



ACTION RESEARCH
SESSION 4.1
SAMPLING METHODS



Objectives

At the end of the session, teachers should be able to:

- 1 Differentiate random and nonrandom sampling procedure in selecting participants for Action Research;
- 2 Describe different random and nonrandom sampling methods; and
- 3 Determine appropriate sampling procedure and sample size for different research questions.



Key Understandings

- 1 Populations are generally large groups of individuals that are the main focus of research.
- 2 Sample from the population is selected for research since it is almost impossible and impractical to study the entire population.
- 3 When samples are carefully and properly selected, findings of research conducted can be generalized to populations from which they are from or populations with similar circumstances.
- 4 Random sampling is the process of selecting research participants from the accessible population in such a way that each member has equal probability of being chosen.
- 5 Sampling in which each member of the population does not have equal chance of being selected is called nonrandom.
- 6 Different research designs and research questions require different sampling methods and sample sizes.

Materials

- laptop
- LCD projector
- manila paper
- marking pens
- masking tape
- scissors
- five instruction sheets for the task under Activity
- five boxes of colored paper clips
- copies of research situation sheets for task under Application
- copies of guide questions for reflection task under Application



TIME ALLOTMENT

120 minutes or 2 hours



References

Mertler, Craig A. (2011) 2014. Action Research: Improving Schools and Empowering Educators. Thousand Oaks, CA: SAGE.

Mills, Geoffrey E. (1999) 2003. Action Research: A Guide for the Teacher Researcher. New Jersey: Pearson.

Introduction

Begin the learning session by saying: “Good _____, everyone. Welcome to today’s LAC session. My name is _____ and I will be your facilitator. We will begin today another section on Action Research, which is data collection methods.

Our focus for now will be sampling methods. In the next sessions, we will talk about four major data collection methods—paper-and-pencil instruments, interviewing, observation, and documents.

Today, it is expected that at the end of this session, you will be able to differentiate random and nonrandom sampling procedure in selecting participants for Action Research; describe different random and nonrandom sampling methods; and determine appropriate sampling procedure and sample size for different research questions.

Activity (15 minutes)

Lead the participants in doing a pre-discussion activity. Observe the following instructions.

- 1 Divide the participants into five groups. Ask the groups to sit together and to choose a moderator. Call on the moderators and brief them on the task.
- 2 Distribute the instruction sheets below and the corresponding materials to the group moderators. Take note that each group will receive a different set of instructions.

Instructions for group 1

Materials: box with colored paper clips, 4-6 paper cups, masking tape, and marking pen

Pour out all the colored paper clips in the box given to you. Count the number of paper clips for each color. Choose five (5) paper clips for each color and put them in separate paper cups. Label the paper cups with the color and the number of paper clips.

Instructions for group 2

Materials: box with colored paper clips, one paper cup, masking tape, and marking pen

From the box of paper clips, select twenty-five ($n = 25$) paper clips without looking at the color. Put these in the paper cup and label the paper cup with the sample size ($n = 25$).

Instructions for group 3

Materials: box with colored paper clips, one paper cup, masking tape, and marking pen

Pour out all the paper clips from the box and arrange them in rows with 6 columns, without any order of color. Then, cut a piece of paper into 6 small sheets. Write the numbers "1" to "6" on each sheet. Pick a number from the sheets randomly. Then, beginning with the first row, pick up the paper clip that corresponds to that number. For example, if you picked the number "4," collect every fourth paper clip on each row. Put the paper clips selected in the paper cup. Label the paper cup with the number of paper clips ($n = \underline{\quad}$).

Instructions for group 4

Materials: box with colored paper clips, three paper cups, masking tape, and marking pen

Pour out all the paper clips from the box and select only the red and the blue ones. Return the rest to the box. Count the number of the red and the blue paper clips then compute the percentage of each. For example, if there are 20 red and 30 blue paper clips, the percentages would be 40% red and 60% blue. Place the red and blue paper clips separately in paper cups. Then, from the two cups, randomly draw twenty ($n = 20$) paper clips following the ratio or the percentage of red and blue. Put the paper clips you select in the third paper cup. Label this paper cup with the number of red and blue paper clips selected.

Instructions for group 5

Materials: box with colored paper clips, one paper cup, masking tape, and marking pen

Pour out all the paper clips from the box and select twenty-five ($n = 25$) green ones. Put these in the paper cup. Label the paper cup with the number and color of the paper clips.

- 3 Make sure that the groups will be able to follow the instructions carefully. Let them know that they may also take photos with their cameras as they follow the instructions and use them for their report later.

- 4 Call on representatives from each group and ask them to describe what they did. Allow all the groups to share what they did. Instruct them to display the paper cups with selected paper clips on a table for everyone to see after each group has presented.

Answer Key:

Group 1—Quota sampling

Group 2—Simple random sampling

Group 3—Systematic sampling

Group 4—Stratified random sampling

Group 5—Purposive sampling

Analysis (10 minutes)

Lead the processing of the results of the activity by asking the participants the following guide questions.

1. Which of the groups do you think did random sampling? (Groups 2 and 4. Group 2 simply selected without looking at the color. Group 4 did the same, except that they made sure the number of red and blue paper clips follow the proportion in the population of paper clips in the box.)
2. What made it “random” sampling? (Every paper clip had equal chance of being selected.)
3. What can you say about what group 1 did? Would you describe that as “random”? (No, because they merely wanted to select a certain number of paper clips for each color. There is no mention about each paper clip being given equal chance of being selected.)
4. What about group 3? (Group 3 lined all the paper clips and chose those that fall in a particular position. This is not random.)
5. What about group 5? (Group 5 selected paper clips of a particular color. This is also not random.)
6. When do we say that sampling procedure is random or not? (When every member of the population has equal chance of being selected, the sampling is random. Otherwise, it is nonrandom.)

Abstraction (45 minutes)

Begin the discussion proper of the learning session by saying: “It is ideal that when we implement an intervention or treatment for a particular problem or issue in or classroom, we can also endorse that intervention or treatment for use by other practitioners facing the same problem or issue. The key to doing this is in the selection of our participants. Before we continue though, let us first define some important terms.”

POPULATIONS AND SAMPLES

Populations are generally a large collection of individuals that is the main focus of a research. Even if an Action Research is intended for a particular group of learners, the general idea is for the findings to be applicable to other groups. Thus, it is of interest to define the population to which the results can be used if the intervention or treatment in Action Research is found to be effective.

Technically, populations are the beneficiary of research findings. It is neither practical nor even possible to implement an intervention or treatment to all learners with the same problems or issues, so it is applied to a small group, usually the students in the classes that we teach.

It is important, however, to try to define our target population. This is the entire group of individuals to which the intervention or treatment might be applied in order to solve the same problem or issue. This target population is also known as the theoretical population, which essentially means that it exists in our mind.

The accessible population is a subset of the target population. It consists of the students within our reach who we can select to participate in our study. This is often referred to as the study population.

The sample is a subset of the accessible population that eventually participates in the Action Research or preliminary study. It is important for the sample to be representative of the population from which it was drawn so that whatever statements are made about them can also be said about the rest. This will enable teacher-investigators to see that whatever intervention or treatment

have been successfully applied has the potential of being useful also for others with the same problem or issue.

RANDOM SAMPLING

When selecting participants for Action Research or for preliminary investigation prior to Action Research, it is ideal to use random sampling methods. These help ensure that the sample is representative of the population.

Random sampling is the process of selecting research participants from the accessible population wherein each member of the subset has an equal probability or chance of being chosen.

The following are the common methods of random sampling.

- 1 Simple Random Sampling. All the names of accessible population are put in one list (or in one box/jar) and are drawn one at a time. Another way of doing simple random sampling is to assign all names with a particular number. Numbers are then drawn one at a time. A table of random numbers may also be used. Names corresponding to the numbers listed sequentially on the table of random numbers are selected as the sample.

NOTE TO THE FACILITATOR:

Demonstrate how to use a Table of Random Numbers.

61424	20419	86546	00517
90222	27993	04952	66762
50349	71146	97668	86523
85676	10005	08216	25906
02429	19761	15370	43882
90519	61988	40164	15815
20631	88967	19660	89624
89990	78733	16447	27932

(Source: <https://researchbasics.education.uconn.edu/random-number-table/#>)

Some computers can generate a set of random numbers. Names corresponding to the numbers generated are then chosen to be part of the sample.

NOTE TO THE FACILITATOR:

Demonstrate how to generate a set of random numbers using the computer.

Example: All names of Grade 10 students in School W are listed alphabetically and assigned a number. Using a table of random numbers, names corresponding to the numbers are selected to join a counseling program to help them prepare for the challenges of Senior High School.

Before proceeding to the next method of random sampling, ask the participants: “Remember what group 2 did? They simply selected twenty-five ($n = 25$) paper clips from the box without looking at the color. That is simple random sampling.”

- 2** Stratified Random Sampling. The accessible population is divided into subgroups (strata), such as males and females. Random sample is taken from each subgroup proportionately.

Example: In the population, 60% are boys and 40% are girls. The names of boys and of girls are placed in separate boxes. For a sample of 30 students ($n = 30$), 18 boys and 12 girls are selected randomly from each subgroup or box. The thirty students will be assigned as corridor monitors to help maintain discipline in the hallways during dismissal time.

Tell the participants: “In our first activity, this is what group 4 did. If you recall, group 4 first selected only the red and the blue ones. Then, they counted the number of red and blue paper clips and computed the percentage of each. They then randomly drew twenty ($n = 20$) paper clips, following the ratio or the percentage of red and blue paper clips.”

- 3** Random Cluster Sampling. Groups, not individuals, are randomly selected. The assumption is that all members of selected groups have similar characteristics. This procedure is suitable when the population is very large or spread over large geographical area. This is also a natural way of sampling in schools because students are grouped into classes.

Example: From each of the 16 divisions in NCR, one section of Grade 12 High School students are chosen to participate in a work program sponsored by a leading manufacturing company to help them develop work and relational skills.

Tell the participants: “If we apply the idea of random cluster sampling to our paper clips, we may say that we have 50 boxes of papers clips. We then randomly choose 10 boxes from them.”

- 4 Two-stage or Multistage Random Sampling. Clusters are randomly selected. From them, individuals are then selected.

Example: Following the earlier example for cluster sampling, one section is selected from each division. Then, in each section, two students (one boy and one girl) are chosen. These students then participate in the work program of the manufacturing company.

Tell the participants: “Applying this to our paper clip example, we first have to do random cluster sampling by selecting 10 boxes from the population of 50 boxes. From each of the 10 boxes, we select 10 paper clips.

NON-RANDOM SAMPLING

In nonrandom sampling methods, members of the accessible population do not have equal chance of being selected.

The following are the methods of nonrandom Sampling.

- 1 Purposive Sampling. Participants are selected on the basis of certain characteristics that they might have, which are crucial to the purpose of the study. Example: A reading remediation is conceptualized as intervention or treatment designed to help Grade 2 pupils who have reading difficulties. The teacher then gives a reading test and selects five pupils who scored lowest. If the scores are indicative of their reading difficulties, then these pupils qualify as participants of the Action Research because the intervention or treatment is intended for them. The participants are selected purposefully or purposively for their characteristics.

Remind the participants about the related task from the pre-discussion activity by saying: “In our paper clip activity, purposive sampling was performed by group 5 who selected only green paper clips. The paper clips were chosen because they possessed a desired quality—the color green.

- 2 Systematic Sampling (with a random start). Before selecting the sample, the members of the accessible population are first organized in some sequence (e.g., alphabetically). The Action Researcher then decides on a periodic interval to be used as guide in selecting participants. For example, he or she might decide to select every fifth name on the list of accessible population. The interval can be computed by dividing the accessible population by the desired sample size. The researcher can also “randomly” choose where to start counting. This method of sampling is advantageous, because it is simple, convenient, and easy.

Example: If there are 50 students and the researcher only wants to involve 10 of them, the interval will be $50/10 = 5$. Therefore, the researcher will choose every fifth name on the list. He or she can randomly select to start with number 2 followed by numbers 7, 12, 17, and so on until all 10 participants have been selected.

Tell the participants: “In our paper clip experience, systematic sampling was performed by group 3. If you recall, the paper clips were first arranged in rows with 6 columns without any consideration for the color. Then, they chose to get every (mention the interval used by the group) paper clip from the first row to the last.”

- 3 Accessible (also known as Accidental or Convenience) Sampling. The sample consists of whoever is present, available, or willing to participate in the Action Research or preliminary study.

Because the sample is not random, and, therefore, may not fully represent the accessible population, there is some challenge to the researcher in terms of generalizing the findings to the population.

- 4 Snowball Sampling. Also known as referral sampling, this type of sampling is usually applied for interviews conducted as preliminary study prior to Action Research. The first interviewee is asked to refer another person who can be interviewed. In doing so, the researcher manages to put together the potential recipients of the intervention or treatment being planned.

Example: Prior to the institution of buddy system to help those who are struggling with Algebra in one Grade 7 class, the teacher-investigator may be curious to find out how prospective participants might respond to the intervention. As a preliminary study, he or she meets up with one prospective buddy who is doing well in the subject and has a pleasant personality. He or she can therefore assist

a classmate who is having difficulties with the subject. The Researcher may ask this prospective buddy for names of classmates who might also be willing to help others as a buddy.

- 5** Quota Sampling. This is the nonrandom or non-probability equivalent of stratified sampling. The sample has the same proportion of individuals from the population according to certain characteristics (e.g., gender).

Example: In a Grade 1 class of 30 pupils, there are 20 girls and 10 boys. If the teacher wants to organize the class into groups of 5, to be headed by one pupil as a way of applying cooperative learning, he/she can just select 4 girls and 2 boys. This is in keeping with the proportion of girls and boys in the class who exhibit leadership and initiative, and who are quite popular among their peers. The selection does not necessarily have to be random.

SUGGESTED SAMPLE SIZES

There is an ideal sample size that is recommended to enable us as researchers to apply statistical tools for the purpose of making general statements about an intervention or treatment. Such general statements will allow us to apply the intervention or treatment to other groups with similar problems or issues.

The following are the sample sizes recommended depending on the research design.

- 1** Experimental and Causal-comparative research (Ex-post facto)
—at least $n = 30$ for each group by the time the experiment finishes; therefore, it is good to include more than 30 at the beginning of the study
- 2** Correlational studies
—at least $n = 50$, preferably random
- 3** Surveys
—at least $n = 100$, preferably random
- 4** Qualitative studies
—sample size can be as small as $n = 1$ (as in case studies); might have to be purposive depending on the research question
—If more than $n = 1$, maximum variation recommended (e.g., as varied as can be to obtain a full picture of the phenomenon)

Take note of this rule of thumb: The smaller the population, the larger should be the sampling ratio (e.g., the ratio of the sample size to the population size).

ETHICAL CONSIDERATIONS

Below are the ethical considerations in the conduct of sampling.

1. Informed Consent

Prior to selecting and including any student as participant in an Action Research or preliminary study, one must first seek permission from the adults who have been entrusted with their care and protection. This might mean asking parents or guardians to allow their wards to be part of the study, particularly when an intervention or treatment is to be applied or when sensitive information will be sought from or about them. The permission of the principal or head of the school may also be required. An informed consent signed by the parent or guardian may suffice for research purposes. However, this might have to be sought way ahead of time before commencing the Action Research or preliminary study.

2. Right to Privacy

Each student has a right to privacy. Any information about him or her or any response obtained from or about him or her must be kept confidential. The researcher may have secured their consent and permission prior to collecting data from students. However, this does not mean that he or she is at liberty to divulge their identities and whatever data was elicited from them. All information must be kept in utmost confidentiality. Raw data must be kept under lock and key and names of students must be replaced by code names or code numbers. It is the duty of the researcher to ensure that the privacy of each student is honored and maintained.



Application (30 minutes)

As a way of putting to use what have just been discussed, have the participants do the following activity.

- 1 Ask the participants to get together again with the group formed for the first activity. Pause as they sit together in their own small groups.
- 2 Give each group an Action Research situation. Ask them to formulate a research question and a corresponding research hypothesis for the situation given. Have them decide on what research design would be appropriate to answer the research question.

- 3 Following their chosen research design, ask the participants to plan the sampling procedure and the sample size for the study. Have them use the format given to them. Ask them also to prepare a poster for their group output. Give them 20 minutes to do everything.
- 4 After 20 minutes, ask the groups to present their output. Ask the participants if they have any questions after the presentation. Respond to the questions briefly and accordingly.

Research Situation 1: Differentiated Instruction

To help struggling pupils in his Grade 4 Math Class, Teacher A is planning to use differentiated instruction. He first groups the pupils into three learning cells: advanced, average, and developing. He plans to provide different activities for each group and to divide the class time so that he can meet each group separately for discussions. His purpose is to make sure that all pupils meet the minimum required competencies in Math while at the same time, encouraging those who are doing well with challenging tasks.

Research Situation 2: Learning Centers

Teacher B reads about the positive effects of organizing classrooms into learning centers or learning nooks. For her Grade 2 Reading class, she plans to set up four such learning centers in the coming month: a Science and Health Center, a History Center, a Math Center, and a Literature Center. She intends to interview several students regarding their perceptions about the different learning centers.

Research Situation 3: Multiple Intelligences

To help his Grade 9 students take interest in Physics, Teacher C has been thinking about using multisensory instruction, a method that links lessons to what students see, hear, and feel, as well as how they move. He is convinced that when students learn using all of their senses, they remember the lessons better. This is an approach that uses Gardner's Theory of Multiple Intelligences. Prior to instituting the instructional method though, he is thinking of assessing the type of intelligences that his students have.

Research Situation 4: Math Achievement and Reading Comprehension

Teacher D has long suspected that the reason why some Grade 6 pupils get low scores in Math is because they have reading difficulties. She is thinking of offering tutorial sessions after class to help pupils read through word problems in Math. However, she wants to make sure that her suspicion is supported by hard facts before she provides the tutorial sessions.

Research Situation 5: Determinants of Achievement

For many years, Teacher E has noticed that there are more female than male students in the honor roll. He wants to see more male students excel in school. Not wanting to sound biased, he is thinking of giving a questionnaire on study habits and attitudes to male and female Grade 10 students. Finding out the differences in these habits and attitudes can probably explain the seemingly higher academic achievement among female than male learners.

After the group task, ask the participants to think about a topic for their own Action Research. Have them answer the following questions about sampling in their journal.

1. Problem or issue in my classroom (Describe briefly):

2. Action Research question:

Research hypothesis:

3. Research design (Identify the design and describe the procedure that you will follow to execute the design):

4. Sampling:

(a) Accessible population (Describe briefly the group of students from whom you will select your sample):

(b) Sampling method (Identify the sampling method you will use and explain why):

(c) Sample size (Give the number of students who will participate in your Action Research and justify this number):

Closing (5 minutes)

Conclude the learning session by saying: “Thank you for your attention and participation in today’s LAC session. In the next LAC sessions, we will be discussing data collection methods. Do read up on the four major techniques for collecting data: paper-and-pencil instruments, interviewing, observation, and documents. Goodbye for now and see you again soon.

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BEST Basic Education Sector Transformation



BEST is supported by the Australian Government