students performed better when taught American history using the more traditional forward (i.e., past to present) approach versus a backward (i.e., present to past) approach. She randomly assigns half of her classes to be taught using the forward approach and the other half to be taught using the backward approach. The independent variable for her study is the type of instruction. There are two levels to this variable that "define" the two groups—the experimental group receives the innovative backward approach to instruction; the control group receives the more traditional forward approach. Finally, the academic performance (dependent variable) of all students is measured using the same instrument (e.g., a final exam) for both groups. The aspect that makes this study experimental in nature is that the teacher herself determines which group will receive which version of the treatment (i.e., instruction); in other words, she is manipulating or controlling the independent variable.

Data collected as part of quantitative research studies are numerical and therefore naturally analyzed statistically. Analyses may include descriptive statistics, inferential statistics, or both. **Descriptive statistics** allow researchers to summarize, organize, and simplify data. Specific techniques include such statistics as the mean, median, mode, range, standard