ACTION RESEARCH

SESSION 5.1

PREPARING DATA FOR ANALYSIS

Objectives

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

1. identify documents and materials that can be used as data or sources of data;
2. differentiate primary and secondary sources;
3. justify the importance of external and internal criticism when using documents and materials as data or sources of data;
4. explain the ethical considerations when using documents and materials as data or sources of data; and
5. select documents and materials that can serve as data and/or major sources of data according to Action Research topics.

Key Understandings

1. Documents and materials can be used as data and/or sources of data.
2. There are primary and secondary documentary and material sources. Each of these should undergo both external and internal criticism prior to inclusion as data and/or source of data for the Action Research.
3. Ethics should be observed when using documents and materials as data and/or sources of data.

Materials

- Laptop
- LCD projector
- Marking pens
- Manila paper
- Masking tape
- Metacards
- Samples of documents for the task under Activity (e.g., student's notebook in Math showing computations, student's diary, letters

written by students and/or by parents to children who are students, portfolio with self-reflection page, teacher's old record book, teacher's lesson plan or lesson guide, minutes of a faculty meeting, chool Improvement Plan or School Development Plan, school records of latest LAPG, PHIL-IRI, or NAT scores, and photocopies of a page from each of these documents)

- Copies of the worksheet for the task under Activity
- Copies of the table for the task under Application
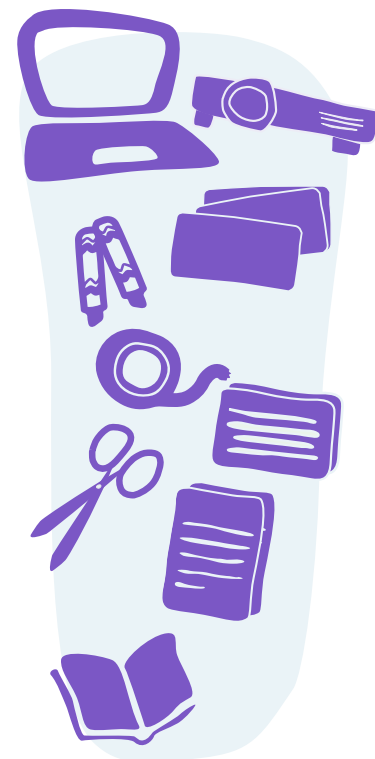
⏰ APPROXIMATE DURATION
120 minutes/ 2 hours

📖 References

Department of Education. 2017. Supplemental Research Guides and Tools. DM 144, s. 2017.

Santiago Canyon College. n.d. Identifying Primary and Secondary Sources. Santiago Canyon College (website). Accessed _____. https://sccollege.edu/Library/Pages/primarysources.aspx

McKernan, James. (1991) 1996. Curriculum Action Research: A Handbook of Methods and Resources for the Reflective Practitioner. London: Kogan Page.

Mills, Geoffrey E. (1999) 2017. Action Research: A Guide for the Teacher Researcher. Boston: Pearson

Introduction

Begin the learning session by saying: "Good day, teachers! I would like to welcome you to today's LAC session. In this session, we will be focusing on the use of documents and related materials as data and/or sources of data. I have

Objectives

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

1. name the four levels (scales) of measurement of data;
2. identify important considerations about the nature of data prior to their preparation for analysis;
3. develop coding guide given a set of data; and
4. encode data following the coding guide prepared.

Key Understandings

1. Measurement is the process of assigning numbers to variables.
2. The four levels (or scales) of measurement are nominal, ordinal, interval, and ratio.
3. The coding guide (or codebook) is key to the efficient and orderly process of encoding data to facilitate analysis.
4. Data sorting and cleaning are also necessary in preparing data for analysis.

Materials

- Laptop
- Pencil and paper
- MS Excel
- Record of recent test scores in your subject area
- LCD projector
- Four metacards with the words "Nominal," "Ordinal," "Interval," and "Ratio"
- At least fifteen (15) metacards each with the name of a variable such as gender, age, height, weight, grade level, test score, sibling rank, parent's occupation, family income, place of residence, class rank, and career track

- Copies of the sample coding guide
- Poster or slide presentation of the sample coding guide
- Sample qualitative data encoding
- Copies of data sheet on Math quiz scores for the task under Application on coding guide and data coding

TIME ALLOTMENT
120 minutes or 2 hours

References

Creswell, John W. (1994) 2009. Research Design: Qualitative, Quantitative, and Mixed Methods Approach. Thousand Oaks, CA: SAGE Publications.

Taylor-Powell, Ellen and Marcus Renner. 2003. Analyzing Qualitative Data. Madison, Wisconsin: University of Wisconsin-Extension: Program Development and Evaluation.

Business Dictionary. n.d. "Data Analysis." Business Dictionary (website). Accessed May 12, 2018. http://www.businessdictionary.com/definition/data-analysis.html.

Introduction

Begin the learning session by saying: "Good _____, everyone. Welcome to another exciting LAC session on Action Research. I am _____, your LAC facilitator for today's session. We will be focusing on the levels or scales of measurement and the preparation of coding guide or codebook for quantitative data. We will also be talking about the important considerations in preparing data for analysis and the parts of a coding guide.

At the end of this session, you are expected to be able to name the four levels (scales) of measurement of data; identify important considerations about the

nature of data prior to their preparation for analysis; develop a data coding guide for a given set of data; and encode data following the coding guide that you prepared.

Before we proceed to our pre-discussion activity, let us first review the levels of measurement. In order to analyze data using statistical tools, we have to quantify or assign numbers to them. The process of quantifying or assigning numbers to data is called measurement.

There are four levels of scales of measurement, namely, nominal, ordinal, interval, and ratio. (Note to the facilitator: It will be good if you would post the names of the levels on the board as you discuss each one of them. Begin with the metacard for the term "Nominal" and end with the one for "Ratio.")

In the nominal level, numbers are used for labeling. In the ordinal level, numbers not only serve as label, but also indicate some kind of ranking. In the interval level, numbers represent equal intervals between values and have an arbitrary zero value. Therefore, the variable can take both positive and negative values. Finally, in the ratio level, numbers are used for labeling, indicate some kind of ranking, represent equal intervals, and have an absolute or true zero value. In ratio level, a value of zero means the complete absence of the trait. This implies that there are no negative values for the variable.

Note to the facilitator: You may have to review the specific features of each level or scale of measurement before moving on to Activity."

Activity (10 minutes)

Proceed to the pre-discussion task by saying: "Now, let us see if you can classify variables according to the levels or scales of measurement that we just reviewed. I will be distributing metacards with names of variables in them. I want you to place them under the appropriate level or scale of measurement as shown on the board."

Divide the participants into groups with at least three members each. Distribute the metacards with names of variables in them to the groups and give them 10 minutes to complete the task.

Analysis (10 minutes)

Lead the processing of the result of the group task on levels or scales of measurement by asking the participants the following guide questions.

1. How did you decide where to categorize the variables? (By imagining the values that the variables might have; If the values are just to label categories of the variable, the variable is nominal; If the values indicate some kind of ranking, the variable is ordinal; If the values have equal intervals but the zero is arbitrary and there are both positive and negative values, the variable is interval; If the variable has an absolute zero value, it is ratio)
2. Look at the levels or scales assigned to the variables. Is there a variable that you think is not categorized correctly? Which variable is this? What should be its correct level or scale?
   Note to the facilitator: Discuss the correct level for the variable/s in question.
3. Can a variable have different levels or scales of measurement? (Yes. For example, family income may have ordinal and ratio levels. If categories such as "less than 10,000", "10,000-20,000", etc. are used, the level is ordinal, but if we ask for the amount of family income, then the variable assumes a ratio level.)

Abstraction (50 minutes)

PRELIMINARY SORTING AND CLEANING OF DATA

Before encoding quantitative or qualitative data for analysis, we must first sort them to ensure that only those that will be useful for analysis are encoded. For instance, when we administer questionnaires to large groups of students, some

respondents may simply write their names but not answer the questionnaire (called nonresponse), or may respond to only a few items they choose randomly (called incomplete response). We need to exclude these questionnaires and properly dispose of them so that only those complete ones will proceed to encoding. As much as possible though, we should not have to exclude any data. In the case of questionnaire, we can do this by making sure that respondents answer all questions or items. We can simply look over the questionnaires as respondents turn them in and call the attention of those who have skipped some items to complete them.

Once encoding has been completed, we will also have to go through the process of "cleaning" the data. This refers to the process of modifying or removing data that are incomplete, incorrect, replicated, or entered in a wrong format. We need to ensure that information encoded from responses of research participants are correctly and accurately encoded. It may happen even to the best data encoder that a wrong entry is made for a data point. We need to find out which data point/s is/are erroneously entered and make the correction before the data are subjected to analysis. One example of this is by inspecting so-called "outliers." These are extreme values (either too high or too low) that seem to be impossible. Quickly inspecting the data encoded one variable at a time will reveal these outliers. We then can refer back to the original questionnaire and examine if the encoded data point is accurate. If it is, we can just let it stay as outliers do exist. However, if it is not accurate, then the correction must be made right away. The corrected file must then be saved anew.

THE CODING GUIDE OR CODEBOOK FOR QUANTITATIVE DATA

Coding of quantitative instruments or items is done on a spreadsheet. For this reason, we have to be specific which variable is entered in a particular space on the spreadsheet. Let us say that we have the following data about a group of twenty (n = 20) students.

TABLE --. Sample Data

ID Number	Gender	Score in English Test
1	Male	7
2	Female	9
3	Male	9
4	Male	8
5	Female	8
6	Male	10
7	Male	7

8	Female	7
9	Female	8
10	Female	7
11	Male	9
12	Female	10
13	Female	11
14	Female	14
15	Male	12
16	Female	8
17	Male	8
18	Male	9
19	Female	10
20	Male	9

The data should be entered on a spreadsheet. But how should these be encoded? For this, we turn to the coding guide or codebook for instructions.

The coding guide or codebook is a table that shows which variable is found in a particular column on a spreadsheet (see Table 1). It also indicates the values that a categorical variable takes and the level or scale of measurement for each variable. These information guide the researcher in deciding what statistical techniques are meaningful for the variable. The coding guide is particularly important for instruments that have quantitative information.

In the sample coding guide below, ID number, which has a nominal level or scale of measurement, is entered under column 1. This is followed by gender of the student in column 2. There are two values for this variable: "1" for male, and "2" for female. The variable also has a nominal level of measurement. The variable under column 3 is score, which has a ratio level of measurement.

TABLE 1. Sample Coding Guide for Quantitative Instruments/Items

Column Number	Variable	Variable Label	Value	Value Label	Level of Measurement
1	ID	ID number	as is		nominal
2	gender	gender	1	male	nominal
			2	female	
3	score	test score	as is		ratio

ENCODING QUALITATIVE DATA

Analysis of qualitative data obtained from open-ended questionnaires, interviews, observations, and documents does not involve statistical techniques so encoding these is simpler and more straightforward. Responses are encoded word-for-word (verbatim) according to each item number. Each response is then tagged by a code number for its source (see Table 2). The format below is an alternative to the one shown in the Teachers' Guide.

TABLE 3. SAMPLE ENCODING FOR QUALITATIVE DATAResponses to Question 1. Ano ang dahilan ng iyong pagtigil sa pag-aaral?	
ID	Response
1	Kailangan kong tulungan ang tatay ko sa bukid.
2	Nagkasakit po ang aking nanay at inalagaan ko siya.
3	Wala akong pamasahe papunta sa paaralan.
4	Mahirap maglakad sa putikan. Naglalakad lang kasi ako.
5	Natatakot ako sa aking guro. Pinapagalitan kami lagi.

Application (60 minutes)

Lead the participants in applying what they have learned about the important considerations in preparing data for analysis by doing the following activity. Observe the directions given.

1 Ask the participants to pair up. Remind those who do not have laptops to pair up with someone who has.

2 Distribute copies of the following data sheet to the participants

DATA SHEET: Math Quiz Scores of Twenty Grade 9 Students in a Remedial Program

Section A		Section B	
Male	Female	Male	Female
7	10	5	6
8	9	6	7
7	8	6	7
8	8	5	6
7	9	4	6

3. First, you will be creating a coding guide or codebook for quantitative data, and then you will be entering the data following the coding guide you created. Guide them by helping them understand the data first by asking this question: What variables can you find in the data sheets? (Three variables: gender, section, and score.)

4. Once the participants have already identified the variables in the given data, remind them that they have to assign a particular column for each of these in the spreadsheet. Tell them that they may follow the format of the sample coding guide presented earlier. Give them 15 minutes to construct the coding guide for the data provided. They may use their laptops to do the task.

5 Ask the participants to raise their hand once they are done to allow you to inspect their work. After you have checked their coding guide, instruct them to proceed to data coding. Give them 20 to 30 minutes to accomplish this task. Move around the room and check the work of each pair. Their outputs should look like the following coding guide. Some teams may enter section before gender. This is also correct.

TABLE ---. Coding Guide for Math Quiz Data

Column Number	Variable	Variable Label	Value	Value Label	Level of Measurement
1	ID	ID number	As is		Nominal
2	Gender	Gender	1	MALE	Nominal
			2	FEMALE	
3	Section	Section	1	Section A	Nominal
			2	Section B	
4	Score	Test Score	As is		Ratio

The encoded data should look like the following spreadsheet output.

TABLE ---. Encoded Math Quiz Data

ID	Gender	Section	Quiz Score
1	1	1	7
2	1	1	8
3	1	1	7
4	1	1	8
5	1	1	7
6	2	1	10
7	2	1	9
8	2	1	8
9	2	1	8

10	2	1	9
11	1	2	5
12	1	2	6
13	1	2	6
14	1	2	5
15	1	2	4
16	2	2	6
17	2	2	7
18	2	2	7
19	2	2	6
20	2	2	6

6 When every pair has completed data coding, call them together. Request at least two pairs to present the coding guide that they developed. Then, call on another set of pairs to show the spreadsheet with the data encoded. After that, ask the rest of the participants if they have any questions? Be ready to respond to them.

Closing (10 minutes)

Conclude the learning session by saying: "Congratulations, dear colleagues! You now know how to prepare a coding guide and how to encode data following it. You are now ready for the next step of preparing Action Research, which is analyzing data. Thank you for being enthusiastic and participative today. Remember that you should always be 'extra' ordinary in doing ordinary things.

Take note that our specific topic for our next LAC session is quantitative analysis, more specifically, descriptive statistics. We will be using MS Excel for the computations so please bring your own laptops; if possible, with the MS Excel ToolPak installed. If you don't know how to install it, I will assist you. Just bring a laptop that you can use. Also, please bring any set of data, either your class record (already encoded in an MS Excel spreadsheet, if possible) or any data about your school or division taken from the EBEIS. Download the data and save it in your laptop. Our next LAC session is tentatively scheduled on (give day, date, time and place).

Goodbye, everyone!"

Final Review by:

Fe' Josefa G. Nava

Fe' Josefa G. Nava, Ph.D.

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Prepared by:
JUMAR M. SADSAD
Education Program Specialist II
Policy Planning and Research Division (PPRD)
Department of Education–Region **IV-A**

Edited by:
FE' JOSEFA G. NAVA, PhD

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