Analysis of School Assessment Data Using Pivot Charts

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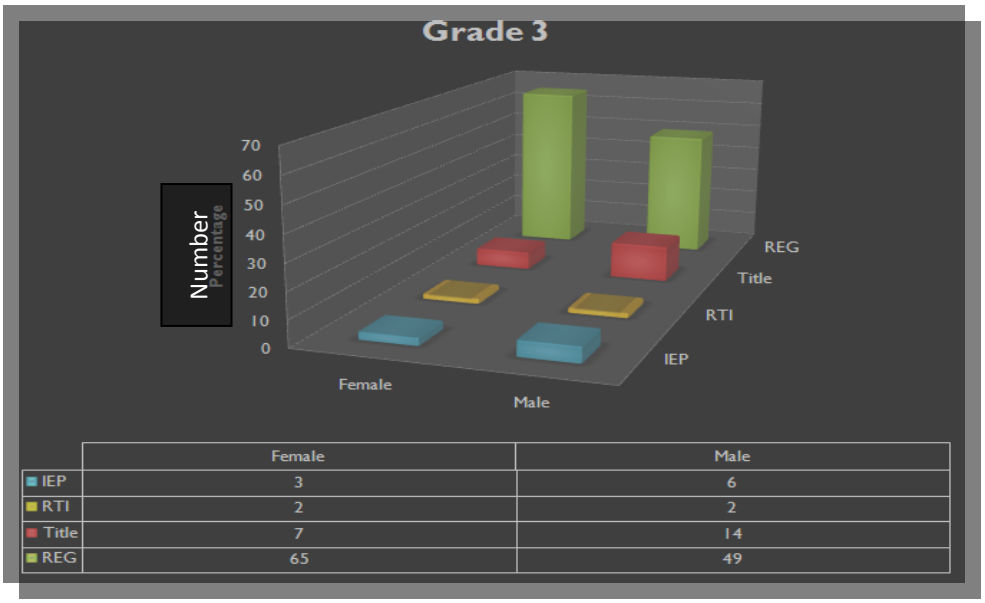
Abstract

One of the most powerful features of Microsoft Excel is its ability to create pivot tables and charts. Even so, it remains one of the least utilized features in academic settings. This poster illustrates how *pivot charts* can provide a dynamic looking glass into assessment data on special needs groups, and additionally proposes that training in this technology should be integrated into teacher preparation programs as part of a TWS requirement.

The Static Analyst

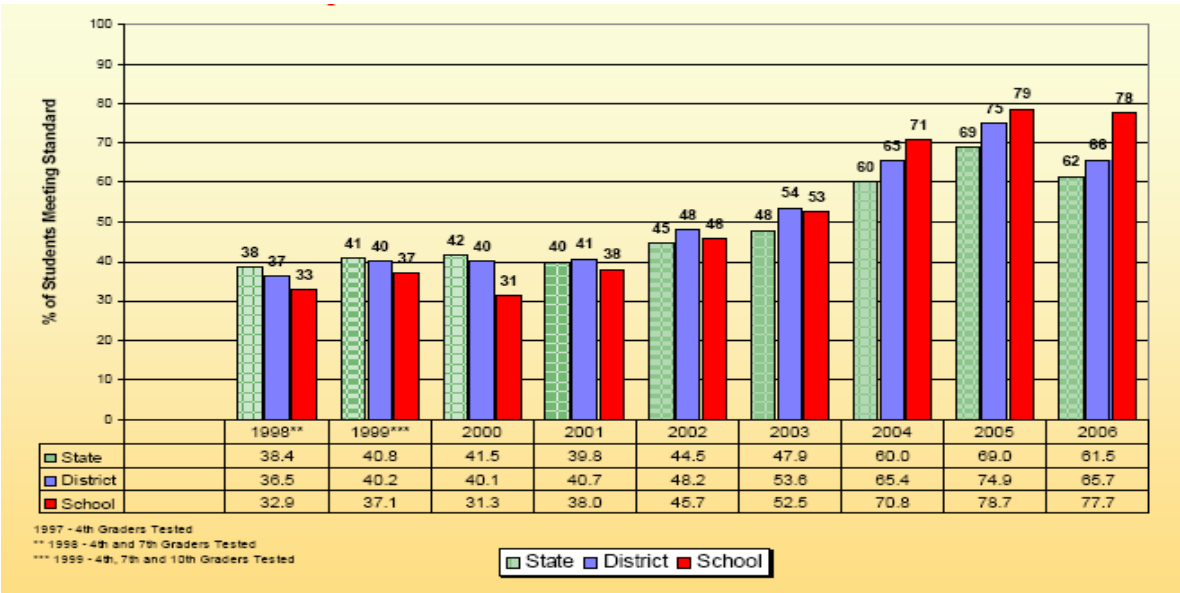
A common use of Microsoft Excel (and other spreadsheet software) is to generate static (non-interactive) charts from data that has been entered into one or more worksheets. For example, **Figure 1** shows a chart of the number of grade 3 students, organized by gender and subgroup, which took the Gates-MacGinitie reading achievement test. A stanine performance score for each student, available in the worksheet, has not been exposed in the chart.



	Female	Male
IEP	3	6
RTI	2	2
Title	7	14
REG	65	49

Figure 1

In another example, shown in **Figure 2**, Gates-MacGinitie reading achievement data for grade 7 students, based on stanine scores, is summarized against similar district and state data.



	1998**	1999***	2000	2001	2002	2003	2004	2005	2006
State	38.4	40.8	41.5	39.8	44.5	47.9	60.0	69.0	61.5
District	36.5	40.2	40.1	40.7	48.2	53.6	65.4	74.9	66.7
School	32.9	37.1	31.3	38.0	45.7	52.5	70.8	78.7	77.7

1997 - 4th Graders Tested
** 1998 - 4th and 7th Graders Tested
*** 1999 - 4th, 7th and 10th Graders Tested

State District School

Figure 2

Creating a chart from spreadsheet data to report demographic, performance, and other student trends is common practice. The data in a worksheet (or set of worksheets) typically provide a rich repository of information, but the dimensions that can be (and should be) charted often need to be many. For example, a school may need to look at performance in different subject areas (math, instead of reading), or in different strand areas (comprehension, instead of vocabulary), or in different grade levels. The number of static charts needed to view these many dimensions can quickly become cumbersome. Additionally, many teacher-training programs often require pre- and post-assessment comparisons by teacher candidates to document student learning. Student teachers will typically create numerous static charts to show this.

Can we Change our Static Ways?

One of the least-used features in Microsoft Excel turns out to be one of its most powerful features: Pivot charts. The concept is to generate one chart and then to "pivot" around different data dimensions to instantly update the chart with a new view. A pivot chart gives you the ability to quickly browse many different graphical views of your data, and to quickly respond to "what if" questions using only a few seconds of point-and-click or drag-and-drop. A significant advantage of static charts is that they are easily published to the web. This can also be done with pivot charts, but it requires the right back-end services. For example, running Excel Services in Microsoft Office System SharePoint is one way to do it. For presentations to school administrators, pivot charts are easily distributed in e-mail or PowerPoint containers.

To illustrate the power of the concept, let's turn the static chart in **Figure 1** into a pivot chart using the tools in Excel 2007 (**Figure 3**). A new element appears in the spreadsheet view, called a pivot table, with movable drop-down fields that can be clicked to filter the worksheet data (gender, subgroup, and stanine score) and instantly update the chart.

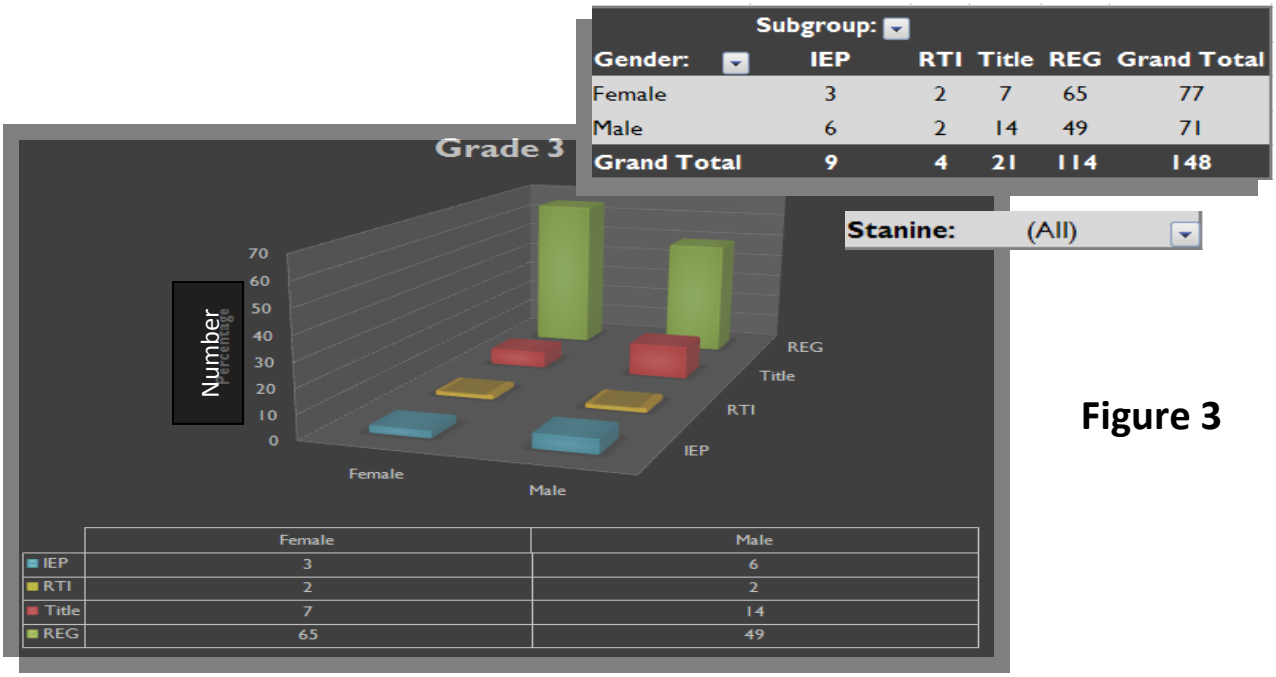


Figure 3

For example, what if we need to view all grade 3 students that did ***not*** meet the reading achievement standard? In other words, can we view only those students that scored *stanine*[i] values of 1, 2, or 3? To do this, drop down the **stanine** field, as shown in **Figure 4**, and deselect values 4 through 9. When the **OK** button is clicked, both the table and chart are instantly filtered to give the view shown below:

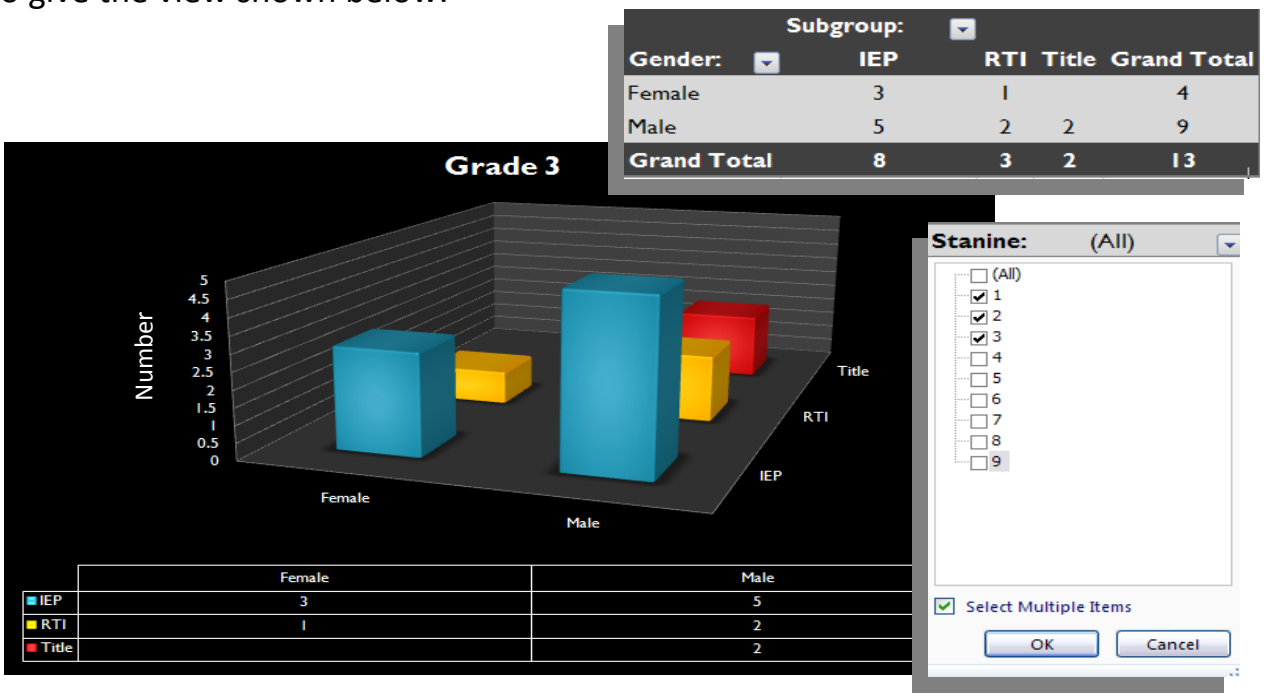


Figure 4

The new chart shows that only two Title students did not meet the standard. What if we now wanted to view *all* students in the Title subgroup, broken down by gender and stanine? This is a two step process. First, drop down the **subgroup** field, as shown in **Figure 5**, and deselect IEP, RTI, and REG. Clicking the **OK** button instantly generates the filtered view shown below:

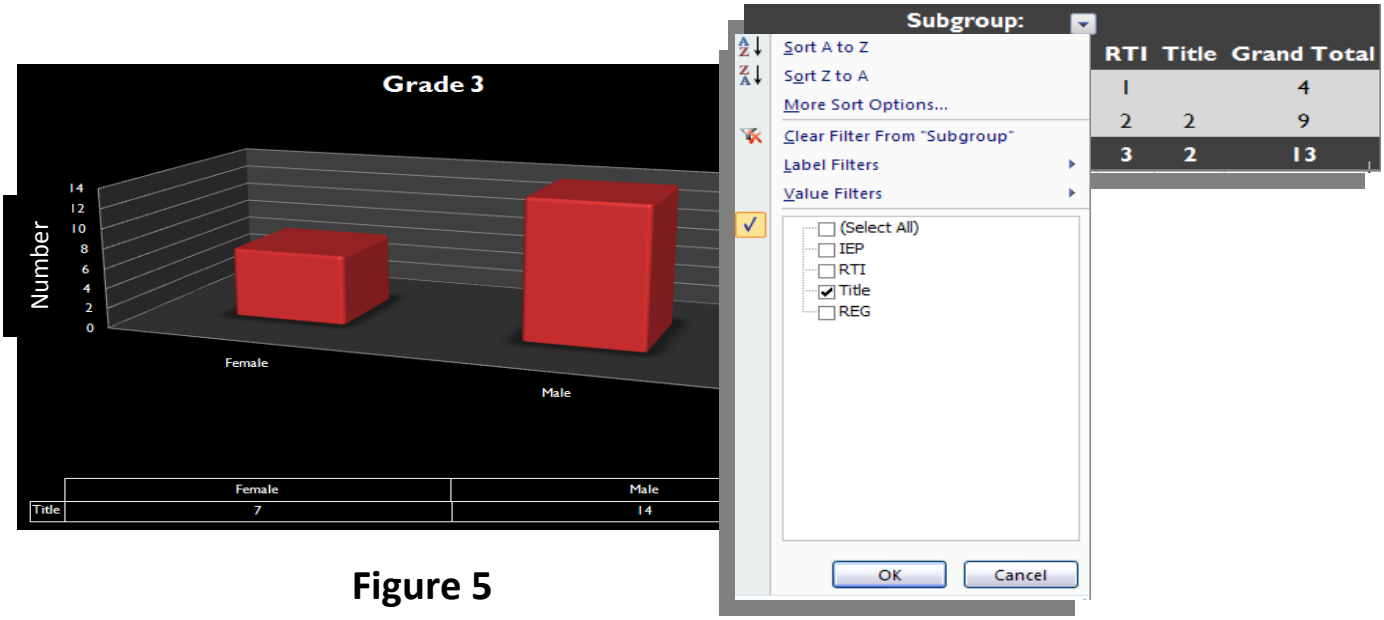


Figure 5

The second step is to add the stanine score to the x-axis to see how all Title students performed. This is easily done using a simple drag-and-drop, another important feature of pivot charts that lets you change the axes fields. For example, to add the stanine score to the x-axis, simply use the "Field List" (which is visible in Excel whenever the pivot chart or table is clicked) and drag-and-drop, as shown in **Figure 6**.

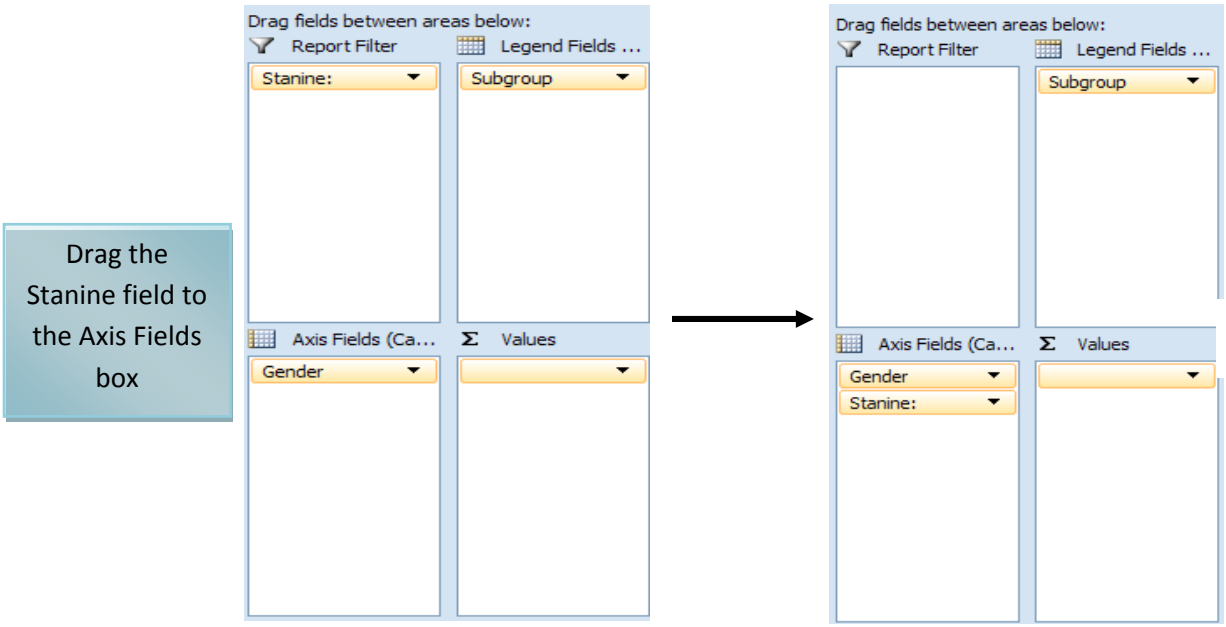
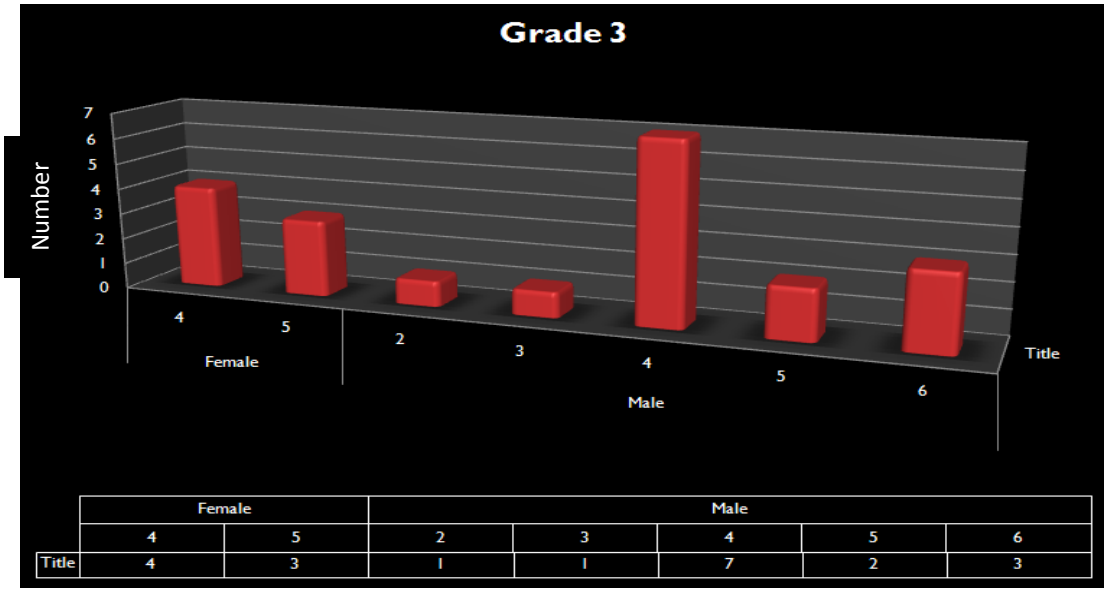


Figure 6

The chart is instantly updated to give the view shown below in **Figure 7**. It is now clear that 19 out of 21 Title students met the reading achievement standard with stanine scores of 4, 5, or 6. None of the Title students exceeded the standard with scores of 7, 8, or 9.



	Female		Male				
	4	5	2	3	4	5	6
Title	4	3	1	1	7	2	3

Figure 7

Summary…and a Recipe for Change.

- Creation of static (non-interactive charts) is common practice in both school districts and teacher-training programs to analyze and report student assessment data.

- The pivot chart has been around in spreadsheet software for a long time. Even so, it remains one of the least utilized features to analyze and report student assessment data.

- Data trends are less likely to be missed when using pivot charts, given that data can be filtered and chart axes updated with a simple point-and-click or drag-and-drop. In addition, questions that arise during a presentation (e.g. "Do you have a graph that shows…") can now be accommodated "on the fly".

  As a case-in-point, this poster presentation uses **four** static charts (Figures 3, 4, 5, and 7) to display Reading achievement data in a Title subgroup. Many more charts could be created to look at other dimensions, such as the RTI subgroup. One pivot chart (rather than many static charts) lets you dynamically create many different views of the data, greatly reducing time spent discovering hidden trends or identifying best reporting formats, and to address "what if" questions whenever they arise (the day of a presentation, or several months later).

  The following recommendations are offered:

  1. Universities that have partnerships with local school districts should host workshops on pivot charts that focus on their use in analyzing and reporting student assessment data. Standardized data-gathering templates should be provided to workshop attendees that include worksheet formats optimized for pivot chart generation. These templates should be designed for use by school personnel to gather real student data that can be analyzed in a follow-up workshop.
  2. Revise technology training in teacher certification programs to integrate pivot chart training in the analysis of pre- and post-assessment data for whole class, subgroups, or individuals. Such data are typically gathered during student teaching, as part of a Teacher Work Sample, to document impact on student learning. Such training could be implemented prior to the student teaching term as part of a TWS simulation project.

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[i] From the Educational Measurement Group of Pearson

"A stanine is a type of scaled score used in many norm-referenced standardized tests. There are nine stanine units (the term is short for "standard nine-point scale"), ranging from 9 to 1. Typically, stanine scores are interpreted as above average (9, 8, 7), average (6, 5, 4), and below average (3, 2, 1). Using only nine numbers, stanine scoring is usually easier to understand than other scoring models."

"Stanine scores are useful in comparing a student's performance across different content areas. For example, a 6 in Mathematics and an 8 in Reading generally indicate a meaningful difference in a student's learning for the two respective content areas. While stanine scores are good at signifying broad differences in performance, they should be used cautiously when making any finer distinctions about performance."