

THE EVALUATION CORNER

By Kyaw Soe, PhD, Scott Keir, PhD,
Charles Giulli, PhD, Eunice Brekke

Using Data for Improved Decision Making in Education

At the Pacific Educational Conference (PEC) held in Honolulu, Hawai'i on July 9–12, 2007, several research and evaluation staff from PREL's Center for Accountability, Research, and Evaluation (CARE) offered a workshop on "Using Data for Improved Decision Making." The purpose of the workshop was to:

- Describe different types of data.
- Demonstrate useful ways to analyze data.
- Discuss some of the challenges in collecting and analyzing data.
- Provide some practical examples of improving the quality of data.

This article describes the topics and issues discussed during that presentation.

Data Types

Data driven decision making is part of a continual process to improve our schools. Data can describe student characteristics, student performance, teacher skills and knowledge, and overall school characteristics. For example, by using data, we can better understand what students are learning (and not learning), what teachers are teaching (and not teaching), what can be done to improve student achievement, and what community characteristics influence students and schools. Many different kinds of data can be used to assist in decision making in the area of education, including:

- Demographic data: age, gender, income level, language.
- Program and curricula data: enrollment, implementation, use of standards.
- Achievement data: norm referenced and/or criterion referenced.
- Aptitude data: vocational, interest.
- Perception data: community perceptions and satisfaction with the educational system or school.

There are four basic types of data:

- Categorical: Names of schools and names of ethnic groups are examples.

- Ordinal: Measures that have order or ranking. For example, ratings such as "poor," "good," or "excellent" have order.
- Interval: Numbers that have equal intervals, but no zero. Such numbers can involve addition and subtraction operations, but not multiplication or division.
- Ratio: Numbers with absolute zero are of ratio type. Ratio numbers can involve all arithmetical operations—addition, subtraction, multiplication, and division.

In order to be interpreted, data have to be analyzed. There are two approaches to analyzing data—qualitative and quantitative.

The quantitative approach to data analysis might be described as asking, *How much?*, or *How many?*. In education, quantitative approaches often involve frequencies, percentages, central tendency (means, medians), and variation (standard deviations). These statistics are used to reduce many pieces of information to smaller pieces of information, often called summary statistics.

When the qualitative approach is used, the *How?* and *Why?* questions are asked. A deep understanding with a lot of detail is required for this approach (e.g., exploring how people perceive an issue), and we have to go through descriptions that are rich, contextual, and insightful. To use the qualitative approach, data collection methods such as interviews with open-ended responses, observations, and reading written documents must be employed. In qualitative analysis, words are often used instead of numbers and one "lets the data do the talking." That is, each case is analyzed, patterns and themes are explored, and the data are viewed many times to develop a summary.

Preparation for Data Analysis

In most cases, you may not be able to analyze data immediately after the data are entered into a computer format, such as a spreadsheet. You must go through the process of cleaning the data and then creating new variables, such as computing an age variable based on students' dates of birth. The data may still need to be reorganized to make it ready for analysis through a statistical software tool, such as SPSS or SAS.

Continued at the top of page 13

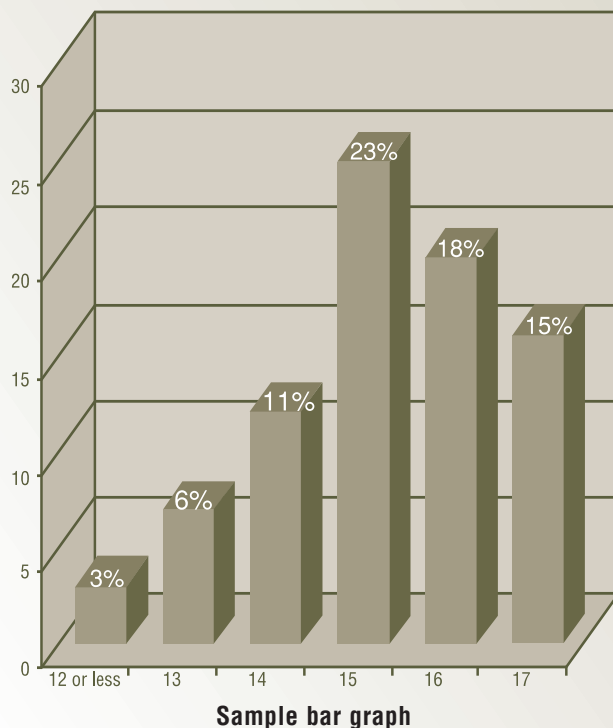
Cleaning Data

In the data cleaning stage, you must make sure that the data:

- Are in appropriate format (i.e., categorical, ordinal, interval, or ratio).
- Are checked for missing values. Plan accordingly, if necessary, regarding missing data. You may have to decide whether missing data points should be replaced with the mean of available data points or values predicted using a regression equation. This may be necessary, especially when you have limited number of cases and you do not want to delete cases.
- Are consistent. This is especially important when we are dealing with categorical data. An example of inconsistent data is when different names for the same school or ethnic group appear in a data set.
- Have no spaces surrounding categorical data. This can result in seemingly different categories when, in fact, they are the same category.
- Contain no blank rows. Some software may regard the first blank row as the end of the data set.

Creating New Variables

After the data are cleaned, new variables may need to be created. For example, you may need to compute the age for each student from his/her date of birth.



Further, you may want to create age ranges (e.g., younger than 5, 5 to 12, 13 to 15, etc.) from the ages you computed. Another example is creating rubric scores from raw scores of students (e.g., Below Basic, Basic, Proficient, and Advanced).

Organizing Data

You may have to make sure that your data arrangement is ready to be analyzed with the software you are using. Changing rows to columns and columns to rows is called transposing data. You may need to transpose the whole data set or only certain rows and columns.

Analyzing the Data

In data analysis, the first thing you need to do is summarize the data. For this, you must compute measures of central tendency, such as the mean, median, and mode. This will also include measures of spread in the data, such as the range, variance, and standard deviation. You may also want to summarize the data by creating frequency tables and cross-tabulations. The result will be a description of the data from several different points of view.

The second thing you need to do in data analysis is conduct some statistical tests to determine whether any relationships that appear to exist really do, or if they are merely “due to chance.” The following are some examples of statistical tests. For example, if you want to find out if:

- Males and females have different reading scores, you might use a t-test for independent groups.
- Reading scores are different before and after a certain reading program or project, you may decide to use a t-test for related measures (i.e., pretreatment and post treatment scores).
- Reading scores are related to student attendance, you may decide to use simple linear regression or just compute a correlation coefficient.

Educators make numerous decisions that range from how well students learn, to what areas of instruction need to be improved, to how best we can support our teachers. Using data to inform these decisions provides educators with a solid basis to plan for meeting the many challenges students and teachers face in the Pacific region.

Kyaw Soe, PhD, Senior Specialist, PREL, may be contacted at soek@prel.org. Scott Keir, PhD, Executive Director, Center for Accountability, Research, and Evaluation, PREL, may be contacted at keirs@prel.org. Charles Giuli, PhD, Director, External Evaluation, PREL, may be contacted at giulic@prel.org. Eunice Brekke, Research and Evaluation Specialist, may be contacted at brekkee@prel.org

