

Selecting a Sample for a Quantitative Research Study

Chances are that when you took social studies in high school you were taught how to look up information, but not how to design a research study. You probably learned how to do research in your science classes and learned more about it in engineering and in grad school. However, the type of research you learned was probably experimental research, not observational, and it probably didn't involve people. So how do we design a study in engineering education research (EER)?

In EER there are essentially, broadly speaking, three categories of methodologies: qualitative, quantitative, and mixed methods. In this research snack, let's consider one of the most basic decisions that needs to be made in a quantitative research study: Sampling.

First, we need to decide on our population. What is the population of interest? A single person, a group of students, instructors, a population in a course(s), a curriculum/a, or other groups? Maybe it is all full-time students in 3rd-year chemical engineering, for example. Ideally, we would have the whole population of interest participate in our study, but this may not be practical. So how do we pick a sample? Here are a few common ways that samples are selected:

Simple random sampling: randomly pick a sample from the population. You could draw out of a hat, roll a dice, use a random number generator, etc. (yes, real professional researchers use names in hats).

Stratified sampling: the population is divided into groups (e.g., by engineering discipline) and then a fraction of each group is randomly included in the study. This could be an equal number from each group, or a fraction that is proportionate to the distribution of groups in the population.

Clustered sampling: If the population is clustered (e.g., students in courses), we might choose to include every person in a random set of clusters, (e.g., every student in a randomly selected set of courses – if the courses do not have overlapping enrolments, or the overlap is very small).

Beware of convenience sampling! Convenience sampling is choosing a sample because it is convenient. For example, choosing the students in your own class to survey. This is certainly easy, but it isn't necessarily the best choice. The students in your own class may not be representative of the population of interest that you have identified. They certainly aren't random in any sense, unless your class is the only population of interest.

Identifying your population of interest and a sampling strategy is one step in designing your research study. In future snacks we will explore questions like:

- Do you need the people in your sample to consent to participate? (the answer is “usually, but not always”)
- What are some strategies to encourage participation?
- What if only a fraction of people in your sample agree to participate?

Author: Susan McCahan, University of Toronto

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