

LESSON
1-3

Practice C

Surveys, Experiments, and Observational Studies

Explain whether each situation is an experiment or an observational study.

1. A school guidance counselor wants to know whether students with older siblings who went away to college are more likely to want to go away to college themselves. She interviews students about whether they have older siblings who went away to college and whether they are planning to themselves.

2. The manager of a grocery store wants to know if a product's location in the store affects how well the product sells. He first tracks how many of a certain item sells over a month when the display is located where it always has been. He then moves the display to the front of the store so customers see it when they first enter. He again tracks how many of the items sell over a month and compares the numbers.

3. A researcher wants to know whether teens in warmer climates tend to be more physically active than teens in colder climates. She randomly selects 100 teens in states with typically colder climates and 100 teens in 3 states with typically warmer climates and surveys them all about their level of activity.

The study described below is a randomized comparative experiment. Describe the treatment, the treatment group, and the control group.

4. A researcher wants to know whether background noise affects people's abilities to complete simple cognitive tasks. She has the 20 people perform a series of tasks. Ten randomly selected subjects perform the tasks in a quiet room. The other 10 perform the tasks in a room traffic noise outside and muffled voices coming from the room next door. She records how successful each group of subjects is in completing the assigned tasks.

5. The transportation department in a city is deciding whether it will save them money in the long run to use a new, more expensive asphalt mixture to pave their roads. Of 6 city roads scheduled for repaving, they pave 3 with the new asphalt and 3 with the old asphalt. After one year's wear, they study the conditions of the roads.

Explain whether the research topic is best addressed through an experiment or an observational study. Then explain how you would set up the experiment or observational study.

6. Will offering access to internet-equipped computers to non-members of a library increase the number of new members?

performance of students in both groups at regular intervals.

7. The treatment (taking a zinc supplement) is both practical and ethical because it is not known to have any negative effects. Perform an experiment. Possible answer: Randomly choose one group of seasonal cold sufferers to give the supplement to. Randomly choose another group of seasonal cold sufferers that are untreated. Monitor the number of colds in both groups at regular intervals.

Practice C

1. Observational study; the guidance counselor gathers data without controlling the individuals or applying a treatment.
2. Experiment; the manager applies a treatment (moving the display to the front of the store) to the subject of the study (the display of items) and compares a characteristic of interest (how well the items sell) before and after the treatment.
3. Observational study; the researcher gathers data without controlling the individuals or applying a treatment.
4. The treatment is *introducing background noise*. The treatment group is the 10 people who completed the tasks while subjected to background noise. The control group is the 10 people who completed the tasks in a quiet room.
5. The treatment is *paving roads with the new asphalt*. The treatment group is the 3 roads that were paved with the new asphalt. The control group is the 3 roads that were paved with the old asphalt.
6. The question is best addressed by an experiment because the treatment (offering non-members access to computers) is neither impractical nor unethical. I would set up the experiment by tracking new library memberships over 3 or more months. Then, I would advertise and begin offering the access to non-members. I would again track new memberships over the number of months and compare the numbers.

Review for Mastery

1. Observational study; the teacher gathers data without controlling the individuals or applying a treatment.
2. Experiment; the park employee applies a treatment (introducing breeding pairs of wolves) to some of the individuals (the park population of animals).
3. Observational study; the researcher gathers data without controlling the individuals or applying a treatment.
4. The treatment (adding a chemical food additive) may be unethical if it causes headaches. Perform an observational study; Possible answer: Randomly choose a number of people and assign them to two groups. One group already consumes food with the chemical additive while the other group does not. Gather data on which group reports more headaches.
5. The treatment in this study is providing students with graphing calculators. The treatment group is *the class that was provided with graphing calculators*. The control group is *the class that was not provided with graphing calculators*.

Challenge

1. Method 1: experiment; Method 2: survey; Method 3: observational study. Method 1 is most reliable; Method 2 and 3 depend on finding farms using the desired fertilizers, and different farms may use different amounts of fertilizer.
2. Method 1: observational study; Method 2: experiment; Method 3: survey. Method 3 is most reliable; Method 1 and 2 require waiting for cavities to develop, which could take years.
3. Method 1: experiment; Method 2: observational study; Method 3: survey. Method 1 is most reliable; Method 2 may not be random, and Method 3 relies on the drivers accurately remembering their battery usage.