Spreadsheets

Some computer technologies come naturally to teachers. Word processing poses few challenges because most teachers have already completed equivalent handwritten projects, such as writing a letter or a report. Despite multimedia's complexity, many teachers manage to complete multimedia projects because they have already experienced interactive design through multimedia CDs or even informational kiosks at museums or train stations.

Unfortunately, the same cannot be said about spreadsheet technology, which can pose unique challenges to teachers. The challenges do not lie with the actual spreadsheet programs or the inherent difficulty of the technology. Rather, complications arise because few teachers have experience gathering, organizing, manipulating, and interpreting large amounts of numeric data. Additionally, few teachers possess an understanding of why a particular type of chart is the most suitable visual representation for a specific set of data.

Given these potential challenges, some trainers may wonder why they should teach spreadsheets to teachers. The answer lies in the fact that certain computer technologies, including spreadsheets, are more likely to develop higher-order thinking skills than other technologies, including word processing and multimedia. While "show-and-tell" applications such as word processing and multimedia provide teachers with unique and effective ways to communicate ideas, spreadsheet applications offer greater opportunities for analysis, synthesis, and evaluation.

By using spreadsheet technology, teachers use abstract and concrete reasoning as they gather and manipulate numeric information that reflects real-world phenomena. Critical-thinking skills are required to organize, arrange, and classify data; to perform calculations; to analyze and interpret data and results; and to make predictions and form conclusions. Despite all of these advantages, spreadsheet technology is rarely used in classrooms, and in instances when teachers have the opportunity to complete spreadsheet activities, they are typically limited to inputting and charting information. This limited use is little more than another example of a "show-and-tell" application. To maximize the educational value of spreadsheet technology, teachers should be expected to use the numeric information and charts to answer questions or solve problems. This critical element to spreadsheet activities both requires higher-order thinking and approximates real-life application of the technology.

General Strategies

The featured spreadsheet activities provide instruction in the various ways that teachers may use spreadsheet technology in their daily lives. First, all teachers complete the required Grade Book activity, which features critical spreadsheet skills, such as entering and formatting data, sorting information, and performing calculations. Teachers looking to develop more advanced knowledge of traditional spreadsheet skills, including entering their own mathematical equations and generating charts based on numeric data, may then choose to complete the Classroom Inventory or Pictograph activity. Other teachers may be more interested in learning some of the less traditional and less difficult applications of spreadsheet technology by completing the Seating Chart or Roll Book activity.

When teachers complete spreadsheet activities, consider the following general strategies:

- The system of lettered columns (labeled along the top edge of the worksheet) and numbered rows (labeled down the left side of the worksheet) may initially confuse some teachers. During the spreadsheet exploration, point out that the letter and number of the cells that teachers click is shown in the name box above the worksheet window. Also, mention that the column letter and the row number changes whenever teachers click a cell. Either (or both) of these strategies can be used to help teachers become familiar with cell references and the system of rows and columns.
- Whenever teachers enter numeric information into a worksheet, they need to type the actual numerals and not the words for those numeric quantities. (For example, teachers need to type the numeral *5* instead of the word *five*.) If they do not type numerals, their formulas, functions, and charts will not work properly.
- Sometimes, a spreadsheet task can be completed in more than one way. (For example, teachers can sort alphabetically by clicking a toolbar button or by choosing the desired commands from a menu.) Encourage teachers to use whichever methods they are most comfortable with.
- Some teachers may decide that performing mathematical calculations on their own and typing the answers is easier than inserting functions and formulas. However, teachers should be instructed to insert functions and formulas as directed. Then, teachers will be able to use the **Fill** command to perform the same calculations in neighboring cells. In the process, teachers will also develop better understandings of the benefits of spreadsheet technology.
- Many teachers feel that spreadsheet activities are like mathematics problems, and as such, teachers might be concerned about "getting the correct answer." Let teachers know that they should focus on learning how to use spreadsheets, not on getting the correct answer. They can learn a lot about spreadsheets even when they make mistakes, and mistakes can be fixed. Over time, teachers will become more familiar with the technology and develop confidence in their abilities to try new things.

- Spreadsheet applications enable teachers to quickly perform calculations, organize information, and generate charts. Skilled spreadsheet users consider the automated features invaluable. On the other hand, the same features can create a sense of discomfort and anxiety in novice users. When teachers use the automated spreadsheet features, they will notice that something has happened. However, they may not understand what has happened or know if they have achieved the desired results. You can increase teacher understanding in a number of ways:
  - Whenever teachers perform calculations (such as using the **Sum** function), encourage them to check their answers. Because the mathematics in the activities is easy for most teachers, they can often determine if they have correctly selected the cells and performed the calculation if they add the numbers themselves. If they find that they have made a mistake, they can use the **Undo** function (or delete the formula) and try again.
  - Although teachers may initially find the process of sorting information to be difficult, encourage them to explore until they achieve the desired results or until they find a sequence that makes sense to them. Remind them that they do not have to get it right the first time. They can always use the **Undo** function to put the rows back into the previous order and try again.
  - Some teachers are unfamiliar with the unique purpose of the various charts they create. However, by generating the charts and discussing the visual display of worksheet data, their understanding will develop gradually. Teachers may also experience difficulty selecting the required information to correctly create the chart. They may also be unable to determine if their generated charts are correct. Encourage teachers to compare their charts to the sample charts in their books. If they think that they may have made a mistake, instruct them to try again until their charts look correct. Later, they can delete any worksheets containing incorrect charts. (They can also select and delete any incorrect charts mistakenly placed in the worksheet itself.)
- Most teachers enjoy changing the look of the information in their worksheets and applying borders and shading to cells, rows, and columns. As a result, they often invest too much time in this task and avoid the steps that they perceive to be more difficult. You might need to encourage teachers to move on to the remaining steps so they can complete the activity and review their work in the allotted time. They can always make additional changes later if time permits.
- In the activities that involve creating charts, teachers are instructed to save them in a separate sheet. However, teachers can also save their charts in the worksheet.