Analyzing Knowledge Gain Using Excel

How can I analyze program impact data about knowledge?

Data analysis is a process to reduce the mound of data you collected to statements or illustrations that are very simple for you and your county commissioners to understand. The analysis should be useful to you.

How you analyze data is influenced by the type of question you ask. One resource to analyze data that is found on many computers in extension offices is a software program called Excel. The program is fairly easy to use for a descriptive analysis.

To illustrate how you can use Excel, data from an example of an impact question typically used by county educators will demonstrate:

>   the steps you need to take
>   the output you receive from Excel
>   the benefits of the analyzed data

EXAMPLE 1

The question comes from an evaluation developed by Emelie Swackhamer and her committee for a Master Gardener Training Program conducted at seven sites throughout the Southeast and Capital Regions. The question asked participants the degree to which they have learned something about each of eleven topics and it provided an ordinal scale reflecting a range of knowledge gain from no new knowledge to a high degree of new knowledge. The question below lists just three of the eleven topics.

Listed below are the topics of each training class. For each class you attended, please circle what you feel you may have learned about the topic.

Soils	**NOTHING NEW**	**SOME NEW KNOWLEDGE**	**A LOT**	**A GREAT DEAL**
Plant Science	**NOTHING NEW**	**SOME NEW KNOWLEDGE**	**A LOT**	**A GREAT DEAL**
Vegetables	**NOTHING NEW**	**SOME NEW KNOWLEDGE**	**A LOT**	**A GREAT DEAL**

Step 1

With a little guidance, volunteers in the program were trained by Connie Schmotzer from York County to code the surveys from all sites and enter the data into a simple Excel spreadsheet that is nothing more than a grid.

The topics were listed along the edge of the grid. For each participant, you enter what he/she has circled for each topic in a separate box in the grid.

Step 2

Using the Excel handbook, put together the appropriate Excel formula.

Ellen Taricani developed the following formulas and explains the reason for each:

A formula was entered to count the number of responses in each category. Here is an example of that formula:

$$=COUNTIF(\$DL30:\$EA30,AX\$54)$$

The range DL30 through EA30 are the values entered, AX54 is the actual number that is checked. In this example AX54 is the number 4. For the range of numbers entered as responses, the computer counts to find if there are any 4's and returns a count.

The counts are divided by the total number of responses to get a percentage. The following formula is used to determine the percentages:

$$=AX55/\$BA55$$

The value in AX55 is divided by the value in BA55 which is the total.

Step 3

For this question, we decided to combine or recode the first two columns and redefined them as MINIMAL learning, and the other two columns as SUBSTANTIAL. This extra step helps you to discuss the data with the public and use it to decide if you need to improve the program.
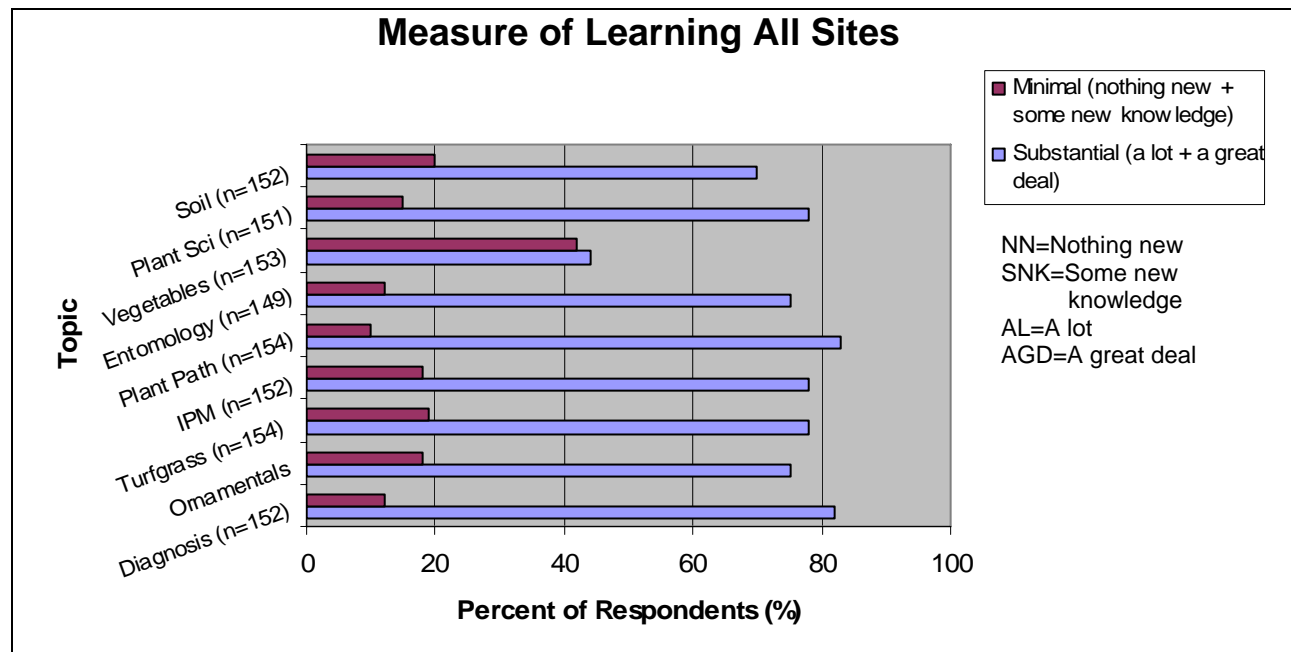
Step 4

Synthesized data appear in many formats such as a table of numbers or a chart. For this question, Emelie Swackhamer chose a bar chart (see Chart 1). Note it displays for each topic, the percentage of respondents who achieved different levels of learning, a low and a high amount, making the data very easy to discuss at a meeting.

Since the number of people who respond to each item or topic in a question is often different, the N for each has been entered in the legend.

Chart 1. Measure of learning on topics at seven sites in the Master Gardener Training Program, Southeast and Capital Regions.

Measure of Learning All Sites

Legend:
- ■ Minimal (nothing new + some new knowledge)
- ■ Substantial (a lot + a great deal)

NN=Nothing new
SNK=Some new knowledge
AL=A lot
AGD=A great deal

Topics (y-axis):
Soil (n=152), Plant Sci (n=151), Vegetables (n=153), Entomology (n=149), Plant Path (n=154), IPM (n=152), Turfgrass (n=154), Ornamentals, Diagnosis (n=152)

X-axis: Percent of Respondents (%) — 0, 20, 40, 60, 80, 100

Y-axis label: Topic

Emelie Swackhamer points to the multiple benefits of this chart for agents:

- clearly shows that many participants felt they had acquired substantial knowledge through the 11-week training period.
- highlights the breadth of topics covered in the training period and amount of cooperation contributed by instructors and site coordinators.
- allows individual instructors the opportunity to see how effective their class was in comparison to other instructors, which contributes to the overall high standards of the training program.

For further information about the program delivery or evaluation strategy of the multi-county training program, contact Emelie Swackhamer, horticulture agent, Lehigh and Northampton counties at exs33@psu.edu.