

Chapter 5: Computer Managed Instruction

**Chapter Five**  
**Computer-Managed Instruction (CMI)**

We live in a time of such rapid change and growth of knowledge that only he who is in a fundamental sense a scholar—that is, a person who continues to learn and inquire—can hope to keep pace, let alone play the role of guide.

*Nathan M Pusey (1907-2001), past President of Harvard*

It takes a lot of preparation to teach just a little.

*Eleanor L Doan (1918- )*

### **LEARNING OUTCOMES**

Much of what a teacher does goes unnoticed. Teachers devote a great deal of time to professional development, immediate and remote preparation, evaluation and follow-up. Good teaching requires all of these activities.

Unfortunately, K-12 teachers can rarely find time for these activities during the school day, let alone immediately before or immediately after each class. There are two reasons for this.

- First, one class is often closely followed by another during the school day, especially in the K-12 environment. Time allocated for planning is often consumed with ad hoc administrative tasks. Before school and after school, time is sometimes allocated for parent conferences and faculty meetings. So most of a K-12 teacher's "immediate" preparation for class has to take place at home, in the evenings and at weekends, during which time the teacher must also be occupied with lesson planning, evaluation and follow-up tasks such as grading and assessment.
- Second, remote, or advance, preparation—reading around one's subject matter, attending conferences and workshops, keeping abreast of ideas and changes in the field of education—often takes place outside the context of the school year. It takes place during the semester on a catch-as-catch-can basis and as time and energy allow. In most U.S. states, teachers have to take academic discipline-related courses to maintain their certifications to teach. Many K-12 teachers attend conferences and take courses during the summer months, school vacations, and on weekends.

So any help teachers can get with preparation, evaluation, and follow-up would be appreciated. This is where the computer can play an important role.

"Good tools," quipped Eleanor Doan, "do not make a good teacher, but a good teacher makes good use of tools." A teacher confident with computer-managed instruction (CMI) uses the

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computer in many ways to support and facilitate that broad range of classroom administrative tasks that are such a time-consuming responsibility.

In this chapter we will discuss ways in which computer systems can help teachers and administrators manage their operations in such a way as to save time and increase efficiency. Success, however, depends entirely on the people using the systems that are introduced. Thus, this chapter will also examine ways in which the computer can be used to improve instruction and assist in the general management of the teacher's job, both inside and outside of the classroom.

Here are the topics that will be covered in Chapter 5:

- Introduction
  - People, Not Computers, Increase Productivity
  - The Computer Is Here to Stay
  - Success with Computers Does Not Come Easily
- Teachers and Productivity Applications
  - The Word Processor
  - The Database
  - The Spreadsheet
  - Drawing and Painting Applications
  - Presentation (Authoring) Applications
  - Web-based Presentations
  - Multimedia Applications
  - Graphical Organizers
  - Communications Software
  - Useful Utilities
- Other Elements of CMI
  - Using Electronic Templates
  - Preparing and Maintaining Curricula and Syllabi
  - Planning Lessons
  - Preparing Learning Materials
  - Assessment
  - The Smart Classroom
  - Distance Learning
  - Managing and Guiding Students
  - Communicating Between Home and School

## INTRODUCTION

### *People, Not Computers, Increase Productivity*

A recurring dream is shared by members of administrative bodies in all walks of life. They dream that to increase productivity and improve efficiency all one needs is up-to-date technology. So they buy computers, put them on people's desks, and wait for productivity to somehow magically

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improve. As all too many have found out, the objective often remains a dream and sometimes becomes a nightmare.

Although they are getting smarter and faster, computers are only as efficient and productive as the people using them. So their users must be given the time, ongoing training, and support to use the technology effectively. It is widely acknowledged in the computer world that the only absolute rule is "Junk in, junk out." It is the quality and quantity of the input that makes the computer a productivity tool. In education, the most important input is the education of the teachers who will be using the tools.

***The Computer is Here to Stay***

Due in large part to growth initiatives like e-Rate<sup>1</sup>, the support of the business community (through recycling and gifts outright), and over 70 billion dollars in state, federal and local spending, the availability of computer technology in schools has increased greatly since 1994. In the United States, 99% of the public schools have access to the Internet and at least 94% have computers with Internet access in instructional rooms. The ratio of students to instructional computers with Internet access in public schools is, on average, 3.8 to 1 (US DOE 2006)<sup>2</sup>. Many states and districts now have 1-1 laptop computer programs for some or all students and all faculty members. The computer is beyond a doubt a permanent part of today's instructional environment.

***Success with Computers Does Not Come Easily***

Conscientious teachers<sup>3</sup> at all levels of education devote time and energy above and beyond the call of duty in order to be effective in the classroom. This is especially true of teachers K-12. The report of the National Commission On Excellence in Education titled *A Nation at Risk* (1984) noted this "dedication, against all odds, that keeps teachers serving in schools and colleges, even as the rewards diminish." There is no reason to believe that this has changed; there is every reason to believe that the odds are even more stacked against the teacher. Against all the odds then, many of these teachers have learned to use computers and have successfully incorporated them into their curricula.

One can understand a reluctance to make the effort to master computing skills. However, teachers are learning to use computers in the classroom. By 2000, only 39% of public school teachers with access to computers or the Internet in their classroom or elsewhere indicated they used computers or the Internet "a lot" to create instructional materials, and 34% reported using computers "a lot" for administrative record keeping (NCES, April 24, 2000). It is clear that instructional use of this

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<sup>1</sup> e-Rate (the Schools and Libraries Universal Service Support Mechanism) is a federal program that provides eligible schools with discounts on approved telecommunications, Internet access, and internal connections costs. Learn more at the e-Rate website: <http://www.usac.org/sl/>

<sup>2</sup>This number is significantly higher in schools with a high poverty student body, one of the unfortunate characteristics of the "digital divide" in this country.

<sup>3</sup>Cynical viewpoints notwithstanding, the great majority of teachers *are* conscientious and do credit to their profession. All professions have their share of individuals who are not conscientious. The teaching profession is no exception. However, it is in the nature of the teaching, like other care-oriented professions, to attract a higher proportion of caring and conscientious individuals.

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technology had to improve, especially in light the rapid growth of student use of all kinds of technologies. The good news is that change has happened. By the year 2005<sup>4</sup> the online survey NetDay Speakup reported that:

Teachers say that technology is having a positive impact on their teaching and on their students' success: As a result of technology, teachers say their jobs are easier (74%), they communicate more with parents about their children's progress (47%), their lesson plans and student's learning experiences are richer because of information from the Internet and multimedia opportunities (47%), and students take a more active role in their learning (47%).  
(Project Tomorrow 2006)

Teachers continue to need help. It is estimated that over 30 hours of inservice or professional development training are required for teachers to feel comfortable with technology integration. It is no surprise then that The National Education Technology Plan make improved teacher training as the 3<sup>rd</sup> Action Step (US DOE 2006). Practical impediments, such as time and finances, often prevent schools and districts from providing necessary training. The practicing teacher must often rely upon online and peer-supported professional development to improve technology skills. Even so, time for learning and practice is hard for most teachers to find.

Perhaps more teachers would be motivated to embrace computer technology if they could see that it not only improves the effectiveness of their teaching, but that it can also save time and effort. With this in mind, let us examine practical steps that teachers can take to reduce the class management burden, thus allowing them to devote more time and energy to doing what they like to do and do best, which is teach. Along the way, we hope that teachers become excited about using the computer as part of the teaching process itself.

The following sections present some of the computer applications and Internet resources that teachers are already using in schools. The Case Study at the end of the chapter presents some further class management applications made possible by computer-mediated communications (CMC).

## **TEACHERS AND PRODUCTIVITY APPLICATIONS**

Productivity applications are computer applications that have become the core set of tools used in administrative environments. These applications include word processing for tasks that involve writing or publication, database management systems for general purpose record keeping, spreadsheets for numerical record keeping, charting, and data analysis, drawing and painting tools for graphic design, presentation tools, graphical organizers, and communications software for establishing and maintaining contact with other people and with online computing systems. Today's integrated applications, or suites, blur the dividing line between tools; word processing can be done inside of a spreadsheet, drawings and paintings can be added to word-processed

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<sup>4</sup> This is over five years ago, but that is the average gap between data collection and analysis. Teachers can get current data by surveying their own school systems. In many districts and states, this is done yearly.

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document, presentations can contain charts and drawings, and many applications generate web pages. Moreover, a new application type, which we might call the “all in one” applications, are readily available to teachers who wish to create, disseminate, portfolio and gather in one digital environment. A key learning phrase will always be “Keep It Simple.” Learning to use the basic tools will provide the teacher with a vast library of useful and transferable computer skills and there is not reason for a teacher to tackle the complex when the straight-forward will do.

Each of these tools has myriad applications in the classroom. In the next chapter, we will focus on their application for purposes of instruction. Here we are concerned with their value for class management tasks – teacher tasks.

It is beyond the scope of this book to explain in detail the features of specific productivity tools. If you are using the Microsoft Office tutorials that optionally accompany this text, you will be learning about the tools in the best way possible: hands-on. These tutorials may be found for free download online at the following URLs<sup>5</sup>:

Essential Microsoft Office 2000: Tutorials for Teachers

<http://www.pitt.edu/~edindex/Officeindex.html>

Essential Microsoft Office XP: Tutorials for Teachers

<http://www.pitt.edu/~edindex/OfficeindexXP.html>

Essential Microsoft Office 2003: Tutorials for Teachers

<http://www.pitt.edu/~edindex/Office2003frame.html>

Essential Microsoft Office 2007: Tutorials for Teachers

[http://www.educationworld.com/a\\_tech/columnists/poole/office\\_tutorials/index.shtml](http://www.educationworld.com/a_tech/columnists/poole/office_tutorials/index.shtml)

If you are not using the tutorials, it is assumed that your studies include an opportunity to work with productivity software<sup>6</sup>. You cannot learn to use the computer without actually using it, anymore than you can learn to ride a bike without riding one. Now days, almost every application creator has a tutorial available – integrated into the application, online, or available for free download. Teachers should not be afraid to ask directions!

### ***The Word Processor***

The word processor is the most efficient writing tool yet invented<sup>7</sup>. While it has all the advantages of a typewriter, what one types using a word processor is literally never chiseled in stone; it is always available for revision. This alone makes for better writing. A word processor can also handle a far wider range of publishing tasks than a traditional typewriter. Examples of these tasks include working with graphics, cutting and pasting between and within documents, pagination, font and style selection, indexing, automatic tabulation, spelling and grammar checking, and so on.

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<sup>5</sup> Universal Resource Locator - the plain language "address" of a web page

<sup>6</sup> It should be noted that the tutorials can also be used with Macintosh versions of Office.

<sup>7</sup> "Voice to text" tools further expand the efficiency of the word processor, as well as meeting the special needs of many students. Teachers need to keep an open eye for "add-ons" to word processing applications.

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In the next section of this chapter (Other Elements of CMI) we will examine some specific uses of the word processor for class management. The word processor not only improves the mechanical process of writing by enhancing the appearance of documents, it also improves the quality of one's writing by encouraging re-reading and revision of one's work. In the networked school environment, word-processed documents can be easily co-edited as well.

***The Database***

Any teacher who has used a computerized card catalog or shopped at Amazon.com has used an electronic database. The electronic database is designed to store data and make that data available to the user in as simple and flexible a manner as possible. Even small databases can store thousands of records. Those records—let us say they are student records—can be sorted in any order, selected (accessed) individually or in groupings determined by the user, displayed as reports on the screen or on paper, or used to personalize form letters or address envelopes.

Most schools now keep student records in a local or web-based computer database, often called a SIS (Student Information System). Some schools have put a computer on every teacher's desk and have either connected them all to a central computer called a host or server or made a wireless access easy. The server gives controlled access to the database of student records through the use of access codes and passwords so as to protect privileged data<sup>8</sup>. Teachers often have a need to know information about their students, and schools that make this data easily available to teachers are helping the teachers do their job. Similarly, teachers can quickly input data, such as attendance, behavior, assignment and grade information, making it instantly available to the entire school community (which may include parents). The more teachers know about their students, the better they can attend to individual needs.

Technology-using teachers also are using the database to maintain their own records so that they can produce form letters to parents to keep them informed of their children's progress in class or personalize announcements.<sup>9</sup>

One important use of administrative databases is for *curriculum mapping*, which has the goal of making the curriculum of an entire school or district accessible and searchable. This will be discussed in more detail when we focus later in this chapter on Preparing Curricula and Syllabi.

***The Spreadsheet***

A spreadsheet is a tool for handling numerical data of all kinds. It started out in the late 1970's as a business tool for accounting applications, which remains a major use of spreadsheets by school administration. But it was quickly adopted by number crunchers in all walks of life, including teachers. The typical application of spreadsheets for class management is for recording and weighting scores for assignments, quizzes, and tests, and for calculating averages and grades. Teachers also use spreadsheets to easily log individual student performance on repeated tasks,

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<sup>8</sup> It is Federal law that student records must be protected. As technology improves, this protection can become more stringent.

<sup>9</sup> In many schools, form letters are being replaced by comments posted to a student's online record – a record that both parents and students can access securely.

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such as reading and vocabulary development and local assessments. Today's spreadsheet software makes the design of eye-catching and informative charts and graphs a snap, and teachers are also using this tool to create visual aids for mathematics, social studies and science lessons. Microsoft's *Excel* (pictured below) and Apple's *Numbers* are two applications often found on teacher computers.

The typical spreadsheet has a selection of built-in mathematical functions (also called formulas) and graphing or charting capabilities that greatly simplify the manipulation of the numerical data. Figure 5.2 illustrates a grade sheet with a chart containing some of the gradesheet data.

Notice the boxes (called cells) in which a formula has been set up to carry out a calculation based on a selected set of scores, such as the total score for one student, the grade as a percentage, or the average score for a class. We will learn later in this chapter about other grade book programs and other instructional uses of a spreadsheet.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1															Range	Grade
2	GRADE REPORT														50%	F
3															60%	D
4	Class: Grade 4														70%	C
5	Semester: 1														80%	B
6	Year: 2001														90%	A
7															100%	A
8				A1	A2	A3	A4	A5	TOTAL	PCNT	GRADE					
9																
10			MAX	20	20	30	100	20	190							
11																
12	LAST NAME	FIRST NAME														
13																
14	Urchick	Pamela		12	14	28	97	3	154	81%	B					
15	Gasdick	Barbara		10	15	23	65	16	129	68%	D					
16	Giorgio	Marilyn		13	18	25	74	17	147	77%	C					
17	Mitnick	Teresa		16	15	20	32	15	98	52%	F					
18	Bond	Patrick		14	13	20	78	18	143	75%	C					
19	Dane	Stephanie		18	19	19	65	19	140	74%	C					
20	Bond	Andrew		15	16	21	85	16	153	81%	B					
21	Fraher	Brigid		18	17	26	95	20	176	93%	A					
22	Brown	Lyn		20	15	19	73	15	142	75%	C					
23	Potochar	Charlene		16	20	20	91	13	160	84%	B					
24																

Fig. 5.2 Spreadsheet made up of student grades

***Drawing and Painting Applications***

Drawing and painting applications are useful for creating visual aids and learning materials that require illustration. Teachers should remember that students will remember what they see much more often – and much better - than they will remember what they hear.





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real beauty of these tools is that they enable relatively unsophisticated users to produce artwork that would have seemed daunting if they had had to produce the same work by hand.

It is not necessary for the teacher to know how to use sophisticated tools to work with digital photographs. In the Apple Macintosh environment, machines come with *iPhoto*, an application that both transforms photographs and facilitates their capture, organization and distribution. Basic photo editing tools are included with Microsoft *Office*; these are easy to learn, easy to use, and all you need for basic work with images, such as cropping, rotating or balancing pictures (sharpen, add brightness, and so forth) before they can be incorporated into documents of one kind or another. Figure 5.5 is a screen shot of the editing toolbar in Microsoft *Office 2003*.



Figure 5.5 Photo editing tools in *Word*

All versions of the Microsoft Windows operating system for the PC also include applications, such as *Picture Manager*, for the capture, organization, printing, sharing and archiving of photographs. Further, most digital cameras and scanners ship with basic photo editing software, which in many cases is all the teacher will need. There are even on-line photograph editing tools! Learning to use any one of these applications adds powerful skills to a teacher's toolkit.

### ***Clip Art***

The computer can transform anyone's artwork. Straight lines, jagged lines, smoothly curved lines, circles, ellipses, shapes of all sorts are a snap to draw, move into position, and fill with a wide range of patterns, pictures, and colors. When you want to include an illustration that might be difficult for a non-artist to create—like a picture of a ship, a map of the world, or a sports figure—you can use a collection of clip art (Fig. 5.6 on the next page).

Clip art is the term used for sets of pre-drawn images saved in digital form, which one can copy into other documents such as newsletters, posters, and assignments. There are many sources of clip art. The most common are: collections that come with productivity applications; purchased CD ROM or DVD collections; and the Internet. Many teachers create their own clip art collections using scanned, drawn or painted images (even student work).

Clip art is the ultimate transportable object, easily imported into most productivity applications, often as easily as dragging-and-dropping or copying-and-pasting. Looked at this way, it is easy to see why clip art is an important asset for the computer-managed classroom. When using clip art, copyright and Fair Use should always be considered! It is best to use images from purchased image collections or software, or from websites like Discovery School (Fig. 5.6 on the next page) that give teachers permission to use the images for education.

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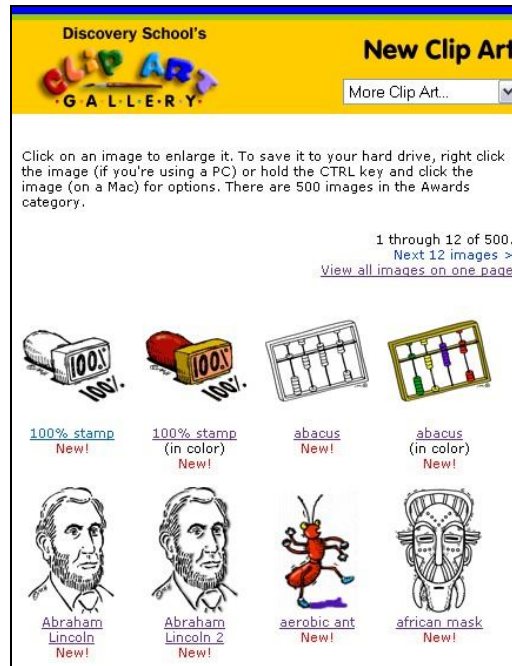


Fig. 5.6 Discovery School's Clip Art gallery

### ***Learning Assets***

The concept of "clips" is a powerful one in the computer world. Often called "assets" or "learning objects," these small snips of often-used media are increasingly collected by schools and teachers wishing to streamline the creation of instructional materials. This has resulted in an extension of the concept of clip art. A teacher who learns to "Insert-Clip Art" in *Office* will find that sounds, animations, photographs and movies are also available in the gallery. Similarly, universities and large schools are using electronic databases to organize "clips" of test questions, instructional videos, visual data, programming and web page code.

On a small level, the teacher who maintains a well-organized folder of instructional assets is creating such a resource for personal use. In the Apple environment, organization is simplified by the Finder's Movies, Pictures, and Music folders, all of which are accessible from within *iLife* and *iWorks* applications. This is indeed an asset in terms of the time it saves!

### ***Charts and graphs***

Charts and graphs are also examples of objects that can be created in one application and inserted easily into another. The computer saves time when producing charts, especially ones that are based on numerical data. Spreadsheets such as Apple's *Numbers* or Microsoft's *Excel* or *Works*, have excellent charting functions built into them. There is even a free website where data can be quickly charted - to create a clip art chart! The user indicates which set of figures is to be charted, then instructs the computer to go ahead and produce either a bar chart, a pie chart, a line chart, or some combination of charts. The process is simple, and the impact as a visual aid in the meeting room or classroom is significant. As the saying goes, "A picture is worth a thousand words," or numbers in this case.

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Fig. 5.7 illustrates some of the chart formats that can be created online from numerical data using Create a Graph (<http://nces.ed.gov/nceskids/graphing/>).

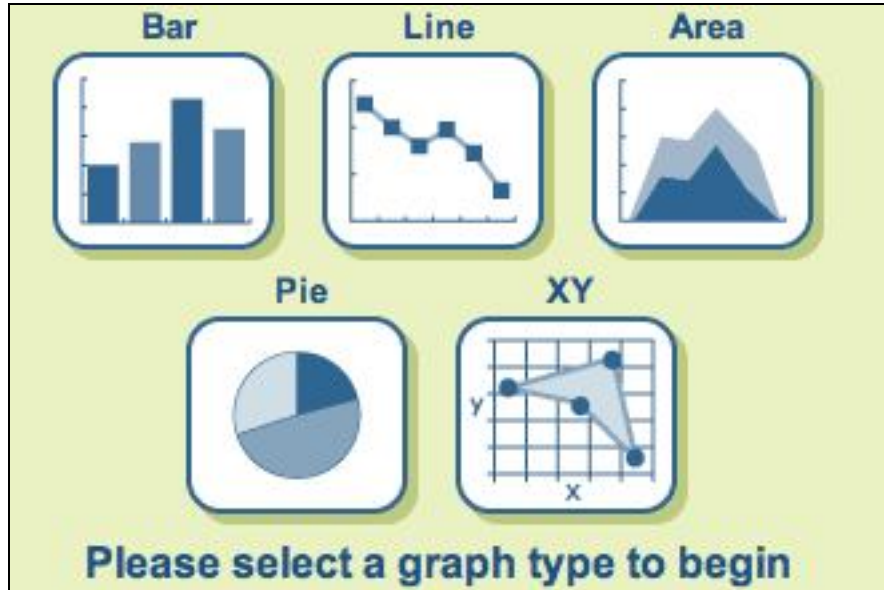


Fig. 5.7 Standard chart formats available at Create A Graph

Teachers, especially elementary school teachers, can combine clip art and drawing tools to create Venn diagrams, pictographs, and other creative visual representations of data more appropriate to the students they teach. Copy-paste makes this easy!

### ***Integrated Applications***

The drawing tools in Microsoft *Office* are excellent and nicely integrated with the word processor so that graphical material can be added to handouts. Microsoft's *Office* suite of productivity software has a large library of clip art that is partly installed with the various programs in the suite, but also extends to the web where Microsoft maintains an ever-growing gallery of thousands of examples of clip art for everything under the sun. This means that users of other computer platforms can use Microsoft clipart as well.

Some of the best tools are the simplest ones. Apple's *AppleWorks* was for years the best all around integrated productivity tool, with its text, spreadsheet, table, drawing and painting tools available in all six of the suite's applications. The beauty of *AppleWorks* is its simplicity: it takes up relatively little room in your computer's hard drive, works quickly, and is easy to learn and use. New Macintosh machines ship with the integrated *iLife* and *iWorks* applications, which also have a consistent, easily learned interface.

Teachers need to be very familiar with one or two of these tools for their own work in preparing for class. But also they should be aware of most of these tools, even if they don't use them all of the time. They will then be able to help their students take advantage of computers for schoolwork and help their colleagues as well. Using the best tool for the job is an important computer skill for teachers, one that requires knowledge of a broad range of applications and

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resources. Teachers who have this knowledge will be able to guide their students wisely and confidently.

***Presentation (Authoring) Software***

Several programs have vied for market share in the area of presentation software—software which helps you to develop visually engaging slides for computer-based presentations, to create digital movies, interactive activities, or transparencies for overhead projection or projection using a document presenter. When used to create a digital presentation (as opposed to one that will be printed for distribution or projection), these applications combine text, images, sound, animation and even video elements. All programs support hyperlinking<sup>12</sup>, but the best instructional presentations are linear "slide shows," and it is upon this that the teacher should focus. Teachers are successfully using such presentations at parent nights and conferences as well as in the classroom. Teachers who are confident presentation builders are encouraging their students to create them.

Roger Wagner's *HyperStudio* program has been quite popular in schools and is still well regarded, although it is less often used now that labs are being replaced by laptops. Other commonly found applications are Broderbund's *KidPix* and Apple's *Keynote*. Learning to use any one of these will provide the teacher with a powerful skill set, for the most important tools and features are similar in all applications. But for ease of use and availability, Microsoft's *PowerPoint* program is hard to beat, and it is probably the one that teachers are best advised to learn. Apart from anything else, it is a component of the *Office* suite of software and as such will be already installed on many recently purchased Mac or Windows computer in the schools. So time spent learning to use *PowerPoint* will not be wasted.

Teachers will quickly be able to produce eye-catching and instructive presentations appropriate for all age groups and for all subject areas. As already indicated, tutorials for Microsoft *Office* designed to help teachers learn all components of the Office suite of programs, including *PowerPoint*, are available from the author free of charge on-line.

*PowerPoint* provides the hooks on which to hang thoughts and ideas. The visual appeal of the presentation focuses the audience upon content while the slides themselves organize the presenter. *PowerPoint* has, therefore, value as a lecture crutch. There are occasions when lecturing is the way to go, even with younger children--in order to present information of various kinds. A presentation is not, however, a replacement for a lecture, any more than it can replace an essay; it is a visual presentation of the key topics being covered. As a general rule, presentations should follow the 5x5 rule: no more than 5 bullet points per slide, each containing no more than 5 words. The text might be interspersed with well selected pictures, charts or tables, even video, musical or audio clips (most presentation software applications have a voice recording feature) to add humor, emphasis or spark. Occasionally there might be a hyperlink to a relevant page on the Internet or a text box containing a longer piece of important information.

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<sup>12</sup> Hyperlinking means moving back and forth between slides in non-linear fashion, much like navigating a website.

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***Managing with PowerPoint (or other presentation application)***

If the presentation is to be projected, the projection in the room should be powerful enough so one barely has to dim the lights. It is important to have ample ambient light for students to take notes and for the teacher to interact with them during the course of the lecture. Every now and then the teacher might grab a piece of chalk and toss some ad hoc diagram, word, or phrase on the chalkboard. In classrooms equipped with a *Smartboard*<sup>13</sup> the teacher is able to capture these spontaneous annotations and notes, saving them as an annotated slide show.

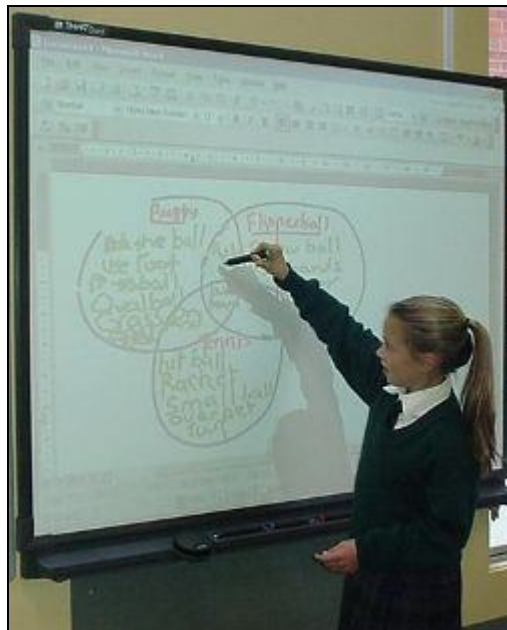


Fig. 5.8 An interactive *SmartBoard*

It is a good idea always to give students, or audience, a three hole-punched handout (three slides per side of a single sheet of paper) that provides a miniature version of the presentation. They will then have a lined area next to each miniature slide where they can take notes. Producing such handouts is a printing option in most presentation applications. Quite a few students will still choose to use their notebooks, however. The teacher might also post the slide shows to the web so that students who miss a class, or do not take good notes, can check them out. All presentation applications simplify this process.

An alternative for the teacher presenting in a computer lab or a classroom with laptops is to distribute the entire presentation, on CD, flash drive (also called a USB drive or keydrive) or over the network. This allows the viewers to add comments and notes to slides during the presentation, creating a personalized slide show.

Other teachers create only the skeleton of the presentation, filling in the "details" as students generate ideas during discussion or research.

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<sup>13</sup> The Smartboard, or electronic whiteboard, is a powerful, but expensive, teaching tool that extends the concept of "chalkboard."

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Both students and teachers can benefit from the multimedia extension that *PowerPoint* provides. It is another powerful example of how the visual presentation of information and ideas enhances learning. In an era in which a typical child is exposed to 8.5 hours of non-school media a day (video games, Internet, music, home computers) and actually *uses* media 6 to 6.5 hours a day outside of school (Kaiser Family Foundation, 2005), it is often helpful for the teacher to have a multimedia "hook."

Presentation tools also can be used for class management. Here are a few of examples of this. The first idea comes from Nicole Foster in Baton Rouge, Louisiana.

Here is an idea I got from a class I took that uses a *PowerPoint* as a timing device to help kids keep track of time left to complete an activity. Just make a slide for each minute an activity takes. For instance, a 10 minute activity would have 11 slides, each saying 10 minutes, then 9 minutes and so on down to 0 minutes. Have a "Bells and Whistles" occur when the last (11th) slide comes up, and have the presentation automatically progress every minute. Students can easily see how much time is left to do an activity if it is placed on a big screen, and no one can complain that they didn't know. You can hide screens as well, if you want the presentation to run for a shorter time.

Other class management ideas come from Glenna Norton.

I use *PowerPoint* in my classroom, but not as a lecture crutch. At the beginning of the year, I post the classroom rules so the students can look them over as they get settled in and I assign seating. I also use it to post steps in a process we are getting ready to do. No matter how many times we review the process, someone will have missed it. It is a time-saver for me so that I don't sound like a broken record. My room has no chalkboards or white boards and it is a simple way of showing the kids a process without repeating yourself, especially if you time each slide and loop it to start over again.

***Web-based Presentations***

More and more teachers are learning how to create and maintain their own web pages. In the next section we will discuss the communication advantages of this. A web page is also, however, a powerful visual presentation, one to which the student or other intended viewer can return anytime, anywhere (as long as there is an Internet connection).

It is now very easy for teachers to present content on the web - all you need are a way to make web pages and a place to put them.<sup>14</sup> A free WYSIWYG (What You See Is What You Get) web page composers is built into the *Netscape* Internet browser. Microsoft *Word* and *AppleWorks* documents can be saved in .html<sup>15</sup> format - instant web pages! Even *PowerPoint* presentations can be exported in .html. The newest Macintosh operating systems support *iLife*, an integrated, media-rich system that makes web page creation a snap. Teachers with local (in school) web

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<sup>14</sup> The technology support staff is one of a teacher's most powerful allies. Their help is essential for teachers wishing to use the school's web site or Intranet for web page hosting.

<sup>15</sup> html, htm, or HTML, is the "hypertext markup language" that browsers read to display web pages. Although it is useful for teachers to know the basics, in depth knowledge is not longer necessary for the creation of an instructional web page.

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space or inexpensive .Mac accounts (available from Apple) can easily and quickly create and upgrade instructional and information web pages.

Many schools are using *First Class*, a multipurpose e-mail application, to host teacher web pages. Additionally, many organizations and companies provide web space, homepage templates, and even tutorials free to teachers. YourHomework.com (<http://www.yourhomework.com>) and HomeworkStation (<http://www.waveside.com/homework/>) are just two examples. A free, global and secure web space for schools, which includes special communication tools and school networking, is available at Oracles *Think.com* (<http://www.think.com>). The communication and instructional uses of web pages will be discussed in later chapters.

A relatively new development is the availability of district-hosted web applications. *Moodle* is a integrated, open source, solution that allows teachers to create informational and research-guiding web pages, as well as quizzes, chat rooms, forums and more. *NoteShare* is an inexpensive application for the Macintosh (currently) environment that allows teachers to make any instructional multimedia “notebook” available to students over a web server.

Although there are many free website and web page hosting services, such as MySpace and Geocities, we don't recommend them to teachers. These sites are supported by advertisers and not selective in any way. Visitors to such sites will see banner ads and alluring pop-up windows, and, perhaps more importantly, will have access to all other sites hosted by the provider, many of which contain adult content inappropriate for children. Use of a secure hosting solution, either in-house or education-specific, is highly recommended.

One exception to this is the use of *blogs* and *wikis* as core teacher web spaces. Safe, secure and easily managed services are freely available to teachers. *Edublogs.org*, *Class Blogmeister* and *Wikispace*, and *pbWiki* are highly regarded examples. Teachers will .Mac accounts and Apple computers can manage their own blogs. By electing this solution, teachers can create instructional content and classroom communications “on the fly” - that include relevant documents, images and other media. They can even create and manage student blog spaces! This trend, which borders upon but is safer than “social networking,” is one today's most exciting productivity solutions.

### ***Multimedia Applications***

As we have seen, media is everywhere today. The classroom should be no exception. Virtually all of the applications mentioned in this chapter will support sound and video as well as images and words. Teachers today need to have some facility with creating and manipulating these media formats.

Luckily, applications and help are readily available. In the Macintosh world, *iMovie* and *Garageband* simplify the job of recording and editing video, sound and integrated documents. Free applications, such as *Audacity*, facilitate music recording, or “ripping” (recording from a CD), and many teachers use *iTunes* to download and organize songs and podcasts. As mentioned before, most presentation applications support both animation and sound recording. Most importantly, presentations can be *exported* (saved as) video files, generally in the QuickTime format. These QT files are compressed, so that the movies can easily be transported or shared.

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We should not ignore the huge growth of online media. *YouTube* is the leading source of short video clips, but both commercial and educational videos are also readily available on the Internet. All that a teacher needs is a “plug in” application that will enable the web browser to capture and save the video file and the appropriate view application (*QuickTime* or *RealPlayer*, for example). The inexpensive *QuickTime Pro* makes it possible to edit or “patch together” short videos, so that the teacher controls the content of the presentation. Each new generation of applications makes the process friendlier. Teachers can always ask their students for help!

Today’s teachers should have an elementary knowledge of how to create and manipulate sound and video files. They must also be mindful of copyright considerations. FairUse applies to presentations created for class use, but does not apply to material that is made available in violation of copyright!

***Graphical Organizers***

Graphical organizers do just what their name implies; they organize information and ideas graphically, or visually. Sometimes called “concept mappers,” these tools have endless uses for the teacher. Most teachers have used “bubbles” to brainstorm ideas on the blackboard or added arrows, circles and colors to planning notes. Most commonly, graphical organizer applications are used in planning. They organize the planning process, from brainstorming to presentation or publication.

Organizers indicate not only the chronological progression of a lesson or process, but also the interrelationships of the many elements or steps. They are also often used to create content for instructional presentations or to gather and organize notes from a meeting, both tasks important for the teacher. Moreover, documents prepared using digital organizers can be archived, easily updated, and shared in many ways with administrators, students, parents and peers.

Draw programs can be used to create visualizations composed of shapes and text. Spreadsheets and word processors can be used to create timelines and tables. Programs specifically designed for these purposes, however, are much less frustrating to use and much more efficient.

Probably the most used graphical organizer is *Inspiration*<sup>16</sup> (<http://www.inspiration.com/>). If used only for brainstorming lesson plans, this is a powerful tool for the teacher. One great advantage is the ability of the teacher to change and annotate a diagram, or web, created by the application (see Fig. 5.9) as part of the evaluation process or as new ideas and information become available.

Another advantage of *Inspiration* is the ability to add web page hyperlinks and appropriate, attractive images to a diagram. Lastly, the compact visual nature of *Inspiration* makes it useful in collaborative planning sessions. Diagrams can be linked and annotated by group members. Diagrams can be saved as web pages and as digital images, enabling the teacher to share them in a variety of ways. A completed diagram can be exported as a fully hyperlinked and indexed website. Further, the diagram can be converted into an outline and exported directly to *Word* or *AppleWorks*, or converted in one click into a *PowerPoint* slide show!

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<sup>16</sup> *Kidspiration*, the elementary grade version, is less widely known



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This versatile application offers the teacher many classroom management tools and quick, efficient organizational solutions.

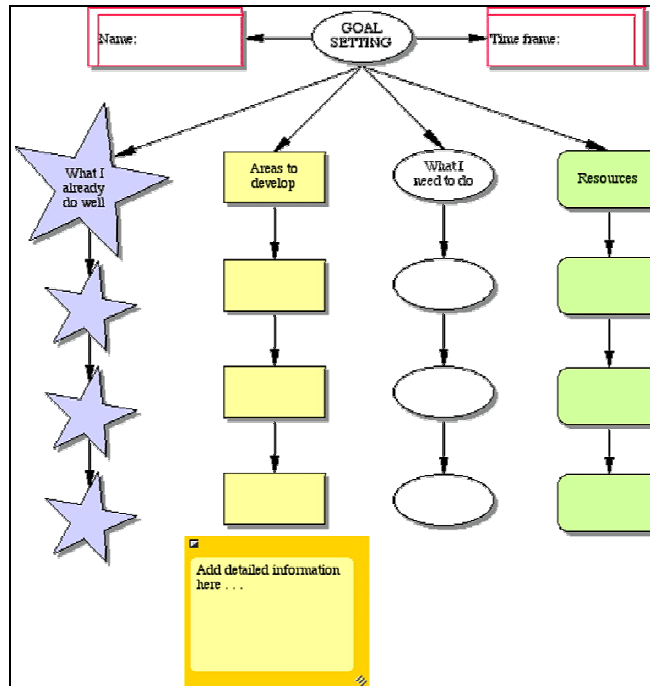


Fig. 5.9 *Inspiration* template used for self-evaluation

Tom Snyder's *Timeliner* (<http://www.tomsnyder.com/products/product.asp?SKU=TIMV50>) is a graphical organizer whose major use is to quickly create timelines. Teachers can use this tool in the planning of lessons and long-term projects, printing banner and poster timelines or sharing them as images files. Like *Inspiration*, then, *Timeliner* is a powerful presentation application. It has a secondary use, however. Because a *Timeliner* "event" can contain media elements (narration, video, music), graphics, and web links, it is a wonderful tool for electronic portfolio building. Portfolios can be displayed digitally by viewing the "events" on the timeline in slideshow mode.

### ***Communications Software***

The subject of communications involves the use of local and remote (wide) area networks to link people and computers for the purpose of data and information exchange.<sup>17</sup> Today, internet connections are ubiquitous in schools. Further, the e-Rate program (discussed earlier), and state and local initiatives, have greatly increased the number of schools that have in-house networking, either wired or wireless. It is increasingly likely, then, that a teacher will be required to complete many essential classroom management tasks using either an internal network or a web page.

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<sup>17</sup> Data is the raw material of information, information being the mind-enriching experience once data has been transmitted, processed, understood and assimilated by the human brain.

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Communication is the lifeblood of education. The more schools cultivate opportunities for their constituents (administration, teachers, parents, students, community at large) to communicate the better—whether within the context of the school, within the larger community of the school district, or beyond. Such communication is the best means to break down prejudice and barriers between people.

Communication applications are key class-management tools when it comes to establishing and maintaining close contact between parents and the school. Such contact is vital to an educational institution's success. Children who are aware of the collaboration between their parent(s) and the school are much more likely to gain the maximum benefit from the educational experience. We will return to this subject later in this chapter (Communicating Between Home and School) and again in chapters 7 and 8 when we discuss computers & communications (C&C). Briefly, voicemail, e-mail and online systems are replacing "the backpack post office" and its reams of printed announcements. Teachers need to learn the tools and methods that their schools have created to meet communication needs.

Browsers are communications software to manage access to the Internet and the World Wide Web, where teachers from around the globe share experience and teaching materials, locate essential information such as current state standards and School Report Cards, and join bulletin boards and lists to share ideas with their peers. As you will learn later, web-posted assignments and announcements are used by many teachers to keep parents and students informed. As mentioned earlier, many schools are also developing web-based SIS (student information systems) to facilitate the communication of all student data.

E-mail is another essential communication technology, one that most teachers are already familiar with. As schools make e-mail available to teachers<sup>18</sup>, communicating with peers is becoming an important part of the teacher's personal preparation. Listservs and mailing lists<sup>19</sup> link teachers to other teachers with similar needs and interests. Internally, schools now frequently communicate in-house and in-district through e-mail, often eliminating printed announcements and voice messaging entirely. Lastly, as will be discussed later in this chapter and in Chapter 7, e-mail has a niche in home-school communication, perhaps the most important communication of all.

The Internet is probably the fastest growing technology of all time. It is no surprise, then, that new applications and tools are constantly being developed to maximize its use. Several advances have already been embraced by educators around the globe. These include "real time"<sup>20</sup> communication tools, such as IM'g (instant messaging), chat, and videoconferencing, cellular communication tools, such as e-mail, photography and texting<sup>21</sup>, and asynchronous<sup>22</sup>

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<sup>18</sup> Because e-mail is the Internet activity most often undertaken by adults, it is reasonable to assume that most teachers have personal e-mail accounts already. However, using a school account for professional communication is more secure and highly recommended.

<sup>19</sup> A *mailing list* is a group of e-mail addresses that will receive the same message with one click of the Send button. A *listserv* is an automated mailing list, generally comprised of those who have subscribed because they share a similar set of interests or learning goals.

<sup>20</sup> *synchronous* is another term for "realtime."

<sup>21</sup> *texting* is the term for inputting a message using a phone pad.

<sup>22</sup> *asynchronous* communication occurs through posting messages that others can read at any time.

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communication tools, such as online bulletin boards, forums, video streaming, blogs, podcasts and wiki's. Free, open source, and online tools for the creation of blogs, wiki's, messaging and podcasts are available online. Increasingly, supporting applications are included with new versions of computer operating systems.

The "tech savvy" teacher should keep abreast of new tools, many of which will be explored more fully in later chapters. As is true with all Internet use in the classroom, however, teachers should be cautious and careful about implementing these new tools and technologies. As is true with all of the tools mentioned in this chapter, the wise teacher will fully explore a new tool before using it with students. Luckily, the education community is aware of this, and information, guides and mentoring are readily available in online communities, through blogs maintained by experienced teacher-users, and in educational publications.

It is important for the teacher to be a confident user of the tools provided by the school and available in the educational community. As you have already learned, it is the nature of technology to change rapidly and for education to lag behind the business and personal worlds in the inclusion of "gadgets" and new tools. This is often for the best, but at times teachers who are not aware of new tools and methods find that this affects their ability to manage effectively in the school environment. Conversely, it is good for teachers to remember that education is about students and teachers - it is about *people*. Often the best communication application is face-to-face, in "real-space."

***Useful Utilities***<sup>23</sup>

Teachers who have computers on their desks, access to a computer in a lab or office area, or the use of a PDA (Personal Digital Assistant, such as a PocketPC, Palm device or new digital smartphone) can take advantage of several useful time-management utilities. These include calendars, memos and notes, address books and file finders. Once again, this kind of software is only as organized as the people using it.

**Calendars** Teachers need to schedule and keep track of endless important dates: due dates, meeting dates, conference dates, vacation dates, and personal dates. Digital calendars are an alternative to the pocket datebook. They come in many forms. Yahoo and other services provide free calendars to registered users and groups. Education website host services generally provide interactive calendars. Both the Windows and the Apple operating systems contain calendar utilities that can be synchronized with hand-held devices. E-mail applications such as Outlook and FirstClass have a calendar feature.

Both the Palm and the PocketPC operating systems have powerful calendar systems. Some schools have created interactive online calendars that can be used by teachers.

Because on-line calendars and calendar applications come with perpetual calendars, you need only enter the year; the system works out which day of the week January 1, 2009 falls on, and whether or not it is a leap year. On the screen, one can display a day, a week or a full month,

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<sup>23</sup> A *utility*, in computerese, is a small application that packs a wallop, often doing an essential small task inexpensively and better than anything else. For the purposes of this chapter, the more general definition of the word, ("a useful tool") will be used.

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like a hard-copy calendar, and enter data into each date. One can add details to an entry by opening up the box for a single day and typing in more extensive notes.

For example, say you have a department meeting scheduled for March 10. You would enter the time of the meeting in the box for March 10, then open up the box to add notes about what you want to bring up at the meeting. Another useful feature of most digital calendars is an alarm that can be set to correspond with a time set on a certain date. For example, you could have the computer or PDA remind you at 3:00 pm that you have a department meeting scheduled for 3:30 pm on March 10. Of course, this will work only if you happen to be using the computer or PDA on March 10!

Most calendar applications also have a utility called the "To-do" list, in which the teacher can note and categorize the specific tasks associated with an event, to be completed by a certain date, or just to be completed, period. Checking off items as "done" is a rewarding element of classroom management. The list and calendar together provide a useful record of a year's work!

Lastly, many calendars can be shared with a group, allowing teachers to enter and retrieve current appointments, meetings, and other scheduling information that is important to classroom management. Other uses of the shared calendar are for collaborative planning, a growing trend in large educational projects, and the scheduling of shared spaces, such as auditoriums and meeting rooms. Many teachers use student-created calendars to organize student projects or to maintain an overview of all student deadlines and tests across the grade curricula. This is a powerful way in which students can take responsibility for their own learning tasks.

**Memos** Another useful utility is a digital note pad for memos. Like calendars, they come in many forms. On a PDA, the memo is a built-in function. Another fun form is the digital sticky, a utility that mounts a stack of virtual sticky notes directly on the computer desktop.

A personal note pad is easy to set up on a teacher's computer, for the modern multitasking operating systems enable you to have several applications and files open at the same time<sup>24</sup> and easily switch from one to the other. One of these files could be a *Notepad* document, which you would keep permanently available in the taskbar to enable you to enter notes in the form of memos, reminders, ideas, dates, to-do lists, even images and shopping lists! At the end of the day, before shutting down the computer, you would simply run off a copy of the *Notepad* document, if necessary, or save it for future use.

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<sup>24</sup> This is called "concurrent processing" in computerese.

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**Address Books** An address book is a database. Although many teachers keep colorful hand-written address books handy, it is useful to keep school contacts in a different, digital file. Both the Microsoft and the Apple operating systems have address book utilities, linked to the e-mail application. Additionally, e-mail applications like Eudora and FirstClass include an address book utility. Teachers can use these utilities to quickly locate and insert e-mail addresses, to create their own mailing lists, to locate phone and FAX numbers, and to quickly merge names and addresses into form letters and labels.

***Other Utilities***

Desktop computers also come with built-in utilities such as a calculator or graphing calculator, an alarm clock, or a file finder. Similar to the "Find" function in most computer applications today, a file finder is useful if you have dozens of files on disk and you cannot remember where you saved the file you need or, even worse, you cannot remember the name of a file. The utility will help you search all the files on a disk on a trial and error basis, using a subset of the name you think you might have used. Newer find applications also allow you to search the text of a file for a keyword string.

Then there are utilities such as card and label makers. These are useful when you want to give the children inexpensive cards or when you want to create business cards or CD labels. Desktop utilities such as this can often be downloaded<sup>25</sup> free of charge from the web at sites such as <http://www.download.com/>, Tucows.com (<http://www.tucows.com/>) or Version Tracker (<http://versiontracker.com/>). Just type "card creator" or "label creator" into the search box and try out some of the programs. *AppleWorks* and *Word* also have label-making utilities built into the word processing applications.

One of the best things a teacher can do is to teach students to use these a utilities – and charge them to do so. Students can then create notebook and file labels, or take care of making a birthday database, say, and getting cards ready in time. Alternatively, teachers can locate free "virtual card" and "e-card" makers on the Internet and have students send them to each other. Of course, students and teachers will need individual or classroom e-mail accounts (more about this later in this chapter).

Remember, your job as a teacher is to help children by doing and discovering. You can model this by doing and discovering for yourself!

**OTHER ELEMENTS OF CMI**

***Using Electronic Templates***

If you have been using the tutorials that optionally accompany this text<sup>26</sup>, you will be familiar with the concept of templates, which are also known as stationery documents or forms. To a great

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<sup>25</sup> *Downloading* means capturing a digital file housed on one computer (on this case, via a web page link) and moving it to a local computer or storage device.

<sup>26</sup> Tutorials for Microsoft Office designed to help teachers learn all components of the Office 2000 suite of programs are available free of charge on-line at <http://www.pitt.edu/~poole/Officeindex2.html>

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extent, much of the paperwork that we use both in and out of the classroom is standardized. This is true whether the paperwork is something as simple as a personal letterhead or a permission slip, or something relatively complex such as a disciplinary report or a curriculum map.

Usually, schools develop templates or forms for these purposes, with fill-in-the-blanks spaces for data entry. There are at least three problems with paper (hard copy)-based templates:

- It is necessary to produce multiple copies and store them somewhere where they can be easily accessed in anticipation of need—so they waste paper and take up space. Moreover, teachers can spend a great deal of time separating and organizing multiple carbons.
- Once forms are printed (usually in large quantities!) they cannot be easily changed—so if it is necessary to update the forms, the old ones have to be scrapped (they usually become memo pads if one side is unused).
- Completed forms, whether done by hand or on a typewriter or word processor,<sup>27</sup> must be entirely rewritten when changes are necessary.

Electronic templates, on the other hand, have none of these disadvantages. Once they have been designed and saved they can be shared with the rest of the administration and/or faculty on an as-needed basis. Where faculty members have their own computers, the personal set of templates they might develop for instructional or class management purposes would be saved in an appropriately-named subdirectory or folder on their hard disks and backed up in some way (always a good idea).

Formal templates, such as medical treatment forms used to supply information and permissions should a student be injured or taken ill while at school, would need to be controlled more carefully by a central administration. After all, assuming that all the teachers have their own computers, and assuming that every teacher knows how to use the word processor or other software used to create a template, how would one control changes to such formal templates if they were not centrally located? As soon as they were distributed onto multiple machines, it would be possible (Murphy's Law says it would be more than likely!) that advertent or inadvertent changes would creep into them.

The ideal situation, and one embraced increasingly by schools and districts, is for schools to have every faculty or administrative computer networked together. One computer, called a *server*, is centrally controlled and managed. Everyone with access to the network has different levels of access to different sets of files or data, controlled by passwords or predetermined based upon the user's login name. Certain files, such as student personal records, are available for read-only access by faculty; they can read the data, but they can't change it or add to it. Likewise, copies of certain templates are available only from the central repository on the server. In this way the format and content of these critical templates is less likely to be corrupted by arbitrary change.

The "next step" for schools and districts is to integrate all school-wide forms into an SIS. This web-based system displays records both interactively, so that staff with permission can add and edit data, and statically, so that appropriate members of the school community can access and

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<sup>27</sup> It is relatively easy to design a database layout or word processing template that will facilitate this task.

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read grade, attendance and other records. Such integrated access is a powerful communication tool.

Other templates, such as letterheads and lesson masters, are stored on each faculty member's machine or in a personal folder on the server, so that they can be customized to serve that faculty member's needs. Many of these templates can be shared among faculty. Indeed, a well-organized school would make some individual—a computer coordinator, perhaps—responsible for setting up a system whereby this sharing was formalized and encouraged.

Many useful templates are included with applications that are often used to generate graphics, publications and web pages, such as *Office*, *AppleWorks* and *Inspiration*. These include calendars, lesson planners, and activity organizers. Additionally, these applications allow the teacher to create her own template for distribution to students or colleagues.

A useful exercise would be for you to get together with a few classmates or colleagues and brainstorm to come up with a list of as many template possibilities as you can think of (consider using a graphical organizer for this task!). Then go through the resulting list to separate critical from non-critical templates. The next step would be to go ahead and create the templates, trying to use the best productivity tool for the task. Save your templates and share them. This will be one of the recommended exercises in the Do Something About It section at the end of the chapter.

***Preparing and Maintaining Curricula and Syllabi***

A syllabus is part of the content of a curriculum. Zais (1976) reminds us that the word "curriculum" comes from the Latin for "racecourse." Zais goes on to point out that many confuse the curriculum with the program of studies followed by students in their race toward graduation. Other interpretations define curriculum as course content, planned learning experiences, a structured series of intended learning outcomes, a written plan of action, even a "hidden" entity defining the unspoken outcomes of a specific educational experience. The concept of "curriculum" is, in fact, as diverse a concept as "educational goals" because the curriculum is, in the end, whatever an educational institution sets out to promote in its students. The curriculum can be painted with broad brush strokes describing overall goals of the institution; it can be painted with fine brush strokes describing the detailed specification of learning experiences and methodologies that are used in practice to achieve the goals of the institution; or it can be painted with any degree of precision in between.

Moreover, there are larger considerations, of which the teacher must increasingly be aware. Some courses, such as AP (Advanced Placement) courses, have suggested or predefined curricula. All states now have a detailed set of Learning Outcomes, or Learning Standards, which are correlated to the curricula and assessments of the individual schools. Many national academic organizations, such as the NCTM (National Council of Teachers of Mathematics, <http://www.nctm.org/standards/>) have created subject standards and contributed these to National Standards.<sup>28</sup> Lastly, NCLB<sup>29</sup> requires states to apply its standards, through testing, to reading,

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<sup>28</sup> Locate standards at the Education World website: <http://www.educationworld.com/standards/> You will also find material here on NCLB.

<sup>29</sup> No Child Left Behind, <http://www.ed.gov/policy/elsec/leg/esea02/index.html>.

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mathematics and science curricula and to be publicly accountable for student performance. Any one or all of these standards and guides may need to be correlated to a teacher's curricula.

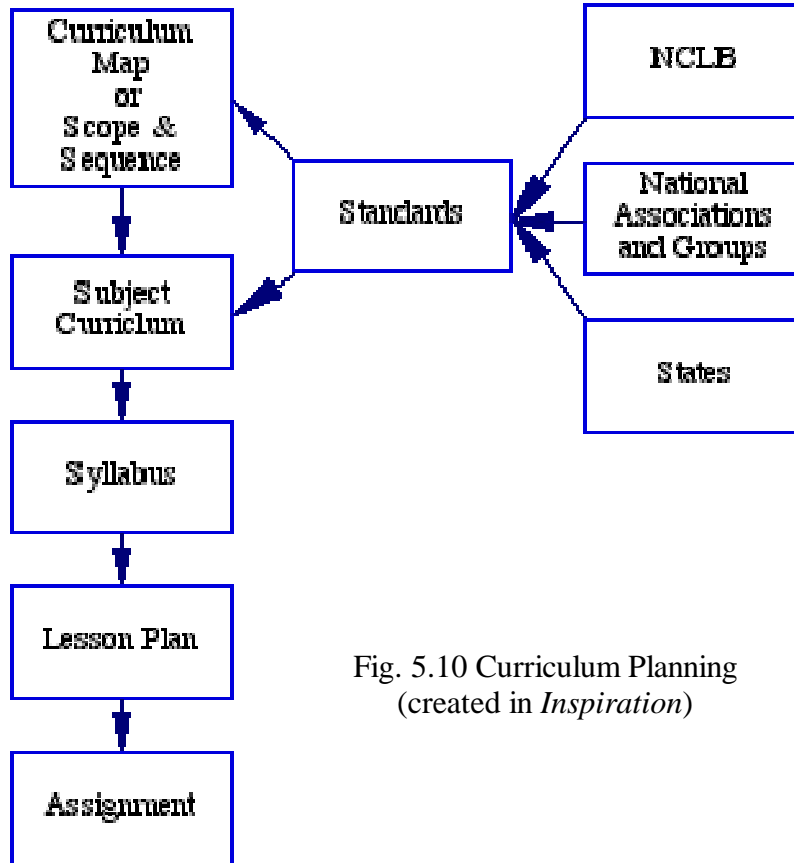


Fig. 5.10 Curriculum Planning  
(created in *Inspiration*)

Much of the planning a teacher does is on a much smaller scale. If we think of curriculum at the subject level, we can talk of the math curriculum, the language arts curriculum, the social studies curriculum, and so on. Each curriculum is promoted by a series of courses, and each course is described by a syllabus detailing its content and learning outcomes.

A curriculum is not static; nor is a syllabus—though a syllabus will change more frequently than a curriculum. This is because a syllabus tends to reflect the current realities of a discipline even though its primary objective is to promote the long-range goals of the curriculum. For example, the syllabus for a geography course in the social studies curriculum will naturally be subject to frequent change in order to reflect current thinking in the field and, if it is contemporary geography, current world affairs. If it does not, then there is a problem with the administration of the course: the course content will become progressively out of date. Although this is not true of all courses (for example, courses that offer instruction in the unchanging fundamentals of a subject such as mathematics), it is true of most.

Now, as the classical Latin scholar Publilius Syrus observed in his *Moral Sayings*: "It is a bad plan that can't be changed." Curricula and syllabi that are drawn up and saved in digital (soft copy) form will be more likely to remain current than those that are produced only on paper (hard



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copy). This is because it is easier to change a digital file. When doing advance preparation for a new school year or a new course, a teacher who only has a hard copy version of a syllabus will be less inclined to update it because it may mean rewriting the whole thing. The teacher with the digital version knows that the syllabus can be quickly updated to reflect new topics, methodologies, and so forth. Moreover, it can easily be shared with colleagues!

***Curriculum Mapping***

Many schools and school districts have undertaken a process called "curriculum mapping." Developed by educator Heidi Hayes Jacobs, curriculum mapping uses a school-wide or district-wide database to collect curricular data across all grades and academic areas, aligning it to the school calendar. Data is collected in three areas: content (essential questions, key concepts), skills, and assessments. It often includes syllabi and lesson plans and correlations to standards. It should come as no surprise that curriculum mapping is almost always digital, completed either over a network or on a website. Teachers benefit greatly from both the mapping process and the mapping product. As a tool for curriculum development and planning, especially *interdisciplinary* planning and *vertical articulation* (following an academic area across several grade levels), a completed map is a powerful tool. Those curious about curriculum mapping might take a look at the work of Oregon Episcopal School. Their map, completed with *Rubicon Atlas*, an online mapping application, has been made partially available to the public at <http://oes.rubiconatlas.org/login/options.asp?UserID=0>.

***Planning Lessons***

Another classical philosopher, Seneca, had this to say about plans: "Our plans miscarry when they have no aim. When a man does not know what harbor he is making for, no wind is the right wind." Lesson plans are drawn up as part of the immediate preparation for a class. Most school districts require that teachers not only prepare written plans for every lesson, but expect the plans to be available for inspection, too. Aside from the obvious practical necessity of having something laid down for a substitute teacher to follow, lesson plans are crucial to the process of achieving educational goals.

Lesson plans are more prone to change than syllabi or curricula. It is difficult to predict much ahead of time what will be covered on any particular day. Lesson plans from previous offerings of a course are useful, of course, but they may need to be rearranged, moved forward, moved back, updated with regard to content, and so on. Fortunately, more and more school districts are accepting lesson plans that have been prepared on the computer instead of using preprinted lesson-plan books or lessons prepared by a textbook publisher. This is another application of the templates we discussed in the previous section. It is easy to prepare a template is that based on the model used in a school district's lesson-plan book. This template can then be made available to any teacher who wants to use the computer for planning. The plans, once prepared, can be printed out and collected into a ring binder for inspection, deposited in a folder on an administrative server, or added to a digital document that can be viewed by all teachers (often, all three occur).

Advantages to using the computer for lesson plans include:

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- The plans are easy to read because they are not handwritten. In fact, teachers can project plans on a screen or whiteboard instead of writing daily plans or class outlines on the chalkboard.
- The plans are more likely to be detailed since it is quicker and less tiring to type in data than to write by hand.
- Plans that have been used before can be easily modified if necessary and reused. Moreover, they can be easily duplicated and filed for use in multiple formats and ways.
- Computerized lesson plans are more flexible. They can be easily rearranged, re-sequenced, added to, or deleted. This is true both for short term and long-term planning. Some schools insist on teachers using bound lesson plan booklets, which clearly limits flexible lesson planning. In addition, a bound booklet does not allow for idiosyncrasy with regard to different approaches to class preparation.
- Plans that have proved highly successful with students can be shared with other teachers through online databases, such as the Educator's Reference Desk (<http://www.eduref.org/Virtual/Lessons/>)—a database containing thousands of lesson plans and teaching ideas submitted by teachers from all over the world.<sup>30</sup> The best schools foster collaboration between the teachers at various age levels. Coordinating the collection and sharing of electronic learning materials is a good way to give added value to such collaboration.

Teachers in search of lesson plans and lesson plan templates will find the Internet a fruitful resource. A "Google search" (<http://www.google.com>) for "whale lesson plans" (for example) will result in literally thousands of "hits." To help the busy teacher, there are many portal sites that collect lesson plans (often reviewed) and index them by content and subject. In addition to the Educator's Reference Desk, PBS *TeacherSource* (<http://www.pbs.org/teachersource/>) and Bernie Poole's *EdIndex* (<http://www.pitt.edu/~edindex/>) are reliable and current resources. Increasingly, educational organizations, museums, magazines, journals and newspapers are creating digital lesson plans to supplement their exhibits and stories, and universities are sharing lessons created by inservice teachers, providing a goldmine of sound materials. The wise teacher will locate the most useful sources and return to them regularly.

### ***Preparing Learning Materials***

Copy masters, illustrations involving graphics in general or graphs and charts in particular, seating plans, style sheets, word lists, puzzles, questionnaires, quizzes and tests, assignment specifications, summary sheets, handouts of all kinds: these are the bread and butter of the teaching profession. Not only is a picture worth a thousand words, but directions are more likely to be followed if they are written down, and concepts are more likely to be digested if time is allowed for them to be mulled over.

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<sup>30</sup> This database complements and overlaps with ERIC (The Educational Resources Information Center), established in 1966 and newly available at <http://www.eric.ed.gov/>.

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It stands to reason that the computer is the best tool to use to prepare this kind of material. Even illustrations that might take extra effort using a computer, as compared with preparing them freehand on paper or on the chalkboard, will benefit in the long run from being captured as a file on the computer because of the increased flexibility afforded by this approach. If some detail of a design needs to be changed, this can be accomplished easily on the computer, whereas a non-computerized freehand drawing might need to be completely redone.

As discussed earlier in this chapter, in the digital world individually created instructional elements, "assets," or "learning objects," can be endlessly recombined, reused, and shared. Every piece of digital learning material is potentially a piece of a presentation, lesson, or assessment.

***About Boards***

Digitally created and distributed lesson materials do not mean that the chalkboard will no longer be a useful tool in the classroom. On the contrary, it is difficult to think of a more valuable medium for the spontaneous visualization of ideas.<sup>31</sup> Often, on the spur of the moment, teachers create remarkably effective diagrams in response to ad hoc interactions with an individual or a class. Too often these remarkably effective diagrams are dutifully erased, either to remove clutter from the board, or to clear the board for another teacher scheduled to use the same room.

One solution to this dilemma is to acquire an electronic board (a *Smartboard*, *Mimio-Board*, etc.) for each classroom so that such material can be saved and catalogued for future use. But this solution is still expensive for schools. More realistically, teachers should jot down a copy of any visual material that has been created on the fly on the chalkboard so that they can later transfer it to electronic form. Better yet, and thinking digitally, teachers can assign a student to take a digital picture of the board at the end of class. In the course of a single year, dozens of such digital assets might be created, updated, and perhaps shared with colleagues.

***Desktop Publishing***

Today, everyone's work can look good. As we have seen, the latest versions of word processors such as *Pages* and Microsoft *Word* incorporate more and more features that originally characterized desktop publishing (DP) software such as Aldus *PageMaker* and Microsoft *Publisher*. Teachers who use these modern word processors can easily create columns of text and tables, add frames and images, and create complex layout designs, along with the usual page layout features expected of word processors. Also, today it is easy to use different fonts (character styles) in a wide range of font sizes. Each of the above applications provides templates to help streamline the process. Producing professional-looking documents for distribution to students, parents, or colleagues is well within everyone's capabilities. Everyone's work looks good.

***Extending Your Productivity Toolkit with the Web***

The Internet is becoming an invaluable resource for the busy teacher. Producing "just the right" presentation, worksheet, puzzle, or assessment used to mean blackline masters, file folders of

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<sup>31</sup> Actually, chalkboards, blackboards and greenboards, are being gradually replaced by "whiteboards" due to the negative effects of chalk dust on both human beings and computers and the positive effect of a white background on projection.

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samples, or expensive software containing "teacher tools." It is now possible to locate online "masters" that will enable you to quickly generate attractive and personalized instructional materials. Sites such as *abcteach* (<http://www.abcteach.com/>) and *Discovery School* (<http://school.discovery.com/teachingtools/teachingtools.html>) facilitate the creation of puzzles, activities and worksheets by providing interactive online templates. Many sites are collecting work created by other teachers or publishers. One of the largest of these is *Quia* (<http://www.quia.com/web/>), where teachers and students may access interactive quizzes and activities (such as matching games and hangman) or, for a small fee, create them. *StudyWiz* (<http://studywizspark.com>) is a commercial online course-management application used in many 1-1 laptop programs for activity creation and document distribution. Some, like *Scholastic Online Activity Center* (<http://teacher.scholastic.com/activities/>), are portals for activities in many topics and grade levels. Other sites, such as *FunBrain - English* (<http://www.funbrain.com/>) and *The National Library of Virtual Manipulatives for Interactive Mathematics* (<http://matti.usu.edu/nlvm/nav/vlibrary.html>) provide interactive activities for specific skills or content.

Internet instructional resources are enormous. A Google search for "mammals word search" will, for example, provide you with a list of over 100,000 links to online word searches about mammals. Locating the best resources can be time consuming, but is one of the most worthwhile uses of the Internet for education. Remember the Rule of 3: STOP when you find 3 good resources! Experienced teachers return to the same resources repeatedly, adding new ones when updating is necessary (or, as often happens, the website disappears!)

A good teaching strategies for those with classroom computers is to create a web page or Favorites<sup>32</sup> folder containing links to puzzle, assessment and activity sites where students can create classroom quizzes and activities or take advantage of activities available online. Free online bookmark collectors are especially useful. Portaportal (<http://portaportal.com>) is one example. It is a wise teacher who takes the time to make such a listing, for this provides control over quality and content, and discourages "free surfing" during class time.

### ***Assessment***

Assessment is integral to the learning process. It includes teacher assessment of each student, of groups of students engaged in collaborative work, and of the class as a whole. It includes student assessments of each other, and of the teacher, too.

Assessment is both informal and formal. Informal assessment is frequent (several times a day or class period) and takes one of two forms: self-questioning about one's immediate and longer range personal and academic accomplishments and objectives (along with activities in pursuit of those objectives)<sup>33</sup>; and questioning about the progress being made by others. In business it is called *taking stock*. Good teachers create an environment where students are encouraged to be conscientious about conducting this kind of informal assessment, thus taking much of the weight off formal tests and other standardized measures of progress or achievement. Important outcomes

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<sup>32</sup> Favorites - the Internet Explorer bookmark folder; other browsers use different terms

<sup>33</sup> See fig. 5.9 for an *Inspiration* template designed for this purpose

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of informal assessment are an affirmation of what is working well and a redirection to a better effort, a different outcome, or a different solution.

Computerized tools that support informal assessment have the advantage of making redirection a reality. Viewing every digital lesson plan and activity guide or rubric (to be discussed next) as a tool for informal assessment encourages the teacher to review and update frequently and "on the fly." Not surprisingly, this is a task that students can take on as well. There are many tools available to support digital journaling. At the simplest level, students (and teachers) can keep an ongoing file in a word processing program. Applications designed for journaling range from the Macintosh specific *NoteShare* and *Journaler* to web-based blogging. No matter what tool is adapted by the teacher, it must be used consistently in order to be effective for self-assessment. The added benefit of digital journaling, of course, is that the "journalists" are developing their computer skills.

Formal assessment occurs in many forms, all of which can be digitally managed.

***Portfolios***

Good teachers assess their students on the basis of portfolios of work gathered over time, rather than relying predominantly on snapshots of progress captured periodically. Portfolios are especially important in assessing the objective value of a student's work, regardless of what other students may be doing. No two students are equally capable or gifted. These portfolios are often physical folders containing hard copies of student work. They can also, however, be digital. Digital "documents" (files, images, movies, etc.) are gathered into portfolios that allow the teacher to assess not how smart the children are, but rather, more appropriately, how they are smart!

Data folders, accessible to both student and teacher over the network, can facilitate the collection of portfolio elements. Some teachers use websites<sup>34</sup>, presentation software, like *PowerPoint* or *iMovie*, or journal applications like *NoteShare* to organize and access student work. Others allow students to collect and present their own portfolios, learning how to scan documents and use a portfolio application in the process. How a portfolio is created will depend upon the time and technologies available to the teacher.

Advantages to digital portfolios are many. They are fluid, allowing for rearrangement and grouping of various elements to follow student progress in a specific area or over a specific period of time. At the same time, they are permanent and can be archived year-to-year. Some schools present graduating students with a DVD or CD along with a diploma. Perhaps most importantly, they are real evidence of a student's work, making them invaluable during parent conferences. Some ambitious teachers (who have the tools available) will accompany a portfolio with a short video of the student actually *doing* the work.

***Rubrics***

A rubric is a chart or checklist that rates student, or group, learning and achievement based upon a scale of clearly defined tasks and skills. It is a powerful tool for assessing multimedia,

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<sup>34</sup> Students can create these sites!

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collaborative and authentic learning tasks. A rubric is a template (the same rubric should be applied across the class), so it stands to reason that it is best created on a computer! Numerous examples of good rubrics exist on the Internet<sup>35</sup>, where a teacher can also find *RubiStar* (<http://rubistar.4teachers.org/index.php>) and the *Rubric Machine* ([http://landmark-project.com/rubric\\_builder/index.php](http://landmark-project.com/rubric_builder/index.php)), tools for both locating and creating rubrics, and *NCREL's Scoring Guide* (<http://goal.ncrel.org/spsg/GetProd.asp>), a tool for creating checklist type rubrics. Rubrics can also be created quickly and easily by using the Tables function in a word processing program. A simple rubric, created in *Word*, is shown in Fig. 5.10. One very effective way of organizing rubrics for a classroom is to create them in an application like *NoteShare* that can hold literally hundred of rubrics on virtual "pages." These can be printed or digitally distributed to students.

There are some basic teaching practices that will make rubric assessment more rewarding for the teacher and for the student:

- First, a rubric is only useful if students understand it. Having them participate in creating it ensures that there will not be an expectation gap or language confusion.
- Second, create the rubric after the lesson is fully planned and after its goals and objectives have been finalized. Ideally, the teacher should also DO the project before beginning a rubric.
- Third, review the rubric with the students at the very beginning of a project and again halfway through it, making changes as necessary and reminding the students about their goals. Some teachers create several rubrics that assess a large project in "chunks" or activity steps.
- Fourth, use the rubric! Be sure to complete it and review it with the students. Many teachers use rubrics for peer assessment, but this requires close supervision and a great deal of trust within the classroom. Teachers can effectively complete a digital, or printed, rubric as students are presenting their learning.
- Fifth, share rubric assessments with parents!
- Sixth, return to the rubric template at the end of the project. This is the best time to make necessary improvements.

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<sup>35</sup> One of the best listings is by Kathy Schrock - <http://school.discovery.com/schrockguide/assess.html>.

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My Favorite School Survey Assignment - How Did I Do?					
					
Name: _____		Teacher: My Favorite Teacher			
Date: _____		Title of Work: _____			
	Criteria				Points
	1	2	3	4	
<b>Data Table - Spreadsheet</b>	Contains fewer than 5 items Table does not contain headings or contains blank rows or columns Data entry does not follow directions Data does not make sense Fonts and alignment are not consistent There is no chart or chart is inappropriate for data set	Contains at least 10 data elements Table has correct headings and no blank rows or columns Little or no additional formatting, but data formatting is consistent Data is entered correctly Consistent fonts and alignment Chart has default formatting, chart type is OK, but there is a better one	Contains more than 10 items Table has been formatted attractively Text fields provide some explanation Chart has been enhanced with formatting, but it is a little hard to read	Formulas have been used for totals and average Graphics enhance the table Text fields provide explanation and analysis Chart has been well-formatted, chart type is excellent for the data	---
<b>Collaboration</b>	Worked poorly or not at all with group members	Worked well with group members but contributed very little effort or refused to do only assigned task	An active group member who did a fair share of the work and kept on task	A group leader as both a listener and a doer Organized group as well as focusing on own task	---

Fig. 5.10 Sample Rubric for a Survey Assignment

**Tests**

Are formal tests necessary? It is beyond the scope of this book to dwell on the arguments for and against formal testing. Some would argue that tests (objective, standardized, or otherwise) are necessary because it is naive to expect that all students (and all teachers, for that matter) will conscientiously conduct useful self-assessment. Others argue that fundamental change is needed in the way schools are organized and managed if formal assessment techniques such as tests are to be done away with.

Some schools of thought would do away with formal testing altogether. But for the time being, formal tests are necessary for two reasons:

- Those who pay for the education system need some commonly agreed upon guideline, or benchmark, for assessing the effectiveness of schools, which usually takes the form of scores on tests. The NCLB Act requires that states design and submit assessment results each year, resulting in state-wide tests aligned to learning standards.
- There is a tradition of formal testing in schools, a tradition with an inertia of its own. Where this is the case, formal testing actually dictates to some extent the academic ethos of the school, in regards both to teaching styles and student study habits. Many teachers rely on testing as an important component of their methodology.

Moreover, formal tests that are given to all students over a period of years provide useful, and often important, information about student progress in the skills and content knowledge targeted by the tests. When used *formatively*, or to inform teachers, students and parents of specifically what the student knows and understands along the timeline of a unit or year, formal testing can be an important component of an individual student's educational plan.

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*Using the computer to generate tests*

The computer can help with the generation of tests in at least three ways:

- Many textbooks come packaged with computerized test generation tools. The software gives the teacher the ability to create new tests, revise old tests, and save multiple versions of tests with questions ordered differently to discourage cheating in classrooms where the children sit closely together. The package usually includes a database of test questions prepared by the author of the textbook. A good test bank is made up of different types of questions: short essay, multiple choice, true/false, fill in the blanks, and matching, for example. Recently published texts may have websites to support or replace "hard copy" support materials.
- Using the word processor, teachers can set up test templates, including all the formatting and page layout features. These templates can be made available for other teachers to use and archived digitally for reuse and revision. Devising and entering the questions would be the only time consuming activity. An alternative to using the word processor is a test generation application such as *ExamView* (<http://www.fscreations.com/examview.php>) or free online test and quiz generators such as *QuizStar* (<http://quizstar.4teachers.org/>) and *EasyTestMaker* (<http://www.easytestmaker.com/>). These packages are not keyed to any particular text. The modules help a teacher create a question file (including graphics, if desired), then create a test, organize the test, and print it out. Once again, the only time-consuming activity is devising and entering the questions. Teachers can also find many *utilities* online to help with test generation, including special fonts, equation editors that create mathematical problems or expressions with little effort<sup>36</sup>, chart makers, graphing calculators and foreign language fonts and keyboards<sup>37</sup>. It is wise to work with the tech support staff to learn these well before beginning to make a test.
- There are many reasons for a teacher to involve the students in building tests. In the spirit of encouraging the students to assess each other and themselves, a teacher can set up the word processor, or a digital *NoteShare* notebook, for students to submit their own questions for tests. For example, if there are 25 students, each would be given the assignment of designing four or five questions, say, and handing them in by a certain date to a student assigned to enter them into a preformatted word processor file. On the due date, the file would be checked over by the teacher. Errors would be removed and, if necessary, more questions added so as to make sure all aspects of the material to be tested have been covered. A copy of all the questions would be run off and duplicated, or distributed electronically, so that each student would have a study sheet as a guide in preparation for the test. Finally, the teacher would select questions for the test, cut and paste them into a document, run off the test, and give it on the designated date. As was suggested earlier, students can access some of the free quiz generator sites as well, working in groups to create "pretests" for the class. One teacher had students create quiz slideshows in *PowerPoint* and combined them into one large presentation for semester review. Others use the computer to make testing and pre-

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<sup>36</sup> One of the best is *Equation Editor*.

<sup>37</sup> Also included with full installations of Microsoft *Office*, but you need to know how to set them up and use them



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testing fun. For example, Jeopardy, Concentration and Who Wants To Be a Millionaire game templates for *PowerPoint* are available online (search for "PowerPoint games"). These can be projected for full-class review, made available on classroom computers, or posted on the teacher website for students to play at home.

***Grading Tests***

Optical Mark Recognition (OMR)<sup>38</sup> is a well-established scanning technology that comes in handy in schools for many forms-based tasks such as attendance, data gathering, questionnaire analysis, test scoring and assessment, checklists, and so forth. The computer recognizes marks made on the printed page and is programmed to interpret them according to a predetermined set of criteria.

Tests that consist of one-option answers (multiple choice, true/false, matching) can be scored in a few seconds, depending on the size of the class. Typically, an optical scanner can process from 50 to more than 150 sheets per minute.

The forms can be purchased from the company that supplies the mark reader, such as *Apperson* (<http://www.appersonedu.com/default.asp>).

Online testing is becoming more prevalent as more districts and testing centers learn to develop this web-based solution. The GRE and TOEFL tests, for example, are already given in CBT (Computer Based Testing) centers worldwide. It is also becoming more common for districts and states to use commercial and non-profit testing ventures, such as NWEA (<http://www.nwea.org>), for student assessment testing. These digital tests, taken only on the computer, are scored immediately. Detailed breakdowns, or *item analyses*, of test questions are generally available over the Internet within a day.

Due to cost factors, volume, and complexity, however, the above methods currently have more application at the national, state and school-district administrative levels than in the individual classroom. However, online applications such *Quia* and *StudyWiz* allow the teacher to create reusable digital testing experiences for students that also provide immediate digital scoring.

A related technology is the interactive student response system. In classrooms equipped with this system, students with handheld devices respond to projected or paper test questions by using a "clicker" that resembles a remote control. Using this system, teachers can get immediate feedback on student understanding of key content and concepts. Because complete systems come with tracking and logging software, they can also be used for summative assessments at the end of a unit or term. Some systems come with tests as well. Like the NWEA testing described above, these systems are expensive, but provide multiple opportunities for guiding individualized, targeted, instruction.

***Distance Learning***

Although the phenomenon of Distance, or Online Learning will be discussed more fully in a later chapter, this is a good time to alert teachers to this growing trend in education. It is possible now for a student to take a for-credit course entirely online – even to complete high school without setting foot in a classroom!

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<sup>38</sup> You might think of it as "filling in the bubbles."

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This means that there are teachers who are doing all of the CMI tasks discussed here with **only** computer tools and without the expectation of seeing students face-to-face. It would stand to reason that there are web-based tools to simplify and support all aspects of the teacher's job (*Blackboard.com* is one of large commercial services). However, the course is only as good as the materials that the teacher gathers and creates. A good distance education teacher makes use of the same multimedia and text tools to create digital materials – those that will give students the best possible content delivered in the best possible way – that have been discussed in this chapter.

The best possible way for a teacher to learn about distance education is to take a course. Most state universities now have course available. *PBS Teacherline* (<http://www.pbs.org/teacherline/>) offers inexpensive professional development courses, many of which highlight technology. It may even be possible for a teacher to work with the tech support personnel to create an online course that supplements or replaces a class taught! *Moodle* (<http://moodle.org/>) is an open source application that makes this possible.

The best online class takes place in a virtual “smart classroom” – one where multimedia is fully integrated into each lesson. This works to keep students alert and interested. The same is true for the traditional, or face-to-face, classroom.

***The Smart Classroom***

Computers have significantly increased the number of options available to teachers for using audio-visual aids to increase the impact of their lessons. Technology such as tape recorders, film and slide projectors, overhead projectors and videocassette recorders (VCRs) are still part of the armory of audio-visual equipment at most schools. But computers and related equipment, powerful enough and at the same time cheap enough to eventually replace most of these machines, are now proliferating in schools.

***Computer-coordinated Classrooms***

In the classroom, the computer can be used with other technologies to form a multimedia instructional system, creating what is often called a "Smart Classroom." Such systems facilitate the incorporation of multimedia material<sup>39</sup> into lesson plans. In Chapter 9 we will look more closely at the subject of multimedia. CD-ROM discs, interactive videodiscs<sup>40</sup> and DVD's packed with computer-accessible media, such as still pictures, video and audio clips, many with multilingual sound tracks, are at the heart of multimedia classroom.

Again it should come as no surprise to the teacher that the Internet is a rich source of free multimedia. National Geographic (<http://www.nationalgeographic.com/>), PBS (<http://www.pbs.org/teachersource/>), and the Library of Congress (<http://memory.loc.gov/>) are among a growing number of institutions that have developed magnificent multimedia content for education. Live radio, *webcasts* (streaming video broadcasts), *podcasts* (recorded audio), and short video clips can be accessed through the Internet, often posted by individual educators<sup>41</sup>.

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<sup>39</sup> The term "A-V" or audio-visual is being replaced by "multimedia." Many schools still have an "AV Department."

<sup>40</sup> The videodisc is a media format that is disappearing. Many schools, however, have large videodisc collections.

<sup>41</sup> Because of this, teachers should always preview media before using it in class!

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United Streaming's (<http://streaming.discoveryeducation.com/index.cfm>) video-on-demand service makes short instructional video clips available for a reasonable fee, greatly reducing the need to purchase extensive video libraries. Many state and local museums and libraries are adding similar resources to their websites. Many make it possible for the teacher to create a free "portfolio" of multimedia learning "objects" that students can access directly. The wise teacher will explore the online media resources for each unit, well ahead of time.

Teachers who have Smart Classrooms find that they make much more use of them than they did of traditional audio-visual equipment. This is because, as we will see in Chapter 9, these systems greatly simplify the incorporation of multimedia into lesson plans. Multi-media applications and high speed Internet connections enable the teacher to access interactive media aids during the course of a presentation to reinforce and add to interest to what is being studied. Such materials are available in all subject areas and for all age levels. A history lesson, for example, gains focus from the display of maps, contemporary fashions, architecture, artifacts, speeches, interactive timelines, and so on. History teachers have always appreciated the need to use audio-visual materials such as these. The difference a computer makes is largely logistical: it streamlines the integration of a variety of media by reducing them to a single digital format.<sup>42</sup> This reduces the clutter and handling otherwise involved with paper, slides, transparencies, film, records, audio and video tapes, and other traditional media. In place of a cart of resources, a teacher can now insert a "burned" DVD into a projected computer or access a page of web links.

More important, Smart Classrooms lend themselves naturally to student-directed use for the development of research-related projects and portfolios of all kinds and for all age groups. The Smart Classroom contains hardware and software to *make media*, technology that was not available in the age of vinyl records and filmstrips. Scanners, for example, can be used to digitize and archive illustrations. Once in electronic form, these can be sequenced and displayed on large screen monitors or projected directly onto a screen, *Smartboard* or whiteboard using an LCD projector. Add microphones, digital voice recorders and digital cameras (still and video) and a classroom becomes a media production center. Software designed for student use and low-cost media storage devices have greatly simplified the creation of media products. It is the computer that coordinates the production and the presentation; but a smart and organized teacher is the production guide! This is another new role requiring new learning.

A useful exercise for teachers would be to discuss the myriad ways in which a Smart Classroom can be used to enhance learning. This will be another of the exercises in the Do Something About It section at the end of this chapter.

It doesn't take much imagination to foresee a future where digital technologies will transform the way teachers teach and students learn. Chapter 9 will give you the opportunity to learn more about the exciting possibilities.

***Managing and guiding students***

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<sup>42</sup> Sophisticated Smart Classrooms have a computer console than controls many media devices. These may be available in one room in a school, but are not widespread.

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Keeping track of students is another time-consuming task. Keeping grades, taking attendance, checking on irregular attendance, following up with communication with the home, keeping notes on each child's attitudes, behavior, health, and home background—these are just a few of the responsibilities that teachers are supposed to take in their stride along with their other responsibilities. Of course, teachers can not do all this as thoroughly as they would like. After all, they also have to teach!

So it would help if there were software to manage tasks such as these; and indeed there is. For example, *Easy Grade Pro* by Orbis Software (<http://www.orbissoft.com/>) allows a teacher to create an electronic grade book that, like a paper grade book, can store student data (which can be downloaded from an administration database), along with assignment, score, and attendance data on all classes and subjects. It also facilitates report writing by providing forms into which grades and student names are automatically entered. Teachers with PDA devices can use a mobile feature, allowing for assessment "on the fly."

*Easy Grade Pro* is also available in a "web edition." This enables a school to use a web server to make the student grade reports available on the Internet, securely of course. Many school are implementing this new generation of digital record-keeping.<sup>43</sup> One huge advantage of web-based grade reports are that they do not have to be printed because parents can also access reports online.

*Guiding Students*

Applications such as *Easy Grade Pro* can come in handy when the teacher is in the role of guidance counselor because "Knowledge is power," and relevant, up-to-date information can only improve a counselor's understanding of a student's situation. We discussed assessment earlier when reviewing the subject of testing. Another aspect of assessment relates to less easily measured skills, such as social skills, study skills, and creative skills—skills that are more generally related to character and personality. A person's character might be defined as the set of basic traits that make up that person's nature, and personality describes the way that character is projected and perceived by others.<sup>44</sup>

One of the greatest difficulties facing teachers today, perhaps more than ever, is the need to help children who are not "ready" for school. Problems at home, in particular, and pressures in the social milieu as well, can mean that a student may be physically present in class but mentally unable to participate to the best of his or her abilities. Even children from relatively stable family and social backgrounds will bring to the learning process ways of being that demand special consideration. Every child is different and deserving of individual attention.

Teachers are most effective with the children whom they come to know well. Some understanding of a student's character and personality and a familiarity with a student's home background and academic history are important in terms of providing the best learning experience. An experienced and empathetic teacher may be skilled at recognizing character and personality traits by

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<sup>43</sup> *PowerSchool* is a very popular tool for student record management, which goes far beyond grade forms.

<sup>44</sup> Random House Webster's College Dictionary, 1991 ed.

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interaction with a student. But the only way to learn about the same student's home background and academic history is to ask.

The computer can provide ways for teachers to "ask" without intruding. Journals, bulletin boards and blogs, for example, allow students to express their thoughts, feelings and fears quietly and in a form they understand - a digital form. Some teachers encourage students to create multimedia projects, like web pages and Digital Storytelling<sup>45</sup> presentations, so they can share and analyze their fears and frustrations. The development of an electronic portfolio is often an affirming process for students who are having difficulties.

Similarly, the computer can provide ways for a teacher to guide without intruding. We have seen how teacher created websites can facilitate lesson presentation. Teachers can also create websites containing links to material that will help students with personal and learning issues. Sound tutorials, homework help sites, health information and just plain "growing up" information can be found on the Internet and accessed privately by students. The librarian is a powerful ally for the teacher in the location and selection of these materials. The students themselves are an even more powerful ally.

For more objective data, schools that have computerized databases of student records are more likely to keep teachers apprised of important student data. This is simply because it is easier to do so. Manual collections of data stored in filing cabinets are cumbersome to get at and time-consuming to search through. Teachers are human; the more difficult it is to accomplish a task, the less likely it is that the effort will be made. Because it is important to know one's students well, data about students should be readily available to those who need it. The data can be protected in various ways to ensure that only those entitled to view a particular student's information may do so. Use of such systems, sometimes called "data driven decision making," has been given a boost by the passage of NCLB. One widely-used system is *PowerSchool* (<http://www.powerschool.com/>), a web-based SIS (Student Information System) that facilitates almost all teacher and administrative management tasks.

WhippleHill (<http://www.whipplehill.com/products/>) provides an alternate solution, more appropriate for smaller and private schools. Both companies scale and adjust their products to meet the requirements of the school or school district.

Another useful exercise for teachers would be to brainstorm the contents of the perfect system to both guide and manage students. What data should it contain? To whom should this data be accessible? This will be another of the exercises in the Do Something About It section at the end of this chapter.

***Communicating between home and school***

An important part of any teacher's job at the K-12 level is to hold conferences with parents, either at school or in the home. This interaction is vital to the quality of the educational process, notwithstanding the fact that it is often neglected. When the responsibility for interacting with parents is taken on by teachers, it must either be scheduled during lunch hours, in the evenings, or

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<sup>45</sup> Digital Storytelling combines narration, still images and video to present a "snapshot" of personal story.

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on weekends, both because of the teacher's heavy class schedule and because parents are not usually available during the day.

In some schools, interaction between the school and the home is coordinated by counselors—or "domestic mediators" as they are sometimes called. This arrangement works especially well when teachers are involved in developing those precious links to the students' homes. The domestic mediator, apart from having the benefit of training and experience, can bring objectivity to the three-way relationship between the parent, the child, and the teacher. Objectivity is especially important whenever, as is often the case, the reason prompting the interaction is some shortfall in the child's performance—for example, poor attendance, unruly behavior, or substandard academic performance.

In several areas, computer technology can foster this extra dimension to education by bringing the home into the school and the school into the home. The telephone system combined with computer technology has given schools the capability of maintaining communication 24/7<sup>46</sup>. Most schools now have a voice mail system. Parents can dial in to a school office or a teacher's voice mail and listen to a pre-recorded message, such as school hours, trip news, or daily assignments. Parents can leave messages of their own, to be responded to later. Teacher access to telephones during the day is often limited, however, and responding to parent requests and information must often be an after-school task - not at all helpful in an emergency!

It is possible for schools to quickly and inexpensively contact groups of parents with a voice message by accessing a central database of phone numbers and "sending" the message automatically. The advantages of voice data are clear: almost every home has at least one phone or cell phone, parents can be contacted during the day at work, and a message can be recorded in many languages. The disadvantages are less obvious: it may not be the parent who receives the message, archiving is difficult, and the communication is one-way; parents still need to initiate contact with the school in order to respond.

More and more common now is the use of e-mail and web-based communication systems. Most schools can, and do, expect most parents to be able to communicate through an Internet medium, either e-mail or web-based. The implementation of such communication systems is not complete, but it is definitely in the cards for teachers to be managing most classroom communications digitally. It is possible right now to teachers to create "free and easy" websites containing assignments, announcements and resources using the school's e-mail or web servers. Fee-based services, such as SchoolCenter (<http://www.schoolcenter.com/>) can provide a simple and secure school-based solution for districts that do not elect to maintain web servers.

Since these technologies come under the umbrella of C&C, we will discuss them in detail in Chapters 7 and 8. You should recognize for now that the classroom is an extension of the home. Some of the good things about the pre-computer age, such as frequent classroom visits by parents and a personal, supportive relationship between teacher and parent, are being reevaluated and redefined. NCLB has made parent-school communication a national priority. There is no doubt that the need for a home-school partnership is real and ongoing, but the best role of the computer in this partnership has yet to be defined.

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<sup>46</sup> 24 hours a day, 7 days a week

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### LOOKING BACK

K-12 teachers make money the old-fashioned way; they earn it! Learning to use computers effectively in the classroom takes a good deal of effort and, for those who are understandably frightened by the technology, it takes a good measure of determination as well. Those who have become skilled in using computers as a tool for teaching and learning will attest to the fact that CMI can be an effective ally to the teacher in the task of preparing and managing an environment in which children will feel encouraged to open up to knowledge. This chapter has identified various features of CMI, showing how technology can add a new dimension to a teacher's work with students.

Unfortunately, the computer does not make the job of teaching any easier. Ironically, the computer is such a versatile and enabling tool that computer-using teachers find themselves doing *more* work than ever, preparing *better* learning materials than ever, and following up on their students *more closely* than ever before—all of which take time.

Computers make teaching more effective when quality applications are used to conscientiously prepare and manage the learning environment. When teachers are given the opportunity to learn the new methodologies associated with computer use, and when they are given the ongoing support that must accompany the hardware and software tools, they have shown themselves capable of transforming the way they teach and the way their students learn. The end result is more effective teaching and more time for interaction with students, which brings its own reward.

As Henry Adams reminds us: "Teachers affect eternity; no one can tell where their influence stops."

### LOOKING FORWARD

Computer-assisted instruction (CAI) is a growing field with enormous potential. Learning systems that are available today are laying the groundwork for future, more standardized and comprehensive learning environments. We are learning what works and what does not, evaluation of CAI being an important task of all teachers who use it in their classes.

In the next chapter, we will look at the broad range of CAI available today. We will look at different types of CAI, and at specific applications designed for specific subject areas. We also will examine different software and web page evaluation instruments. Finally we will look into the crystal ball and try to predict future directions for CAI. It is an exciting prospect.

Charles Babbage, who, in 1812, invented the Difference Engine which earned him the title of "Father of Computers," Alan Turing, who, in 1936, posited the theory of the computer as a "Universal Machine," and John Vincent Atanasoff, who, in 1939, invented the electronic digital computer—along with the countless other individuals who made small and large contributions to the development of this amazing machine—deserve the gratitude of society in general and of children in particular. Haltingly, step by step, the state of the art in educational computing is

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advancing. It is up to teachers to help maintain the momentum, for "all that is human must retrograde if it does not advance."<sup>47</sup>

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<sup>47</sup> Edward Gibbon. *The History of the Decline and Fall of the Roman Empire*, 1776.