

ACTION RESEARCH
SESSION 3.4
DESIGNING
CORRELATIONAL
RESEARCH FOR
ASSESSING THE
SITUATION

(STAGE 1 OF THE ACTION RESEARCH FRAMEWORK)



Objectives

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

- 1 explain the important features of correlational research as tool for preliminary investigation prior to Action Research;
- 2 describe the procedures for collecting and analyzing data to provide information for correlational research; and
- 3 apply the correlational research design for “Assessing the situation” (stage 1 of the Action Research Framework) prior to the implementation of an intervention for Action Research.



Key Understandings

- 1 Correlational research, classified also as an associational research, is a research method that can be used in the preliminary assessment of a situation before a practitioner initiates an Action Research.
- 2 It examines the nature of relationships between or among variables, a predictor variables (X) and a criterion variables (Y), also referred to as the outcome variables.
- 3 Both variables have to be continuous variables (e.g., must range from a low to a high level). They must either be interval or ratio scales. However, ranks or dichotomous (two levels, like “correct-incorrect”) may also be used, if these are the only measures of the variables of interest.
- 4 The statistical analysis applied on data collected for correlational research is the correlation coefficient. The most popular of which is the Pearson product-moment correlation coefficient.

Materials

- laptop (preferably with Excel add-on application or any licensed statistical software such as SPSS)
- LCD projector
- lecture materials, preferably on slides
- graphing paper, 6 to 10 sheets
- manila paper or poster paper for groups to show scatterplots



- manila paper or poster paper to be used by groups for task under Application
- pens and pencils
- marking pens
- masking tape
- copies of data sets for three groups for Activity
- pictures of different types of scatterplots, showing linear, curvilinear, positive, negative and zero relationships
- copies for participants of worksheet for task under Application



TIME ALLOTMENT

120 minutes/ 2 hours



References

Fraenkel, JackR. and Norman E. Wallen. (1990) 2003. How to Design and Evaluate Research in Education. Boston, MA: McGraw-Hill.

Introduction

Begin the learning session by saying: “Good _____, everyone. I am _____, your LAC facilitator. We will be continuing our discussions on Action Research. For today, we will particularly be learning about correlational research design.

The purpose of correlational research is to describe the nature of relationships between or among variables. This knowledge helps practitioners understand problems and issues well enough to be able to identify an intervention or treatment that might solve them.

Suppose you hypothesize that the amount of study time students have is related to test performance. You first ask the students in your advisory class to record the amount of time they spend doing homework at home everyday. You collect this information everyday at the beginning of each class. After a month, you give them a long examination. Suppose, you compute a correlation coefficient for the two variables and find out that it is 0.70. The relationship between study time and test performance is moderate and direct; the more hours spent studying, the higher the test score.

Having found this, you plan on implementing a 30-minute in-class study time for your advisory class to allow students to get started with their assignments even while in school. You intend to show that additional study hours will greatly improve academic performance.

At the end of this section, you are expected to be able to explain the important features of correlational research as preliminary investigative tool prior to Action Research; describe the procedures for collecting and analyzing data to provide information for correlational research; and apply the correlational research design for 'Assessing the situation' given classroom problems or issues."

Activity (15 minutes)

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

- 1 Divide the participants into three groups by asking them to count off from one to three. Ask the participants with the same numbers to sit together to be able to form the three groups. Have each group choose a moderator and a rapporteur.
- 2 Distribute data sheets containing data for two variables and ask the groups to describe the relationship between them. You may say that these are data of ten ($n = 10$) Grade 7 students on four variables—daily study hours, daily meal hours, daily leisure hours, and test score. Given only one pair of variables for each group to examine.

- 3 Distribute graphing paper and pencils together with the data given earlier. Ask the groups to plot the data given to them using the graphing paper. If anyone from the groups know how to compute a correlation coefficient (a measure of the linear correlation between two variables) using their laptop, you may allow them to do so. Give them 15 minutes to complete this task.
- 4 Once the groups are done, ask them to draw the plot they created on manila paper or poster paper. Have the groups' output posted on designated places on the board. Arrange the posters in such a way that the negative correlation is on the left-most, followed by the zero correlation in the middle, and the positive correlation on the right-most part of the board.

DATA SET 1

ID	DAILY STUDY HOURS (X)	TEST SCORE (Y)
1	4	12
2	2	6
3	3	8
4	2	7
5	3	12
6	3	9
7	4	13
8	5	14
9	3	8
10	1	10

DATA SET 2

ID	DAILY MEAL HOURS (X)	TEST SCORE (Y)
1	3	12
2	2	6
3	2	8
4	3	7
5	4	12
6	2	9
7	1	13
8	2	14
9	2	8
10	1	10

DATA SET 3

ID	DAILY LEISURE HOURS (X)	TEST SCORE (Y)
1	2	12
2	6	6
3	4	8
4	5	7
5	3	12
6	2	9
7	1	13
8	2	14
9	2	8
10	1	10

Analysis (10 minutes)

Proceed to the processing of the outcome of the activity by observing the following instructions and asking the following guide questions. Say: “Let us describe each of the scatterplots you created. First, let us discuss data set

1 Group _____, please explain your work.” Allow the group’s moderator or rapporteur to explain the scatterplot then ask the following:

1. What can be said about the relationship between study hours and test scores? (It is positive or direct.)
2. What does a positive or direct relationship between two variables mean? (As one variable increases, the other variable also increases; the more time a student spends studying, the higher his or her test scores will be.)

Move on to the next group by saying: “Now, let me ask Group _____ to discuss their work.” Allow the moderator or rapporteur to explain the scatterplot then ask the following:

- 1 How would you describe the relationship between leisure hours and test scores? (It is negative or inverse.)
- 2 What does it mean if the relationship between two variables is negative or inverse? (As one variable increases, the other one decreases; the more time a student spends on leisure, the lower his/her test score is.)

Proceed to the last group by saying: “And now, let me ask Group _____ to present their scatterplot.” Allow the moderator or rapporteur to explain then ask the following:

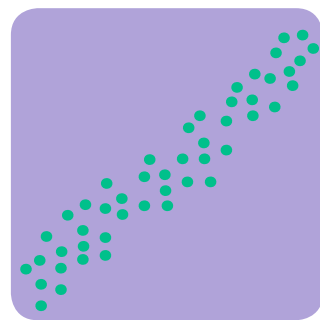
- 1 What can be said about the relationship between meal time and test scores? (There is no relationship between the amount of time spent eating and test scores.)
- 2 What does it mean when the relationship between two variables is zero? (The increase or decrease in one variable has no effect or influence on the increase or decrease of the other variable; test scores is not related to the time spent eating.)

Abstraction (40 minutes)

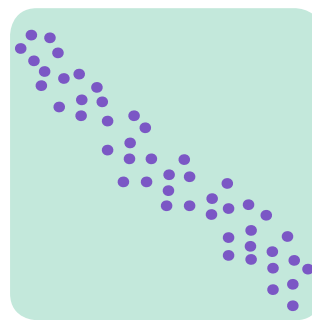
UNDERSTANDING CORRELATIONAL RESEARCH

Correlational research is a type of research design that focuses on describing the nature of relationship between two or more variables. Unlike experimental research, there is no manipulation of variables in correlational research. Also, compared to causal-comparative research, there is only one group studied, but measured on two (or more) variables.

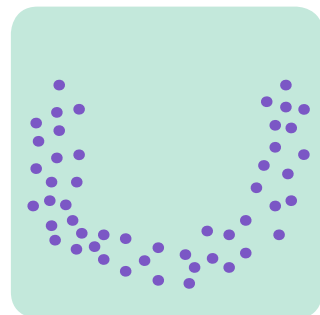
Technically, there is neither independent variable nor dependent variable in correlational research; that is because it is not the purpose of this research design to specifically describe a causal (cause-effect) relationship (the distinct purpose of experiments). Instead, the variables are referred to as predictor variable (X) and criterion variable (Y).



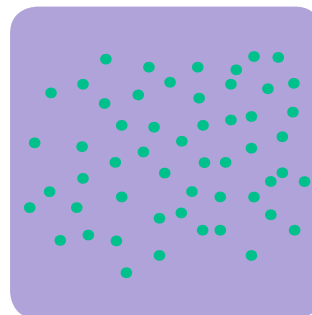
Positive Linear Association



Negative Linear Association



Nonlinear Association



No Association

Relationships between two variables in a correlational research may be described as linear or nonlinear/curvilinear. This can be seen from a plot of the two variables against each other. The resulting figure, called scatterplot, shows whether an increase in one variable means a corresponding increase or decrease in the other variable; in which case, we ought to visualize a line running through the points. Some relationships, however, may be nonlinear, or curvilinear, which means that an increase in the value of one

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variable does not necessarily lead to a corresponding increase or decrease in the value of the other. The following are examples of linear and curvilinear scatterplots.

Research questions for correlational research may be stated in this way: “What is the nature of the relationship between variable X (predictor variable) and variable Y (criterion variable)?”

DESCRIBING RELATIONSHIP BETWEEN VARIABLES

The relationship between variables has two aspects, intensity and direction. Intensity refers to the strength of the relationship. Some variables have strong relationships; others have weak. Direction refers to how the variables covary—direct or inverse. Direct relationship, on the one hand, occurs when one variable X increases and the other variable Y also increases, and vice versa. For example, the more hours spent in studying, the higher the student achievement, and vice versa. Inverse relationship, on the other hand, happens when one variable X increases, but the other variable Y decreases, and vice versa. For example, the longer the time spent for leisure, the lower the achievement, and vice versa.

In answering the correlational research question “What is the nature of the relationship between variable X (predictor variable) and variable Y (criterion variable),” one can describe the intensity and direction of the relationship in this way: “There is strong direct relationship between variable X and variable Y.”

SAMPLING METHOD

It is desired that sampling be randomized if the population is large enough for the teacher-investigator to do so. However, since correlational research is preliminary to an Action Research, the teacher may decide to use either purposive or accessible sampling (e.g., selecting the students that are available to give the data needed). It is recommended that a minimum sample size of fifty ($n = 50$) students be followed for correlational research.

DATA COLLECTION METHODS

Data for correlational research can be collected using tests, rating scales, and other paper-and-pencil instruments. Data that are already available in the teachers’ class



records are also useful for correlational research as preliminary investigation prior to Action Research. Records found in the Guidance Office may also be included for analysis, provided that permission has been granted for their use.

DATA ANALYSIS TECHNIQUES

Data for correlational research can be analyzed using the following basic techniques.

- 1 Scatterplot. Also known as scatter graph, scatter chart, scattergram, or scatter diagram, the scatterplot is a type of plot or mathematical diagram using Cartesian coordinates to display values for two variables, one on the X-axis and the other one on the Y-axis. Each point represents a “cross-point” for one person on the two variables. Initially, a scatterplot is almost always necessary to give the reader an idea of the relationship between the variables of interest.
- 2 Correlation Coefficient. The Correlation Coefficient is a measure of the linear correlation between two variables. It takes values from 0.0 (no relationship) to 1.0 (perfect relationship). Most correlational research will yield a correlation coefficient between 0.0 and 1.0. The numerical value of the coefficient indicates the intensity of the relationship, while the sign (positive or negative) signifies its direction.

The following is a table for interpreting values of correlation coefficients.

Intensity	Direction
<ul style="list-style-type: none">• 0.1 to 0.3—Weak Relationship• 0.4 to 0.6—Moderate Relationship• 0.7 to 0.9—Strong Relationship	<ul style="list-style-type: none">• Positive—Direct: as X increases, so does Y• Negative—Inverse: as X increases, Y decreases

- 3 Pearson Product-Moment Correlation Coefficient. This is a measure of the strength and direction of association that exists between two variables measured on at least an interval scale. This is used when both variables are continuous (e.g., test scores).
- 4 Spearman Rho Coefficient. This is a nonparametric measure of correlation of ranks. This is applied when both variables are ranks, not continuous scores.



Application (30 minutes)

Lead the participants in applying what they have learned so far by saying: “Now that we have learned the important features of correlational research, let us see if we can formulate correlational research questions and plan for data collection and analysis.” Proceed by observing the following instructions.

1. Ask the participants to sit together in small groups with four to five members each.
2. Distribute the following worksheet. Read the instructions together with the participants.

WORKSHEET ON CORRELATIONAL RESEARCH

Directions: From the table below, choose two variables that you think should be explored prior to an Action Research. Formulate a research question then plan how participants will be collected and what data will be collected from them and how. Decide also on the appropriate data analysis technique to be used in answering the research question.

Write your responses on the manila paper provided. Once you are done, put them up on the board for presentation.

PREDICTOR VARIABLES	CRITERION VARIABLES
<ul style="list-style-type: none">• entrance test scores• grades in any subject or average in any grade level in Elementary• scores on an Academic Self-Concept Scale (ASCS)• scores in diagnostic test• scores on an any subject in Elementary	<ul style="list-style-type: none">• average for all four years of Junior High School• final grades in any subject or final average in any grade level in High School• scores in final examination in any subject• test scores in any subject in High School

1. Correlational research question
2. Draw your idea of how the Scatterplot for the two variables might look.
3. Sampling procedure and sample size
4. Data collection method for two variables
5. Data analysis to answer research question
6. Tentative answer to the research question
7. Possible conclusion and recommendation for Action Research

3. Give the groups 30 minutes for groups to finish this task. After that, instruct them to post their output on the board then ask one representative for each group to read aloud and explain their ideas one at a time. Be sure to correct any misinformation or wrong entry in the groups' output.
4. Lead the processing of the result of the participants' output by asking the following questions.
 - a. What have you noticed about the types of research questions that are formulated for correlational research? (They ask about the nature of relationships between variables, the amount of variance in variable that is explained by another, the possibility of using one variable to predict another. They are descriptive in nature.)
 - b. Do these questions hypothesize that one variable is the cause and the other, the effect? (No, they do not. They merely ask about descriptions of the relationship between variables; these relationships are not necessarily causal.)
 - c. What purpose does correlational research serve in conducting Action Research? (It is used as preliminary study in "Assessing the situation" [stage 1 of the Action Research framework], which can then lead us to the development and implementation of an intervention or treatment for an Action Research.)
 - d. What does it mean for us as Action Researchers when we find that certain variables are related? (It means that the two variables go together; where we observe one variable, we will most likely observe the other variable too.)
 - e. If two variables have a strong relationship, is it possible that that relationship is causal and, therefore, one of the two variables can be used as an intervention or treatment in an Action Research? (Yes, this is possible.)
 - f. Can you think of two variables in the group presentations today or in the list of variables in the worksheet that can be related in a causal way? Which variable might be the cause and which one might be the effect? Can you think of how you might implement the causal variable as an intervention for Action Research?

Closing (5 minutes)

End the learning session by saying: “We certainly had a rather long but very enriching LAC session today, didn’t we? Are there any questions?” Respond to the participants’ questions briefly. For questions that require lengthy discussion, suggest that they write them down in their Action Research journals and try to answer them.

Proceed with your ending spiel by saying: “Thank you for your active participation today. We have one more LAC session on research designs, which would be about survey research. Goodbye for now and see you next time.”

Prepared by:

JEOFFREY L. BERNABE

Facilitator

Planning, Policy and Research Division

Department of Education-Region XI

Edited by:

FE' JOSEFA G. NAVA, PhD



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