

Handouts for

One Step Back, Two Steps Forward: What's Needed to Teach Teachers to Use Technology Effectively

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Growth in teacher use of technology:			
Stage	Skills	Type of training	Philosophy
Personal productivity	CODE77 rubrics	Classes	Just-in-case
Upgrading current practices	How-to-use specific software and hardware	Training on Demand	Just-in-time
Use as an information-problem solving tool with students and to restructure current educational practices	Rubrics for restructuring	Professional Growth Plans that have a technology component	Just-in-part

One Step Back, Two Steps Forward: What's Needed to Teach Teachers to Use Technology Effectively (Synopsis)

Describes the Why, What, How and Who of effective staff technology training programs. The presentation argues that building level support is vital to the process if teachers are to integrate technology and use it to foster higher-level thinking. A list of teacher technology competencies, teacher self-evaluation rubrics, and training assessment tools are included.



Learned Helplessness

For many years staff development for technology went something like this:

- 1) Teacher signs up for "Computer Basics" and completes the inservice, leaving the training with a sense of mastery.
- 2) A week or two later when Teacher gets a few minutes to use the building's computer, she sits down to find out that she remembers little of what she thought she had mastered. "Must need more training," she thinks.
- 3) Next time technology training rolls around, Teacher signs up again for "Computer Basics" and completes the inservice.
- 4) A week or two later when Teacher gets a few minutes to use the building's computer, she sits down to find out that she remembers little of what she was taught. "Must need more training," she thinks.
- 5) Repeat steps 3 and 4 a couple more times.
- 6) Teacher finally decides that she just isn't "good" with technology, and begins to avoid computer inservices at all cost.

Far too many teachers have fallen prey to the syndrome that Donald Norman in his book *The Psychology of Everyday Things* calls "learned helplessness." It's easy to acquire. Folks have learned to be helpless about a lot of things beside computers - music, cooking, languages, carpentry, writing, swimming etc. If we register a couple negative experiences with an activity or skill, we quite easily rationalize our frustrations by saying "I was just never very good at _____" (fill in the blank).

It may be too late to save some teachers - the learned helplessness may be too deeply ingrained. But most are salvageable if your staff development program includes:

1) Access, access, access. A (working) computer in a teacher's room or office is probably the single best way to prevent "learned helplessness." Teachers need to be able to check computers out to take home in the evenings, over the weekend, and especially during the summer. I have found that many teachers get tired of lugging computers back and forth, and wind up buying a computer for home within a year of active computer use anyway.

2) Meaningful application. I am not sure technology advocates have done anyone a favor by suggesting that computers make one's life easier. They may save a little time here and there, but the real benefit computing is that it just plain makes one better at one's job! Our district staff development activities stress the use of the computer as a productivity tool FOR THE TEACHER. We work hard to see that all teachers use word processing, e-mail, and a computerized record keeping system in the form of an electronic grade book, spreadsheet or database. I am firmly convinced that teachers will not use productivity tools with kids until they themselves have experienced the empowering effect of technology on a personal basis. Oh, and teachers seem NOT to need instruction on how to use drill and kill applications.

3) Time for practice. Learning to use a computer, it's said, requires about the same investment in time and energy as gaining rudimentary fluency in second language. So how do you "give" a person more time? A savvy administrator who knows that a teacher is earnestly trying to master computer skills might temporarily release that individual from some supervisory responsibilities, understand if they don't sign up for building committees, look for others to do special assignments, find ways to reduce the number of preps etc. Technology use should be accepted as a professional improvement goal. Inservice and workshop days for technology training are a must. A couple of laptop computers for teacher check-out can extend teachers learning time from a couple hours a day to literally any time they are not in class.

4) A technology environment. It's amazing what happens in a school when even a few teachers start using a computer. It gives everyone else in the building courage. The internal dialog goes something like, "Geeze, if Johnson can learn to use a computer - and I know I am a heck of a lot smarter than he is - so can I."

5) Support. We all need it, but some need it more than others. This can be formalized by holding follow-up sessions to training a few weeks after the initial round. But as importantly, it means having someone close to call. These are the steps we advise new computer users to follow when they hit a road block:

- Try again
- Get a cup of coffee, go to the bathroom, stretch & try again.
- Check the manual (optional)
- Call another teacher who was in the training
- Ask your kids, neighbors' kids, or the local computer club.
- Call your media specialist. (Mine say they don't have a life anyway.)
- Call the computer coordinator.
- When all other avenues have been explored, call the district media supervisor. He can rarely help, but he's often very sympathetic.

6) A little fear mongering. Let's face it. Computer illiterate teachers are not good for kids. It's time administrators and fellow teachers stop accepting excuses for some teachers not having computer skills. But we may be too late. Kids and parents are already communicating that message very well.

The CODE 77 Teacher Technology Program

A computer will be a part of your future in one of two ways, I tell beginning users. One possibility is that it will be there to compensate for your lack of training and skills: the computer in the fast-food cash register will relieve you of the need to compute tax or make change. The computer will also relieve you of the higher pay, which comes with a skilled job.

Another future might have you using the computer as a productivity tool to enhance your talents as a diagnostician in medicine or in mechanics; as a researcher in law or in academics; or as a communicator in business or engineering or art. The computer will then enhance your income as well.

If our schools are to produce graduates who can proficiently use the computer as a productivity tool, we first need teachers who are skilled at using technology to enhance their own abilities, and are comfortable enough with these skills to fully integrate them into their classroom lessons.

In the Mankato Area Public Schools, we felt that past technology training for classroom teachers too often did little more than acquaint them with a few easy to open and operate drill and practice pieces of software. These programs, like the small brain in the cash register, asked the student (or teacher) for little higher order thinking or creativity. Learning to use the computer as a productivity tool - for electronic research, for written communication, for assisted drawing or drafting, for database design, or for spreadsheet construction - requires more time for training and more equipment for practice than the district had been willing to invest.

We had to revisit our assumption that students always have first priority for technology. We realized the district needed to take a step back to first train teachers to use the technology as a productivity tool, before any we would see the long term gains in increased student skills.

Since 1992, our district has been conducting the CODE 77 staff development program. This program has as its goal an improved learning environment as a result of teachers gaining computer productivity skills to enhance their professional competence, and as a result of teachers becoming comfortable enough with the applications to integrate them into their curricula.

I. The procedure

In 1992, a team of five teachers and the district media supervisor decided that our district needed a formal plan for getting computers into the hands of all teachers who wanted them. On that group's recommendation, the district media supervisor requested and received capital funds from the administrative council and school board for 40 computers (approximately 10% of the teaching staff), printers, modems, carrying bags, and software packages for teacher use. The program was named CODE 77 - Computers On Desks Everywhere in District 77. The project has subsequently been funded for all subsequent school years.

CODE 77 has the following characteristics, which make it unlike many other staff development efforts in technology:

- the project is long term and far-reaching, eventually giving all teachers in the district computer access;
- computers are awarded on the basis of a competitive grant proposal - the participants have ideas about what they will do with the equipment before receiving it;
- computers are assigned to individuals, not buildings, grade levels or departments, and the computer stays with the teacher as long as he/she is with the district;
- 30 hours of inservice for teachers are required, and all inservice is done outside of regular school hours with no pay for the participants;
- participants have the option getting graduate credit for taking the class through a local university
- all participants present a portfolio to the school board on the project;
- the current year's CODE 77 participants recommend modifications to the program for the following year; and
- the current year's participants serve as mentors to next year's participants.

Funds are appropriated in April and one page proposal forms are sent to all teachers in the district. A team consisting of the district media supervisor, computer coordinator, and curriculum director choose the participants on the following criteria:

- uniqueness of proposal,
- likelihood of goal achievement, and
- wide representation of grade levels and subject areas throughout the district.

Proposals are received and participants selected in May. Participants receive their "bundles" on the first day of a three-day training session during the summer. Seven weekly classes in the evenings continue through the following fall. Participants receive hands-on training in general computer use, file management, word processing, spreadsheet use, database use, and graphic use. On-line communications and presentation software are demonstrated to the class.

A board report is given in March. This report in the past has included written evaluations of the program, shared portfolios of computer-generated materials, videotape presentations, and formal verbal reports by teacher participants and the media supervisor.

II. Assessment

The program assessments are designed to evaluate the effectiveness of the skill instruction, the attitude of the participants toward the program, and the impact of the program on the teaching and learning environment in the district. Participation in all assessments has been at least 80% of the total individuals. The following methods are used:

Skill Rubrics

A set of 11 skill rubrics was written covering a range of basic computer knowledge and productivity competencies. (See Basic CODE 77 rubrics below.) Each rubric describes the abilities required at four skill levels: pre-awareness, awareness, mastery, and expert. Participants do an anonymous self-evaluation of their skills using the competency rubrics before and after the training. Participants keep a copy of the rubrics to help determine the areas in which they are deficient and need to improve. A comparison of pre and post skill levels by participants is made.

Portfolios

Participants keep a portfolio of representative work produced with the computer. Participants who are taking the training for college credit are also asked to provide portfolio examples correlating with the skill rubrics.

Survey

A survey which asked questions about frequency of hardware and software use and the attitudes of the participants toward the program is given. Participants can reply anonymously.

Anecdotal and indirect information

Participants' written comments are collected and the number of applications to the program for successive years was compared.

III. Evaluation

Skill Rubrics

Analyses of the rubrics have shown that for all skills major upward shifts in all levels occurred. For each skill the first number shows the average level gain made by the group, and the second number shows the percent of participants achieving mastery or expert level.

I. Basic computer operation	1.22	100%
II. File management	.99	80%
III. Word processing	1.23	93%
IV. Spreadsheet use	1.16	49%
V. Database use	1.16	51%
VI. Graphics use	1.26	53%
VII. Multimedia presentations	1.03	31%
VIII. Ethical use understanding	.79	67%

Nearly all areas show either a high percentage of participants who achieved mastery or an average gain of an entire level. I believe some conclusions about computer skill teaching methodology can be drawn:

- 1) Users need directed learning and hands-on training. Skills which were only demonstrated (Multimedia) were not mastered.
- 2) Clearly stated objectives, recipe-type handouts, and experienced instructors are essential to skill mastery. Allowing the learner to control the mouse and keyboard while being given individual instruction, rather than the instructor taking control, is one key indicator of a good instructor.
- 3) Skills need to be set in the larger context of educational use. While all participants received the same training, and showed the initial ability to use databases, spreadsheets, and graphics, only the participants who continued to use those applications purposely tended to achieve mastery.
- 4) The number of skills which participants are asked to master may need to be adjusted. Eleven major skills may be too many to master in the 30 hours of training time available.
- 5) The skill rubrics themselves were good tools for both evaluation and as guides for the learner. The learner has a gauge and guide during the instruction and for future learning.

Portfolios

The teacher portfolios showed a wide range of computer applications and productions. These included -

- clear and easily modified instructional materials;
- the teaching of computer productivity skills to students;
- reviews of educational software;
- communications with students, parents, the community, other teachers, and administrators;
- student record keeping, including student portfolios;

- classroom newspapers;
- professional newsletters and announcements;
- on-line information accessed through a modem; and
- grants, curricula, and continuing education assignments.

The submitted portfolios validated the data gathered from the skill rubrics. Word processing applications were by far the most prevalent samples, but most participants included examples of spreadsheets, databases, on-line searches etc.. Many portfolios showed materials produced by applications and programs not taught in class like greeting card, poster, calendar, banner, test, and crossword puzzle makers. Most examples showed that teachers were “automating” current tasks rather than inventing new teaching methodologies or activities.

Survey

The equipment and software use survey showed that 97% of the teachers were using their computers daily or regularly. Other applications varied in degree of use. The modem was the least used item, and reflects the lack of hands-on training for participants in its use and that additional expenses like long distance and on-line charges would be incurred by participants.

Participants gave a strong positive response to the effect of the computer and training on their teaching. 95% of the participants agreed or strongly agreed with the statement “The availability of a computer has made me a better teacher,” and 100% of the participants agreed or strongly agreed that they would recommend the program to other district teachers.

Anecdotal and indirect information

The written comments on the evaluation sheets fell into two major categories. Teachers suggested improvements. These included more and continued training, grouping of experienced and non-experienced users, more powerful hardware, and more emphasis on educational software. Participants also praised the program, and expressed pride and accomplishment.

Another indirect way of evaluating the program is to compare the number of applications received in each year of the project. For 1992-3, 73 applications were submitted; for 1993-4, 102 applications were submitted; and for 1994-5, 153 teachers indicated they were going to apply for the CODE 77 program. The numbers continued to grow despite a shrinking pool of potential applicants.

IV. Interpretations and observations

1) The findings may validate earlier studies

Some common observations from professional literature about teachers and computers seem to be validated by the assessments of the CODE 77 project. (Written anecdotal comments from CODE 77 participants are included in italics)

- Teachers with computers expect more from their students, spend more time with individual students, are more comfortable with students working independently or in small groups, and spend less time lecturing and teaching to the whole class.
This computer program has saved me hours of preparation time ... I have been able to do many things with children and for the children that would not have been possible before.
- Teachers are willing to take more risks and see themselves more as coaches and facilitators.
*I am no longer intimidated by the computer or by students that have them.
I'm not afraid to try different approaches, and very often discover new things.*
- Collaboration among teachers increases which results in a more productive work settings. Collaboration includes not just computer skill instruction, but course development, classroom procedure development, and administrative tasks.
*I have appreciated all the help from former CODE 77 teachers.
I am really interested in sharing my knowledge with others*
- Teachers have a better sense of professional competence as a result of mastering the computer. They believe their students see them as more professional.
*Everything I create is so much more professional and takes less time. I keep learning more all the time.
Now I feel like a teacher of today.*
- Team-teaching, interdisciplinary project-based instruction, and individualized instruction become more common. Text-based curriculum is first strengthened by the use of technology, then replaced by more dynamic learning experiences.
(Requests for curriculum specific student software and instruction in using computer based individualized learning plans and electronic portfolio assessments are common among CODE 77 participants.)
- Teachers save significant amounts of time on administrative tasks.
*I'm constantly impressed with the speed and professional documents I can now produce. My (students') parents have enjoyed my monthly newsletter.
This program) is the single most valuable single thing I have been involved with in 30 years of teaching. And I am just getting started!*
- It can take four to six years before teachers become comfortable enough with computers to fully integrate them into their classrooms
I need only time to master those areas of Mac use that remain a blur or even a mystery to me. I am no longer afraid to experiment, but time is on my side. Time for learning remains a major problem for me with a full day of teaching and a busy family life at home.

2) The findings give the project direction

The results of the assessment of this project, especially comments from the participants, help modify the program to maximize skill achievement and choose skills and materials, which are of the greatest use to participants. A “second generation” of computer training activities has grown out of these assessments as well. Our district offers a summer technology academy, which teaches additional technology skills, and we are piloting a project in which past CODE 77 participants give their current equipment and provide individualized instruction to new participants in return for upgraded equipment.

3) Quantitative analysis can be done on authentic assessment

Accurate, measurable growth of skills and attitudes can be shown using authentic assessment techniques. After compiling several years of assessments, a benchmark for acceptable participant growth can be determined, and the training techniques of groups, which deviate, from the benchmark can be analyzed for effective and ineffective instruction.

V. Conclusion

CODE 77 has created a sea-change of teacher skills and attitudes in our district. Teachers now not only accept the reality of technology in their lives and in the lives of their students, but actively pursue training and petition for computer equipment. The use of the computer for increasing educational effectiveness is now the rule in our district not the exception. Mankato schools believe this “step-back” to teach teachers computer productivity skills will lead to giant strides forward for our students.

The district has also gained credibility in the community. While major amounts of time and labor are directed in schools toward staff development activities, too seldom do educators demonstrate the effects of these efforts on school climate, teacher skills or student achievement. The lack of accountability in the use of public funds has eroded the public’s faith in schools, resulting in declining public support. By sharing the quantitative measurements of our CODE 77 program with the board, parents, and community, we are reversing that trend.

The CODE 77 Rubrics

Parents and administrators want “computer-literate” teachers. Students seek out teachers who meaningfully use technology. And teachers themselves acknowledge that computer skills are increasingly necessary and important in fulfilling their professional duties. The specific computer skills, which comprise computer literacy, however, are rarely articulated. “Computer literacy” as it applies to teachers can easily remain ill-defined: a politically correct buzzword without meaning or purpose.

When Mankato Area Public Schools began its formal staff development program to train teachers how to use technology in 1993, I wrote a series of rubrics (graduated performance indicators) which described what the district expected a computer using teacher to be able to do after 30 hours of formal computer instruction and six to nine months of practice. (The CODE 77 stands for Computers On Desks Everywhere in District #77, the name of our program.) These rubrics have been revised. The 2002 version (below) is the most recent.

These rubrics primarily address professional productivity. They are the foundation on which more complex technology and technology-related professional skills are built. Teachers who have mastered these skills are able to use the computer to improve their traditional instructional tasks such as writing, record keeping, designing student materials, and presenting lessons. These skills also build the confidence teachers need to use technology to restructure the educational process.

Each of the ten rubrics has four levels:

Level 1: Pre-awareness

Level 2: Awareness

Level 3: Mastery

Level 4: Advanced

Prior to training, we assumed most teachers would be at level 1 or 2, and our training efforts were designed with that assumption. By the end of the training, we anticipated teachers would be at level 3 or 4 in most skill areas, and have gone up at least one level in all areas.

These rubrics then have served two purposes in our district. By asking teachers to complete an anonymous self-assessment using the rubrics before training and again after training, we have been able to judge the effectiveness of our staff development efforts. Simple graphs showing the percentage of training participants at each level pre and post training are constructed. These results are shared with the staff development committees and the administration.

The rubrics also serve to provide a “road map” for teachers wanting to improve their computer skills. By examining the specific skills described, teachers know in what areas they need to continue to take classes or practice.

The Roman numerals following the rubric title indicate the NETS Standard to which they correlate.

Please judge your level of achievement in each of the following competencies. Circle the number which best reflects your current level of skill attainment. (Be honest, but be kind.) At the end of the training program, you will complete the same set of rubrics, which will reflect your level of skill attainment at that time. (Level 3 is considered mastery.) This tool is to help measure the effectiveness of our training program, and to help you do a self-analysis to determine the areas in which you should continue to learn and practice. Keep a copy of these rubrics to refer to during the training.

CODE 77 Self-Evaluation Rubrics for Basic Teacher Computer Use (2002)

I. Basic computer operation (NETS I.A., I.B.)

Level 1 I do not use a computer.

Level 2 I know the basic operations of using a mouse, clicking, and working with windows. I can use the computer to open, run and close a few specific, preloaded programs. Computer use has little effect on how I work. I am somewhat anxious I might damage the machine or its programs.

Level 3 I can set-up my computer and peripheral devices, load software, print, and use most of the operating system tools like the clipboard, clock, note pad, find command, and trash can (recycling bin). I can format a data disk, connect to my school's network, and run programs that require a CD. I have a virus protection program that scans my files on a regular basis.

Level 4 I can run several programs simultaneously, and have multiple windows open at the same time. I can customize the look and sounds of my computer. I use techniques like shift-clicking to work with multiple files. I look for programs and techniques such as using virtual memory to maximize my computer system. I feel confident enough to teach others some basic operations.

II. File management (NETS I.A., I.B.)

Level 1 I do not save any documents I create using the computer.

Level 2 I save documents I've created but often have difficulty finding them. I do not store duplicates of my files on disks or servers for back-up purposes.

Level 3 I have a filing system for organizing my files, and can locate files quickly and reliably in folders and subfolders. I back-up my files to disk, file server, or Internet storage site on a regular basis. I use the district's networked file storage server when provided so I can access my files from any computer, including my home computer. I save my files with the appropriate extension (.txt, .jpg, .doc, .cwk, etc.) to facilitate cross-platform use.

Level 4 I regularly run a disk-optimizer on my hard drive, and use a back-up program to make copies of my files on a weekly basis. I have a system for archiving files which I do not need on a regular basis to conserve my computer's hard drive space.

III. Time management and organization (NETS V.C.)

Level 1 I do not use electronic tools or devices to help me keep a calendar or organize my tasks and address book.

Level 2 I can access the school's calendar for basic schedule information.

Level 3 I use an electronic calendar program, to-do list, and address book that includes email address to help organize and schedule my professional activities. I can synchronize the information on my computer with that in my PDA (personal digital assistant).

Level 4 I store my calendar, task manager, web bookmarks, and address book online so it can be accessed from any Internet-worked computer. I help my students with using technology for time management and organizational purposes.

IV. Word processing (NETS I.A., I.B. V.C.)

Level 1 I do not use a word processor, nor can I identify any uses or features it might have which would benefit the way I work.

Level 2 I occasionally use the word processor for simple documents that I know I will modify and use again. I generally find it easier to handwrite or type most written work I do.

Level 3 I use the word processor for nearly all my written professional work: memos, tests, worksheets, and home communication. I can edit my document using commands like copy and paste, find, undo, and "save as." I can spell check, and change the format of a document. I can paginate, preview and print my work. I can use tables within my documents. I feel my work looks professional.

Level 4 I can save my document as a text or rtf document so it can be opened by others who may not use the same word processor I use. I take advantage of collaborative writing/editing environments when available. I use the word processor not only for my work, but have used it with students to help them improve their own communication skills.

V. Network and Internet use (NETS I.A., I.B., V.A., V.D.)

Level 1 I do not use the on-line resources available in my building, nor can I identify any uses or features they might have which would benefit the way I work.

Level 2 I understand that there is a large amount of information available to me as a teacher that can be accessed through networks, including the Internet. With the help of the media specialist, I can use the resources on the network in our building.

Level 3 I use the networks to access professional and personal information from a variety of sources including networked CD-ROM reference materials, on-line library catalogs and periodical databases, and the World Wide Web. I have an e-mail account that I use on a regular basis to communicate with parents and other professionals. I use the district-specific networked resources that are available to me such as file storage space, student information, IEP forms, curriculum guides, and online forms. I have a strategy for analyzing the quality of information I find online.

Level 4 Using telecommunications, I am an active participant in on-line discussions, can download files and programs from remote computers. I use the network to share documents with my colleagues for collaborative review and editing. I accept student work sent to me electronically. I use telecommunications activities with my students.

VI. Graphics and digital image use (NETS I.A., I.B. V.C., V.D.)

Level 1 I do not use graphics in my word processing or presentations, nor can I identify any uses or features they might have which would benefit the way I work.

Level 2 I can open and create simple pictures with the painting and drawing programs. I can use programs like *PrintShop*.

Level 3 I use both pre-made clip art and simple original graphics in my word-processed documents and presentations. I can edit clip art, change its size, and place it on a page. I can use most of the drawing tools, and can group and un-group objects. I can use the clipboard to take graphics from one application for use in another. I can take, import, edit, and use images from a digital camera in my work. I can use a scanner. The use of graphics in my work helps clarify or amplify my message.

Level 4 I use graphics not only for my work, but have used them with students to help them improve their own communications. I can use graphics and digital images to create a professional looking newsletter. I can do basic editing of digital video production.

VII. Student Assessment (NETS IV. A.)

Level 1 I do not use the computer for student assessment.

Level 2 I understand that there are ways I can keep track of student progress using the computer. I keep some student produced materials on the computer, and write evaluations of student work and notes to parents with the word processor.

Level 3 I effectively use an electronic grade book to keep track of student data and/or I keep portfolios of student produced materials on the computer. I use the electronic data during parent/teacher conferences. I use the networked grading, attendance, report card/progress report, and discipline system provided by my district.

Level 4 I rely on the computer to keep track of outcomes and objectives individual students have mastered. I use that information in determining assignments, teaching strategies, and groupings.

VIII. Spreadsheet use (NETS I.A., I.B., V.C.)

Level 1 I do not use a spreadsheet, nor can I identify any uses or features it might have which would benefit the way I work.

Level 2 I understand the use of a spreadsheet and can navigate within one. I can create a simple spreadsheet that adds a column of numbers.

Level 3 I use a spreadsheet for several professional applications such as keeping a budget or analyzing student data. My spreadsheets use labels, formulas and cell references. I can change the format of the spreadsheets by changing column widths and text style. I can use the spreadsheet to make a simple graph or chart.

Level 4 I can import a spreadsheet into a word processing document or presentation program when needed. I use the spreadsheet not only for my work, but have used it with students to help them improve their own data keeping and analysis skills.

IX. Database use (NETS I.A., I.B., V.C.)

Level 1 I do not use a database, nor can I identify any uses or features it might have which would benefit the way I work.

Level 2 I understand the function of a database and can locate information within one that has been pre-made. I can add or delete data in a database.

Level 3 I use databases for professional applications. I can create a simple original database that has a professional application such as an address book by defining fields and creating layouts. I can find, sort and print information that is useful to me. I can use my building's student information system database to find information about students in my class.

Level 4 I can use formulas with my database to create summaries of numerical data. I can use database information to do mail merge in a word processing document. I use the database not only for my work, but have used it with students to help them improve their own data keeping and analysis skills.

X. Hypermedia/presentation software use (NETS I.A., I.B.)

Level 1 I do not use hypermedia or presentation software, nor can I identify any uses or features it might have which would benefit the way I work.

Level 2 I can navigate through a pre-made hypermedia program or presentation program. I can create a simple presentation using a program's templates or wizards.

Level 3 I can create my own hypermedia stacks and computer presentations that can be used to accompany a lesson in my classroom. These stacks use navigation buttons, sounds, dissolves, graphics, and text fields. I know some basic rules of graphic design that can apply when designing the presentation. I can use an LCD projection device to display the presentation to a class. The computer generated slides help reinforce or amplify my message.

Level 4 I can link to other programs and to websites from my hypermedia stacks or presentations. I use hypermedia and presentation programs with students in their own information keeping and communication efforts.

XI. Ethical use understanding (NETS VI. A, D, F.)

Level 1 I am not aware of any ethical issues surrounding computer use.

Level 2 I know that some copyright restrictions apply to computer software.

Level 3 I clearly understand the difference between freeware, shareware, and commercial software and the fees involved in the use of each. I know the programs for which the district or my building holds a site license. I understand the school board policy on the use of copyrighted materials. I demonstrate ethical usage of all software and let my students know my personal stand on legal, moral, and safety issues involving technology. I know and enforce the school's technology policies and guidelines, including its Internet Acceptable Use Policy. I have a personal philosophy I can articulate regarding the use of technology in education.

Level 4 I am aware of other controversial aspects of technology use including data privacy, equitable access, and free speech issues. I can speak to a variety of technology issues at my professional association meetings, to parent groups, and to the general community.

VIII. Spreadsheet use (NETS I.A., I.B., V.C.)

- Level 1 I do not use a spreadsheet, nor can I identify any uses or features it might have which would benefit the way I work.
- Level 2 I understand the use of a spreadsheet and can navigate within one. I can create a simple spreadsheet that adds a column of numbers.
- Level 3 I use a spreadsheet for several professional applications such as keeping a budget or analyzing student data. My spreadsheets use labels, formulas and cell references. I can change the format of the spreadsheets by changing column widths and text style. I can use the spreadsheet to make a simple graph or chart.
- Level 4 I can import a spreadsheet into a word processing document or presentation program when needed. I use the spreadsheet not only for my work, but have used it with students to help them improve their own data keeping and analysis skills.

Class Objectives: Beginning Spreadsheets (3 hours)

- 1) Understand the function of the spreadsheet.
- 2) Open a new spreadsheet. Identify rows, columns, and cells.
- 3) Know and use labels, values, and formulas.
- 4) Use a range of values in a formula.
- 5) Add additional rows and columns.
- 6) Change the width of columns.
- 7) Alphabetize items in a spreadsheet.
- 8) Format spreadsheet cells, rows and columns / format numbers as currency.
- 9) Create and size a chart on the spreadsheet.

10) Paste a chart into a word

processing document.

11) Delete column and row

headings and grid lines.

Restore the same.

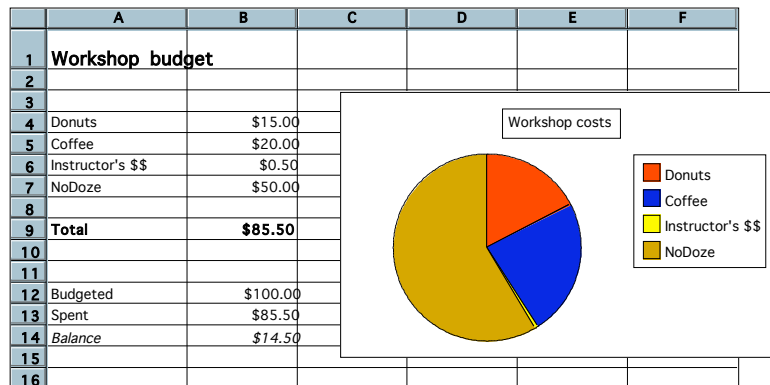
12) Select a print range.

13) Select a horizontal print orientation.

Teacher need for basic spreadsheet skills:

Your portfolio must include both the printout and file of a spreadsheet that demonstrates:

1. the use of column and row labels, a cell reference and formula that uses a range of cells
2. a variety of column widths and text styles
3. a simple, well labeled pie or bar chart that uses data in the spreadsheet



Spreadsheets are a practical way to keep and work with numerical data in an organized, easily read and accurate way. Many “non-math” people have found spreadsheets can take the drudgery out of calculations. Well-designed printed reports generated by the spreadsheet are rapidly understood and, I think, are more readily believed.

- ◆ Most teachers are responsible for some budget keeping. Revenues and expenses are easily and accurately kept using a simple spreadsheet. (You can catch your business office’s mistakes.)
 - Fundraising sales
 - Classroom materials budget
 - Extracurricular activities budgets
- ◆ Spreadsheets can be modified to create highly customized grade books. Progress charts and checklist forms can be made using a spreadsheet grid.
- ◆ Coaches and athletic directors use spreadsheets to record sports statistics.
- ◆ The results of any data gathering projects such as surveys, counts or polls can be organized and graphed.

Student need for basic spreadsheet skills:

Besides benefiting from more accurate record keeping by the teachers, students can use the spreadsheet in a wide variety of classroom activities:

- ◆ To solve story problems
- ◆ To record data from projects that involve surveys, counts or polls
- ◆ To keep personal budget records or personal statistics

In using cell references and formulas, students are learning to think math, not just do math.

Homework:

Create a spreadsheet for these problems:

1. Develop a “favorite food” graph for your class using the results of a simple survey.
2. You are in charge of the school play. You have a budget of \$500. You expect to take in \$200 in ticket sales. Here are your expenses:

scripts and royalties	\$237.45
set materials	\$101.67
costume rental	\$57.34

Create a spreadsheet that gives you a running total of your balance.

3. Here is a story problem your kids can solve using the spreadsheet:

Farmer Brown wants to raise chickens. However she must first build some chicken coops. Brown plans to raise 150 chickens and each coop can hold 50 chickens. To build a coop takes 75 feet of board at \$1.50 per board foot; 4 bundles of shingles at \$20 per bundle; and 3 pounds of nails at \$6.00 per pound. She also needs a gallon of paint which sells for \$12.00 per gallon. How much money will Farmer Brown need to build the coops she needs? How much would she have to spend if she wants to raise 200 chickens? 500 chickens?

Internet Skill Rubrics for Teachers

The Internet has blown on the education scene like a tornado. Local, state, and national initiatives are howling for all classrooms being "wired" to this massive information resource. But like all tools, the Internet does little good unless it is used skillfully and purposely. Media specialists and classroom teachers need formal training in its use. The rubrics below have been created to help staff development designers plan and measure effective Internet use by educators.

Not long ago, formal instruction about the Internet focused primarily on how to use a wide variety of specialized tools for locating and retrieving files. Tools like gophers, newsreaders, e-mail programs, telnet, and ftp were all dedicated to single tasks and each required extensive training in its use. Now most Internet resources can be easily accessed using a properly configured Internet browser like *Netscape* or *Explorer*. The specialized tools have become modules built-in to these powerful programs. For all but the most demanding of Internet users, a web browser configured with some "helper applications" will be the only tool needed for Internet.

The interface to the Internet has changed dramatically as well. Only a few years ago the Internet was accessed almost exclusively through text-based interfaces running on large computers to which one's workstation only served as a "dumb terminal." This model of access has been largely replaced by workstation based programs that use the workstation's processing power to provide point-and-click simplicity of use and to display information in colorful formats that include text styles and fonts, graphics, sounds, animations and digital video. "Streaming" is quickly allowing Internet users to play music and hear discussions. Using the Internet as a telephone is becoming more common. "Push" technologies deliver up to the minute news, weather, and business information to one's desktop, relieving the user the responsibility of finding and retrieving it.

These changes in access and content have allowed Internet instructional time to be spent less on:

- How do I find files and data?
- How do I use specific Internet tools?
- How do I download the information to my computer?

And increasingly on:

- How can I focus my searches?
- How can I determine if the information is accurate?
- How do I interpret and make meaning of the information?
- How do I use and communicate the information within an educational setting?
- How do I prepare my information so it can be displayed on the Internet?
- How do I construct meaningful activities for students using Internet resources?

Believe me, the older skills, while at times frustrating to teach, were easier to master!

I have used variations of these rubrics working with teachers and media specialists over the years. While needed skills for using the Internet seem to change almost daily, they can be used as a starting point for measuring staff competencies. The Internet rubrics, along with support materials including class outcomes, portfolio suggestions, training tips, and other resources, can be found in my book, *The Indispensable Teacher's Guide to Computer Skills 2nd edition*, Linworth, 2002.

Each of the Internet rubrics has four levels:

- Level 1: Pre-awareness
- Level 2: Awareness
- Level 3: Mastery
- Level 4: Advanced

Prior to training, we assume most teachers are at level 1 or 2, and our district's training efforts are designed with that assumption. By the end of the training, we anticipate teachers will be at level 3 or 4 in most skill areas, and have gone up at least one level in all areas. Thirty hours of direct instruction are needed at minimum for the mastery of all ten competency areas.

These rubrics then serve two purposes:

- By asking teachers to complete an anonymous self-assessment using the rubrics before training and again after training, we can judge the effectiveness of our staff development efforts. Simple graphs showing the percentage of training participants at each level pre and post training are constructed. These results can be shared with the staff development committees and administration.
- The rubrics also provide a "road map" for teachers wanting to improve their Internet skills. By examining the specific skills described, teachers know in what areas they need to continue to take classes or practice.
-

Please feel free to use and modify the rubrics for your district's specific needs and as technology changes.

Please judge your level of achievement in each of the following competencies. Circle the number which best reflects your current level of skill attainment. (Be honest, but be kind.) At the end of the training program, you will complete the same set of rubrics that will reflect your level of skill attainment at that time. (Level 3 is considered mastery.) This tool is to help measure the effectiveness of our training program, and to help you do a self-analysis to determine the areas in which you should continue to learn and practice. Keep a copy of these rubrics to refer to during the training.

This is an anonymous assessment. You do not need to sign the pre or post evaluation tool. Individual results will be aggregated to determine how effective the program has been for the group as a whole. You should, however, keep track of your own individual progress.

Self-Evaluation Rubrics for Teacher Internet Use (2002)

I. Internet basics and history (NETS I.A., V.A., VI.A.)

Level 1 I do not understand how networks work, nor can I identify any personal or professional uses for networks, including the Internet. I do not have an account on any network nor would I know how to get one.

Level 2 I can identify some personal or professional uses for networks, and understand they may have a value to my students and to me. I've read some articles about the Internet in the popular press. I can directly use network access to a library catalog or CD-ROM.

Level 3 I can describe what a computer network does and how it can be useful personally and professionally. I can distinguish between a local area network, a wide area network, and the Internet and can describe educational uses for each. I can describe the history of the Internet, recognize its international character, and know to a degree the extent of its resources. I know the purpose and historical significance of newsgroups, gophers, and telnet. I have personal access to the Internet that allows me to receive and send email, download files, and access the World Wide Web. I know that I must protect my password, and should restrict access by others to my account

Level 4 I use networks on a daily basis to access and communicate information. I can serve as an active participant in a school or organizational planning group, giving advice and providing information about networks. I can recommend several ways of obtaining Internet access to others.

II. Email (I.A., I.B., IV.B., V.A., V.D., VI.A.)

Level 1 I do not use email.

Level 2 I understand the concept of email and can explain some administrative and educational uses for it.

Level 3 I use email regularly and can:

- read and delete messages
- send, forward and reply to messages to
- create nicknames, mailing lists, and a signature file
- send and receive attachments

Level 4 I can send group mailings and feel confident that I could administer an electronic mailing list. I use activities that require email in my teaching. I can locate lists of subject oriented mailing lists.

III. The World Wide Web (NETS I.B., II.D., V.A., V.C., VI.A.)

Level 1 I do not use the World Wide Web.

Level 2 I am aware that the World Wide Web is a means of sharing information on the Internet. I can browse the Web for recreational purposes.

Level 3 I can use a Web browser like Explorer or Netscape to find information on the World Wide Web, and can list some of the Web's unique features. I can explain the terms: hypertext, URL, http, and html. I can write URLs to share information locations with others. I can use Web search engines to locate subject specific information and can create bookmarks to Web sites of educational value.

Level 4 I can configure my web browser with a variety of helper applications. I understand what "cookies" do and whether to keep them enabled. I can speak to the security issues of on-line commerce and data privacy.

IV. Search tools and evaluation strategies (NETS II.C., V.C., VI.C.)

Level 1 I cannot locate any information on the Internet.

Level 2 I can occasionally locate useful information on the Internet by browsing or through remembered sources.

Level 3 I can conduct an efficient search of Internet resources using directories like Yahoo or search engines like Google. I can use advanced search commands to specify and limited the number of hits I get. I can state some guidelines for evaluating the relevance of sited and the quality of the information I find on the Internet. I can write a bibliographic citation for information found.

Level 4 I can identify some specialized search tools for finding software and email addresses. I can speculate on future developments in on-line information searching including know-bots, meta-search engines, and other kinds of intelligent search agents.

V. Newsgroups, telnet and electronic mailing lists (NETS I.A., II.C., V.A.,V.B., V.D.)

Level 1 I have no knowledge of newsgroups, telnet or electronic mailing list functions.

Level 2 I know that there are resources in a variety of formats available on the Internet, but cannot confidently access them.

Level 3 I read the newsgroups that interest me on a regular basis, and I can contribute to newsgroups. I can access a remote computer through the telnet command, including remote library catalogs. I can find the help screens when emulating remote computers and can log off properly. I can subscribe, unsubscribe and contribute to electronic mailing lists (listservs) related to my educational field.

Level 4 I know how to find, configure, and use the specialized tools for newsgroups and telnet access. I use the resources found in these areas with my students.

VI. Obtaining, decompressing, viewing and using files (NETS I.A., VI.D)

Level 1 I cannot retrieve files from remote computers.

Level 2 I know that documents and computer programs that are useful to my students and to me are stored on computers throughout the world. I cannot retrieve these files. I can open a .pdf file with a browser plug in.

Level 3 I understand the concept and netiquette of “anonymous FTP” sites. I can transfer files and programs from remote locations to my computer, and can use programs or plug-ins that help me do this. I can extract compressed files, and know some utilities that help me view graphics and play sounds and movies. I understand the nature and danger of computer viruses, and know how to minimize my risk of contracting a computer virus.

Level 4 I use information I have retrieved as a resource for and with my students. I understand the concept of a network server, and the functions it can serve in an organization. I can use an ftp client to upload files to a server. I can create a .pdf document.

VII. Real-time, streaming and push technologies (NETS II.C., III.C., V.A., V.C.,V.D.)

Level 1 I use only static documents and files I retrieve from the Internet.

Level 2 I have some information sent to me on a regular basis through e-mail and I check some sites on a regular basis for information.

Level 3 I use chat-rooms, instant messaging, and customized news and information feeds. I can listen to audio streamed from the web. I know the hardware and software requirements for web-based videoconferencing. I can install the plug-ins necessary to hear and view multimedia resources.

Level 4 I can use real-time applications to design a “virtual” classroom or interactive learning experience. My students use videoconferencing for communication with experts and project collaboration with other students.

VIII. Webpage construction (NETS II.D, III.A., III.B., IV.B., V.C., V.D., VI.E.)

Level 1 I cannot create a page which can be viewed with a web browser.

Level 2 I can save text I’ve created as an html file with a command in my word processor. I know a few, simple html commands. I can use a form-based tool to create a webpage.

Level 3 Using hand-coded html or a web page authoring tool, I can:

- view web pages as source documents
- create a formatted web page that uses background color, font styles and alignment, graphics, and tables
- include links to other parts of my document or other Internet sites in my page
- know basic guidelines for good web page construction and the district’s web policies

Level 4 I can use the web as an interface to databases. When appropriate, I can register my pages with search engine sites. I can help write web creation policies for design, content, and use.

IX. Learning opportunities using the Internet (NETS III. A-D.)

Level 1 I am not aware of any ways the Internet can be used with students in my classroom.

Level 2 I occasionally allow my students to use the Internet to find information.

Level 3 I know a variety of projects and activities that effectively use the Internet to instruct and involve students. I know sources for collaborative projects, can direct students to on-line tutorials and learning resources, and encourage a variety of activities that use email.

Level 4 I can design and implement an Internet project or maintain an educational Internet site.

X. Netiquette, On-line Ethics, and Current Issues Surrounding Internet Use in K-12 Schools (NETS VI.A-E.)

Level 1 I am not aware of any ethics or proprieties regarding the Internet nor am I unaware of any issues dealing with Internet use in a school setting.

Level 2 I understand a few rules that my students and I should follow when using the Internet. I understand that the Internet is sometimes a controversial resource which many educators and parents do not understand.

Level 3 I have read a guideline for Internet use such as Rinaldi's "The Net: User Guidelines and Netiquette" or other source, and follow the rules outlined. I know and read the FAQ files associated with sources on the Internet. I am aware that electronic communication is a new communications medium that may require new sensitivities. I can identify print and on-line resources that speak to current Internet issues like:

- censorship/site blocking software
- copyright
- legal and illegal uses
- data privacy
- security

I can list some of the critical components of a good Acceptable Use Policy and know and use our district's policy.

Level 4 I can use my knowledge of the Internet to write good school policies and activities that help students develop good judgment and good information skills.

Rubrics for Restructuring

Most teacher training is designed to give teachers a basic familiarity with the computer skills that help them improve their professional productivity: basic computer operation, word processing, telecommunication, record keeping, etc.. But if technology is realize its powerful potential for improving education, it must be used for more than just automating the traditional methods and practices of teaching.

The rubrics below are designed to help teachers move to a second (and final?) level of professional computer use. Rather than the computer simply being a tool, which allows a common task to be done more efficiently, these skills modify how instruction is delivered, how student performance is measured, and how teachers view themselves as professionals. The technology is used to restructure the educational process to assure that:

- all students master the basic skills of writing, reading and computation
- all students practice information literacy and research skills, and the higher order thinking skills inherent in them
- all teachers have the tools and ability:
 - to locate the research findings that will guide their use of technology and
 - to collect the data that measures the effectiveness of their practices.

Because of the long-range nature of these staff development efforts, sample professional growth plans rather than a list of specific skills taught in classes are described for each rubric. A teacher or group of teachers should pick one or two rubrics on which to work each year after having mastered the necessary basic skills in the preceding chapters. The teacher's supervisor or staff development leader can then evaluate the completion of the professional growth plan, as district policy requires.

Building principals and staff development committees have the responsibility for evaluating the effectiveness of staff development efforts, including those in technology. The degree to which conferencing, planning and assessment of the portfolios is carried out will vary from building to building.

These advanced rubrics are designed for the same purposes as the beginning CODE 77 rubrics: to help schools measure the effectiveness of their teacher training efforts, and to help guide teachers on their own learning path. These challenging skills will take time to master, but schools with teachers who do so will be in a better position to meet future educational demands.

Self-Evaluation Rubrics for Advanced Teacher Computer Use: Rubrics for Restructuring (2002)

I. Instructional software use (NETS III. A, III.D)

Level 1 I do not use instructional software as a part of my instructional program, nor am I aware of any titles that might help my students meet their learning goals.

Level 2 I use a few computer programs as an instructional supplement, as a reward, or with special needs children.

Level 3 I use several programs (drill and practice, simulations, tutorials, etc.) chosen by my department or grade level to help all my students meet specific, identified learning objectives. The software allows me teach and/or reinforce concepts more effectively than traditional methods. When it is available, I use the software's management system to help assess individual student performance. I use the school's integrated learning system in a purposeful way and help assess its overall effectiveness.

Level 4 I seek out new programs for evaluation and adoption. I know sources of software reviews and keep current on developments in computer technologies through professional reading and conference attendance. I share my findings with other professionals.

II. Using technology to improve student writing (NETS II.B.)

Level 1 I am not familiar any technologies that would allow me to help my students improve their writing skills.

Level 2 I ask that the final draft of some student writing assignments be word-processed. I do not expect or encourage my students to compose or edit using the computer.

Level 3 I help students use the computer in all phases of the writing process from brainstorming to editing to publishing. This may included the use of idea generators, graphic organizers, portable writing computers, outlining tools, spelling and grammar checkers, desktop publishing tools, and webpage generators. I use technology to help students share their work for a wide reading audience. I can find and use best practices data on improving writing with technology.

Level 4 I store portfolios of my students' work electronically. I share successful units with others through print and electronic publishing and through conference presentations and workshops. I look for specific technology tools for helping my students improve their writing skills.

III. Information literacy skills using secondary sources (NETS III.A, II.C.)

Level 1 I am not familiar with the term information literacy, nor do I know why such skills are important.

Level 2 As a part of my curriculum I have library research projects, and I support the library skills taught by the media specialist. I am aware that there are electronic resources available to my students.

Level 3 My curriculum includes at least two information literacy projects, team-taught with the media specialist. I understand the Big6 or a similar information literacy process and design student projects that require higher level thinking skills, use and cite electronic information sources, require the use of computer productivity software, and are authentically assessed. I ask students to use technology to help them share the results of their research with others. I reinforce information literacy skills on a daily basis as opportunities arise.

Level 4 I am actively involved in curriculum planning teams and advocate for multidisciplinary units and activities that require information literacy skills. I share successful units with others through print and electronic publishing and through conference presentations and workshops.

IV. Information literacy skills - primary sources (NETS III.A, II.C.)

Level 1 When asking students to do research, I expect them to only use secondary resources like books, magazines, or reference materials.

Level 2 As a part of my curriculum, I have some units which require the collection and use of original data. I generally can predict the outcome of such experiments.

Level 3 My curriculum includes at least two information literacy projects that require the collection of original data to answer a genuine question. I may use tools to collect data like computerized probes and sensors, online surveys, interviews, or digitized sources of historical records, as well as tools to record, organize, and communicate the data such as databases and spreadsheets. I ask students to use technology to help them share the results of their research with others.

Level 4 I am actively involved in curriculum planning teams and advocate for multidisciplinary units and activities that require information literacy skills. I share successful units with others through print and electronic publishing and through conference presentations and workshops.

V. Modification of instructional delivery (NETS II.A., III.D)

Level 1 I have one or two effective methods of delivering content to my students. I do not use technology that requires that I change my instructional methodology.

Level 2 I have tried units or projects that are student-directed, use small groups, or are highly individualized, but I primarily use teacher-directed, whole group instruction.

Level 3 I use a variety of instructional delivery methods and student grouping strategies routinely throughout the year. I can design activities and approaches that best fit both the learning objectives and the availability of the technology available to me. I can use small groups working cooperatively or in rotation to take advantage of student to equipment ratios of greater than one to one.

Level 4 I continuously try new approaches suggested by research or observation to discover the most effective means of using technology to engage my students and meet curricular goals. I work with a team of fellow teachers to create, modify and improve my practices in this area.

VI. Assessment of student performance (NETS IV.A, IV.B, IV.C)

Level 1 I evaluate my students using objective tests only.

Level 2 I evaluate some student performances or projects using subjective criteria. I save some student work for cumulative folders and parent conferences, and print some electronically produced student work.

Level 3 I use a wide range of assessments to evaluate student projects and performances. I can use technology to help create assessment tools like checklists, rubrics, and benchmarks that help the student assess his own performance and allow me to objectively determine the quality of student work. I ask students to keep both a physical and electronic portfolio of their work. I have a computerized means of aggregating performance data for my class that I use to modify my teaching activities and strategies.

Level 4 I continuously try new approaches suggested by research or observation to discover the most effective means of using technology to help assess student learning. I work with a team of fellow teachers to create, modify, and improve my work in this area.

VII. Individualization of instruction and educational program (NETS III.B., V.B., VI.B.)

Level 1 I modify my curriculum or instructional methods only for students with identified special needs.

Level 2 I occasionally give students the choice of assignments in my class, but all class members (unless they are in special education) must meet in the same learning objectives within the same time frame. Skill remediation is done during summer school or informally during or after school.

Level 3 With the assistance of the student, parents, and appropriate specialists, I create a learning plan for each of my students. I track the accomplishment of learning goals in the plan using a computerized tool. I use this tool during parent conferences and for school or state reporting.

Level 4 I provide suggestions about the content and design of the individualized computerized planning and report tools.

VIII. Fostering home-school communications (NETS V.D.)

Level 1 I use the traditional methods of communication with my students' homes: telephone, report cards, progress reports and print school or classroom newsletters.

Level 2 I send email to parents who request it in response to specific inquiries. I use my district or building's generic parent/guardian mailing list to distribute messages of general interest.

Level 3 I maintain a parent/guardian mailing list to distribute information about happening in my classroom. I maintain a classroom webpage that has basic information about my classroom and curriculum including study guides, notification of upcoming evaluation, assessment criteria of projects, class expectations, and other information parents may find useful.

Level 4 I use a webpage or web interface to my gradebook to provide real-time information to parents about individual student's progress in my class. I formally work with parent organizations to teach parents how to access school information electronically.

IX. Assistive and adaptive technologies (NETS V.B., VI.C., VI.E)

Level 1 I am not aware of how technology can help students with learning problems or with physical or mental limitations.

Level 2 I work with students who may bring with them special devices that allow them to work and communicate in the classroom. I allow some students to use electronic aides to help overcome special learning problems.

Level 3 I use technology when appropriate to help students with special learning needs. These may include detailed individualized education plans, specialized communications devices, or other compensatory devices.

Level 4 I provide professional growth opportunities for other teachers in the use of assistive and adaptive technologies.

X. Professional growth and communication (NETS V.A., V.B, V.D)

Level 1 I do not use electronic resources for professional growth or communication.

Level 2 I can find lesson plans and some research in online data bases. I correspond with parents and other teachers using email.

Level 3 I use the Internet and other online resources to obtain research, teaching materials and information related to the content of my classes. I read electronic newsletters and journals to keep current on educational practices. I participate in electronic discussion groups and chat rooms that are related to my area of education. I use a computerized presentation program when giving workshops or speaking at conferences. I take part in distance learning opportunities using technology.

Level 4 I organize professional growth opportunities for other teachers and feel comfortable teaching other staff members about the use of technology.

XI. Research and evaluation of technology use (NETS IV.B., V.B)

Level 1 I have not attempted to determine whether the use of instructional technology has made a difference in my student's learning or classroom climate.

Level 2 I gather, use, and share anecdotal information and observations about student use of technology in my classroom.

Level 3 I use action research and aggregated data to accurately determine whether the technology and methodology I am using has an impact on how well my students learn and on school climate.

Level 4 I participate in formal studies of the impact of technology on student learning conducted by professional groups and academics. I have designed such studies as part of my own professional education. I report electronically and in print the findings of my research to other professionals.

IV. *Information literacy skills - primary sources (NETS III.A, II.C.)*

- Level 1 When asking students to do research, I expect them to only use secondary resources like books, magazines, or reference materials.
- Level 2 As a part of my curriculum, I have some units which require the collection and use of original data. I generally can predict the outcome of such experiments.
- Level 3 My curriculum includes at least two information literacy projects that require the collection of original data to answer a genuine question. I may use tools to collect data like computerized probes and sensors, online surveys, interviews, or digitized sources of historical records, as well as tools to record, organize, and communicate the data such as databases and spreadsheets. I ask students to use technology to help them share the results of their research with others.
- Level 4 I am actively involved in curriculum planning teams and advocate for multidisciplinary units and activities that require information literacy skills. I share successful units with others through print and electronic publishing and through conference presentations and workshops.

Professional growth plan to meet this competency (to be written in collaboration with curriculum director or department chair and technology coordinator or media specialist):

1. I will obtain the district's information literacy curriculum, library and technology student benchmarks, assessment tools and activity suggestions. (If these items do not exist, an alternate professional growth plan would describe how a teacher could help develop them.) I will examine my curriculum to determine if proscribed projects or lessons that teach information literacy skills exist.
2. I will review the literature for current descriptions of information literacy, especially as it applies to using primary sources of information and data gathering techniques.
3. I will plan and teach two projects that have information literacy/technology skills and use primary source data to help answer the research question.
4. I will assess student work on these projects using tools that determine whether individuals met the benchmarked level of performance and use the findings as part of the student's grade, portfolio, or progress report.
5. I will examine the performance data for my classes and aggregate it to determine the efficacy of the activities and instruction and/or the validity of the benchmarks. I will share my findings through in-district workshops or on staff development days.
6. (Optional) I will take a college class, seminar, or workshop information literacy and/or research methods using primary data.

Your portfolio might include:

- 1) descriptions of units taught in your classroom that have information literacy objectives as well as content objectives that include the use of primary sources
- 2) assessment tools to use with students on these projects
- 3) a copy of the district's information literacy curriculum and student performance benchmarks in technology /information literacy
- 4) personal journal reflections on teaching information literacy skills including what does and does not work well

Why teachers need an information literacy technology skill set using primary sources:

Consider these actual research assignments:

- High school students trace the history of a building on their town's main street through interviews and courthouse records. They publish their findings in the local newspaper.
- Students in a technology education class use computerized timers to develop the most aerodynamically efficient design for a racecar.
- A middle school class learns about World War II by interviewing the town's senior citizens and creating web pages of their stories, photographs and memorabilia related to that time period.
- Elementary students collect holiday customs celebrated by students from around the world using electronic mail and the Internet.
- Students poll the community for their suggestions on how the park system can be improved.

Increasingly common projects like these have some qualities that make them both effective, but potentially frustrating:

1. **The research focuses on topics of local significance.** Whether researching a building, person, immigrant group, or custom, the emphasis is on things in the student's immediate geographic area, if not in his/her own household. Even when the topic is of national or international scope: pollution, the global economy, terrorism, technology, or health issues, teachers are asking students to assess the impact of policies and events on their own families and communities.
2. **Researchers are being asked to use primary rather than secondary resources.** Local history and current data is scarce in most school media centers, and when it does exist, like in back issues of local newspapers or in government documents, it's not often indexed or is difficult to obtain. The county courthouse, a local university, original surveys, government statistics (published on the Internet), and the memories of local "experts" are examples of primary information sources in increasingly common use.
3. **Projects are purposely designed to be meaningful to the student researcher.** The issues of World War II become exciting when told by the local, flesh-and-blood people who actually were affected by them. The genuine voices of another culture's students of a similar age speak louder than any text or reference book.

The tasks of the information process (see a description of the Big6 in the previous rubric) remain much the same regardless of the source of the information. Students still need to formulate good questions and identify the needed information. They still need a method of gathering, recording, organizing and analyzing the information whether those tasks are accomplished with paper and pencil, video camera, database or e-mail. However, primary data needs to be critically evaluated even more skillfully than data gleaned from edited secondary information sources.

As "performance-based" assessment becomes a standard means of evaluating student work, the communication of the researched findings becomes increasingly important. Students need guidance in deciding the medium and preparing the display of their findings, whether through thoughtfully crafted charts and graphs, a multi-media presentation, computerized slide shows, or even web pages.

For many teachers, who probably were not asked to do primary source research until they were in graduate school (if ever), the use of original research and the use of primary sources may be as new to them as it is to their students. An educational philosophy that accepts knowledge growth and skill acquisition by both the student *and* the teacher will be essential.

Just-in-Time Technology Training

Is investing in technology training a good investment of a teacher's energy and time? Isn't this just another passing educational fad? (Can you say outcome-based education?)

Considering that technology is a permanent fixture in banking, medicine, manufacturing, farming, and, well, just about any enterprise one can name, the probability that it will remain one in education is very good indeed. If you as a teacher have scarce time and resources to devote to learning new skills, learning those that will last you the remainder of your career is a sound investment. All teachers *do* need to be "technologically literate" if they are to both improve their professional productivity and to give their students the learning opportunities technology provides. If we don't, we are as unethical as a doctor who refuses to learn how to take advantage of a CAT scan.

The International Society for Technology in Education does a good, if ambitious, job of describing what teachers should know and be able to do with technology in its NETS standards <<http://cnets.iste.org/teachers/>>. These de facto national guidelines suggest that teachers:

- *Demonstrate a sound understanding of technology operations and concepts.*
- *Plan and design effective learning environments and experiences supported by technology.*
- *Implement curriculum plans that include methods and strategies for applying technology to maximize student learning.*
- *Apply technology to facilitate a variety of effective assessment and evaluation strategies.*
- *Use technology to enhance their productivity and professional practice.*
- *Understand the social, ethical, legal, and human issues surrounding the use of technology in PK-12 schools and apply those principles in practice.*

But until somebody invents a brain chip that imbues the implantee with these skills instantly, teachers will need learning experiences to acquire them.

For many schools, large group instruction remains a popular, if not terribly effective, means of teaching teachers how to use technology. Computer boot camps instill at least a passing knowledge of how to turn on the machine, open a program, organize one's files, and operate a word processor, e-mail program, web browser, and electronic grade book – prerequisite skills for higher end uses of technology. (A list of these basic technology skills can be found at <www.doug-johnson.com/dougwri/rubrics2002.html#beg>.)

As a result of boot-camp style instruction most teachers have acquired the basics of technology use, but staff development models have not changed to reflect the more individualize requirements of specific teaching assignments. Most districts still offer classes to large groups on individual software programs – spreadsheets, databases, web editing, digital still photo and video editing, etc. The offerings tend to be "just in case" the teacher needs to know it. (Same philosophy my algebra teacher had about solving quadratic equations.) The same classes are offered to elementary teachers, secondary teachers, special education teachers, guidance counselors, and reading specialists without acknowledging the unique goals and technology uses of the individual educator. When considering that a major challenge for every teacher is keeping up with *all* the changes in education, not just technology, such a scatter-shot, just-in-case approach to tech training is inefficient and ineffective.

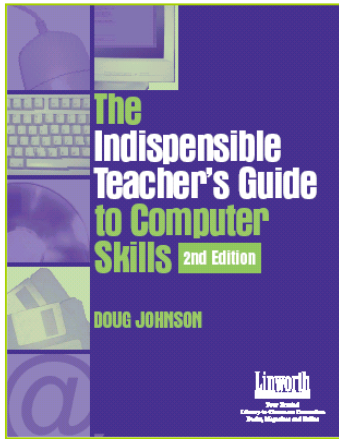
The focus of all teacher training must shift from just-in-case to just-in-time - learning only what one needs to know, just when one needs it. The just-in-time model of technology training relies less of district- mandated classes and more on more personal, individual learning opportunities

Whether from another teacher, a librarian, technology integration specialist, or student, the rudiments of most software programs can be learned in less than an hour – just enough to get one started – when done one-on-one. Online tutorial services can be a convenient and effective supplement face-to-face instruction. My favorite, AtomicLearning <www.atomiclearning.com> offers short videos showing specific "how-to's" for nearly every software package and operating system schools use. These digital tutors are always available, understandable and exceptionally patient. Many teachers learn technology skills right along with their classes when a librarian or technology specialist collaboratively teaches with them. Some of us are genuinely independent learners and would prefer to be given a program with a decent manual and online help and simply be given time to learn, through trial and error.

Whether individualize or though a class, learning technology should *only* be a part of a larger professional growth target. Learning to use a database should be a part of learning to do more effective assessments. Learning to use mind-mapping software such as *Inspiration* should be a part of learning better writing instruction practices. Learning to more effectively search the Web should be a part of learning to how to improve student research practices. (Other examples can be found at <www.doug-johnson.com/dougwri/rubrics2002.html#adv>) In other words, the focus should be on improving professional practices, not learning to use a computer.

Most educators, including me, are better teachers than students. I'll confess I have small patience with most classes and workshops whether they are about technology or anything else. Sitting, even for a few hours, listening to a presenter drone on does little for me except help develop a strong empathy for our kids. But if we learn to structure technology training to suit individual adult learning styles and place it within the context of improving educational practices, teachers can and will become "technology-literate" – just in time.

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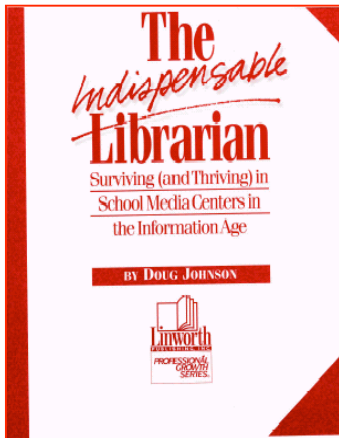


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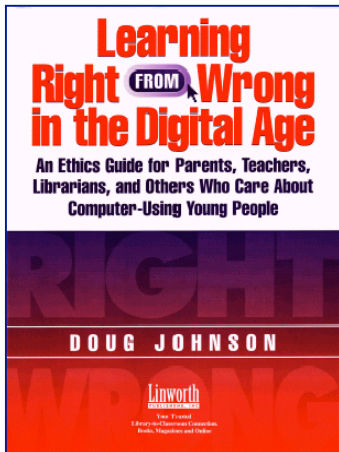
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