Research and research designs that accompany them can generally be broken down into five different categories. These categories include experimental research designs, correlational research designs, causal-comparative research, survey research, and action research. This chapter will describe the different types of designs and critique their relative advantages and disadvantages. The best research designs will address virtually all of the threats to internal validity that were discussed in the last chapter. Unfortunately some research designs address very few of the threats to internal validity.

1 Experimental Research Designs

The first types of research are experimental research designs. Experimental research involves the manipulation of an independent variable, sometimes referred to as the treatment variable. It looks at the effect on the dependent variable or the outcome. In experimental research the researcher can examine the relationship of variables in terms of their cause and effect.

One of the requirements of experimental research is the random assignment and random selection of individuals for the treatment. Random assignment and random selection were discussed earlier in Chapter 5. Random assignment means that every individual in the experiment has an equal chance of being assigned to either the experimental group or the control group. This assignment is very important to internal validity. Random selection means that every member of the population has an equal chance of being selected to be a member of the sample, which will then be subdivided into the experimental and control group. The selection process is very important for external validity. Experimental research can control many of the threats to the validity of an experiment. It is the responsibility of the researcher to control for threats to internal and external validity.

1.1 True Experimental Designs

The first type of experimental research is referred to as true experimental designs. For a research design to be a true experimental design, there must be random assignment of subjects to the treatment and control groups. Random assignment is a powerful tool for controlling threats to internal validity. Four
types of randomized experimental designs will be discussed first. They are the randomized posttest only control group design, the randomized pretest-posttest control group design, the randomized Solomon four group design, and the factorial design.

The randomized posttest only control group design means that subjects are randomly assigned to either an experimental or control group. Then the treatment is conducted for the experimental group. After the treatment is completed, a posttest is administered to the subjects. The posttest measures any differences that may exist between the two groups on the dependent variable or the outcome of the study. The researcher then analyzes the data to determine if there was a difference in the results for the experimental group compared to the control group.

The next type of design is called the pretest-posttest control group design. This design is very similar to the posttest only design except that a pretest is added to the design. The pretest is administered after subjects are randomly assigned to the groups to get an indication of the level of performance of both groups before the experiment is conducted. The pretest has an advantage of determining if there are any significant differences between the experimental and control groups before the study begins. Then the treatment is administered to the experimental group and at the end a posttest is administered to both the experimental group and the control group. Another advantage of the pretest-posttest design is that not only can the researcher determine if there is a difference between experimental and the control group, but also can determine how much of a change or how much growth there was between the pretest and the posttest. This type of design is very desirable in education because we usually want to know not only if there is as a difference between groups but also how much of a change actually occurred or how much growth occurred between the pretest and the posttest.

The only disadvantage of the pretest-posttest control group design compared to the posttest only design, is that there can be a threat to internal validity called the testing threat. As was discussed in an earlier chapter, this threat can occur when there is an interaction between the pretest and the treatment. If the intervention is dealing with an academic outcome, this threat may not be a serious issue. However, the researcher must determine if the results of the study would be just as valid if there had not been a pretest administered. If this is the case, the researcher can be confident in the internal validity of the design and also have the benefit of being able to assess the growth or change of the subjects during the treatment.

The next type of design is a combination of both of the above designs. It is referred to as the randomized Solomon four group design. In this design four