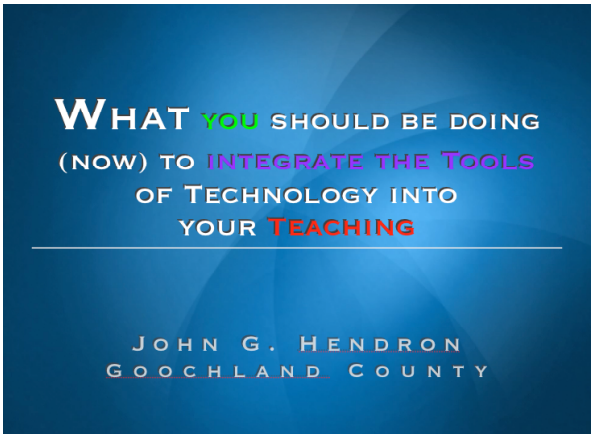
5 Things



Introduction

So much of the concern it seems now a days with administrators in schools, with regards to technology, is how best to use it. Bang for the buck. The buzzword, "integration," is always the focus, and steps are often taken to increase integration, maximize the benefit of the money spent on software, hardware, and networks. This forward-looking approach however always seems a step-behind, as technology continues to evolve; software applications need more bandwidth, more memory, and the projects we create require more storage space. Computer technology today is evolving at a fairly rapid rate. The increases in computer speed, not unlike the development of a new class of applications and increasingly-more sophisticated software, seem to be growing along a logarithmic scale.

It amazes me, to some degree, how technology can simply "enter" into a society space and simply work. I'm fortunate enough to have grown up in, and lived to witness the progression of technologies in the United States, where, along with Japan, things seem to be at the leading edge of progression. When I grew up, a remote control was an expensive luxury, we got out of the chair to change one of the three channels on the television. Even the cable box, when that was installed, was a "get up and change it" device. The home computer used the low-resolution television as its monitor; computer games were common, yet crude. I contrast this with the technology available to folks in mainland China, and I was shocked when a friend confided in me that he thought color television wasn't available until 1990. "What?" I asked, perplexed, "what do you mean 1990?" "Color television, I mean, they didn't come out until around 1990? We got ours in 1991 in China, you guys had black and white television throughout the 1980s, I know..."

I stepped back, in disbelief. For at least this guy, color television is 15 years old; he saw his first computer in college in the early 1990s, and these machines were not even running a GUI. Yet, look at China today. High-speed network access is available in various communities (at least, I confess, before it had become available in my own community, here in the U.S.), cell phones are a common accessory, and China seems no worse for making-up all the catch-up time. My point is that some of the latest technology found its way into China in a very short period of time, and many of the Chinese who are buying and using this technology never lived through a period where typing-in BASIC games from a book was considered a past time. In effect, they waited until the technology was easier to use, and more powerful than we could have imagined, perhaps, in the mid- 1980s when many of us had access to color television.

My guess is that the Chinese, too, will be playing catch up in the 10 years ahead, much like we have been doing for the past 20. Yet, this time around, we will be catching up with them at much the same pace, and my guess is that despite our head start, the sheer number of people now using computer technologies and network services will make the integration and adoption of new technologies easier, rather than more difficult. Yet, the lessons of the past will still likely hold true: citizens, and more so schools, will have a tough time keeping pace with innovation. There will always be newer hardware and software to buy that will do more, yet at the same time, knowing what to buy that is best will always be a gamble. CD or cassette. CD-R or CD-RW? DVD+R or DVD-R? DVD-A or SACD? Mac or IBM? Microsoft or Apple? Walkman or iPod?

In the 1988, Nike shoes introduced a new slogan which they still use today, "Just do it." The slogan is not bad advice for those concerned with technology integration. **This article suggests five things teachers ought to be doing towards integrating the tools of technology into teaching.** Over the past ten years, I hate to admit it, but teachers have been practicing, struggling, and experimenting with technology. Let's try LOGO, let's try video conferencing, let's try drill and practice multimedia CD-ROMs. Across schools, across my state, and probably yours too, the initiatives and frequent-starts of new ways to use technology in education have been varied with inconsistent outcomes and lessons learned.

Over the same ten years, states implemented standards for their students in public education. In Virginia, they established standards for technology. Just this year, the Virginia state board of education published new technology standards that spell out what students ought to be doing in the following areas: basic operations, social and ethical issues, technology research tools, problem-solving, and technology communication tools. These standards are the result of that teacher experimentation over the past five, if not ten years, in education, along with a growing body of research in the field of instructional and educational technology.

Standards are nice. It feels good to have some, right? As a teacher, however, looking at standards that suggest my students "use a variety of media and formats to communicate information and ideas effectively to multiple audiences," (C/T 6-8.9, VA SOL) there's a big assumption implied. In order for my students to use those media for communication, I need to know what precisely those media may be, and who we might communicate with. A creative, energetic teacher who has not yet met fear may come up with some good ideas, but what about the teacher who has built up a career's worth of experience, who knows what works, who knows how to reach her students? The standard falls short of helping this type of teacher, who may in fact not know how to use various forms of media to communicate herself. The standard is vague enough to stand the test of a number of years (it's futureproofed), but what is the essence of this standard? Effective communication of ideas? Using a variety of media? Demonstrate "ability to edit, reformat, and integrate various software tools?" I know from experience many teachers need more direction. They do not want to use technology for the sake of saying "I did it," but for getting their job of teaching done. When meeting with one teacher last year, to develop her individual technology plan, she grew frustrated at the options before her... "Just tell me what you think I should do, what will help my students... and I'll just do it."

I am not sure what brand of sneakers this teacher wore (were they Nike?), but her response to me has stuck in the back of my mind over the past twelve months. **I offer five ideas of what teachers and students should be doing, now, that really does integrate the use of technology, but also benefits the teaching and learning process.** We are at a point now in our societal adoption of technology that I feel these activities work, and are approachable for teachers with a wide variety of experience. Some of our teachers are like the Chinese in 1990 with a color television. Others possess technology know-how that is on-par with current professional standards in the technology or broadcast sectors. Still others can pick-up new technologies as easily as our friends in China have adopted the need for cell phones and access to the Internet. Despite the progression of technology, despite the differences among our comfort with technology, these five methods/ideas/implementations work. We can create action plans, we can build staff development modules, we can tutor and mentor. Some of us are just ready to get started.

Classroom Blogging

Blogging, weblogs, the "blogosphere"—it may seem new to you, but the concept and practice is almost ten years old. Several years ago I heard well-known education consultant Alan November say, at a conference, "Every teacher should have a webpage." The reasons he provided escape me, but one opinion stayed with me. I returned home and told my boss, "I think each teacher should have a webpage!" There was an excitement about that idea, that teachers should be publishers. Naturally, I thought, they'd also pick up skills to better-acquaint themselves with technology. "Our teachers have already had training in HTML, so... we're on that one..." "Yes," I thought, but I could only identify one teacher with a website.

Blogging is at the point now that it's easy to slip-in. HTML is not required. In the 1980s we bought computers to write programs, primarily. The fact that pre-compiled and authored software was available was nice, but, what was the fun in simply running programs someone else had written? Personal computer sales, however, took off once the availability of quality software applications became available. "I can do my taxes with my computer!" proclaimed one guy, while a woman confessed that her computer with game software could entertain her four boys. Personal computers eventually became easy enough to use that without any experience in programming or system maintenance, we could buy something that did something pretty cool, out of the box. We didn't need to even create webpages to appreciate the fun and power the Web provided.

Anyone who can type and write can blog. In fact, the act of blogging can increase your ability to do the same two things: type and write. Blogs allow teachers to report the progress of learning with all the stakeholders in their building—the parents, the colleagues, the administration, and the students. Teachers

can collaborate with one another through blogging. Teachers can document assignments and open communication. Blogs point visitors to sites of interest online.

Blogs also allow students to publish their work. There's a school in New Jersey that pushed hard with blogging. Students there turn-in assignments through blogs. The weblog paradigm allows individual students to have a voice, but also gives students the opportunities to engage in displaced dialogue. Posts made to blogs can contain comments. Many blogs are quite subjective, but the higher-order skills required to defend positions you take through a weblog enforce objective citation and linking.

Blogs are easy to set up, or obtain. Setting up a server at a school district to support blogging is affordable. Blogs arose out of a natural need for netizens to communicate. The structure and qualities of a blog make for some positive educational applications. One immediately thinks of electronic portfolios, journals, and discussion groups. The technology involved in blogging, including syndication, also means that aside from the medium itself, blogging helps the educational process through ease of use.

One of our teachers assigned a writing assignment that required the use of a word processor. "I don't want them to print all those papers, I want to try something electronic this time," she told me. The solution was to pass around a flash memory-based "thumb" drive to each student. When she got the drive back, she was frustrated. "I'm missing six papers, and three of them don't have names..." One student turned his assignment in late, from home, and sent it to the teacher in a format she could not use on her laptop. "Argh! Technology!!!" she bemoaned.

I envision another process, where not only the technology being used helps students by its nature (smaller writings, more focused on depth and citation) but also helps the teacher. When students post writings into a weblog, then the teacher subscribes to these blogs using a news aggregator application, the transfer of digital information is simplified, automated, taken out of the frustration equation. In this scenario, technology is really integrated: blogging isn't about making webpages, it's about communication, writing, and sharing.

Research and Problem-Solving

Sitting in the teacher's lounge one lunchtime not long ago, I listened-in on a teacher chronicling the uphill battle she engages upon each Monday with her husband. "You know, I'm trying to get ready for work myself, but he'll call me from upstairs, like clockwork, you know..." she says as she shakes her head... Next, she mimics the cries for help, from her husband, "Honey! Where's my belt? Where are all my blue socks??" She reports if it's not blue socks, it's black, if not the belt, his favorite tie. "You'd think after four years of this, he'd learn to put things where he can find them."

This tale is not unlike the ones we find in classrooms across the country. Students have questions, and as parents and teachers, it is far less troublesome to simply give the answers. "What's the capital of Mexico?" "Why do farmers rotate the fields they use for growing crops?" "Does the idea of global warming really affect us here in Virginia?" Each of these questions can be answered by using the Web; the first is a simple fact, and the last requires more than simple fact-finding. The information required to test the effects of global warming is only the beginning, manipulation of this data is required to really answer the question.

A second method for integrating technology is using the Web for researching the answers to questions, i.e., problem-solving. If the number of discussion boards, blogs, and self-help websites out on the Web are of any indication, we are now beginning to use the Internet to seek out our answers. My idea is that this trend will only continue, and one of the "basics" of information literacy will be the ability to use the Web as a resource, as a tool, and as a means to quickly find the answers we need, and the information needed to solve problems we encounter. The use of webquests, simulations, and searching strategies are how we approach this.

One such example of how the Web is helping netizens today is the Metafilter website, specifically their "Ask Metafilter" section (http://ask.metafilter.com/). Ask a question, and opinionated readers contribute answers. A look on July 12, 2005, reveals some examples of what problems folks are trying to solve:

> - What's the best cell phone I can buy right now in the United States that will sync with a Mac? I have some specific wants and am totally perplexed by the world of cell phones.

- Anyone watched the Sebrenica commemoration in Bosnia yesterday? I'd love to find a CD/mp3 of the moving song the little girl in red was singing and the chorus in white. I don't speak the language, and I'm having a lot of trouble finding the /name/ of the song, let alone a recording of it.. Please help!

- You're married or single, have no kids, hold a regular job and are out of school. So what do you do in the evenings after work?

- Anything going on in Des Moines, Iowa on the cultural scene? Art museums, galleries, music, best kept secrets, restaurants, even shopping etc. Spending 3 days in August...yikes.

- Last Thursday I found out my brother has Multiple Sclerosis. This morning I found out that New Mexico is having The Atomic Tour MS 150 Bike Ride in just under a month. I signed up for it. Now what?

Incidentally, the question regarding "what do you do in the evenings if you do not have kids" registered 32 responses within the timeframe of less than 3 hours since the question was posted. Many folks read, surf the web, and go run, or work out. To get possible ideas for the solution to this person's problem, I could spend 5-10 minutes reading and skimming over the responses other visitors have left. Or, I can take those responses and process them using a computer program to "summarize" the information. Either way, I have possible answers to my question; our friend's problem will be solved when he tries some of these suggestions out... a real-life experiment. I think you can begin to see how incredible a resource the Web can be.

While Metafilter does contain subject matter that would be inappropriate for K-12 use, it does provide a leading example of how the Web is being used by folks who are comfortable with technology. The web is not always the best source of content, but it is getting better as people use it. For better quality answers, users can visit "AskGoogle," pay a fee, and Google researchers will find the answer to your question. The web is poised to become the primary source of information for Americans in the near future. Our integration of technology here is associated with building the skills necessary today to problem solve and retrieve information on demand using proven research and query skills. This will include looking at electronic databases of published materials, but also evaluating sources that are living, changing, evolving documents (blogs, wikis, etc.).

Let Me See It

A substantial area of research in education has focused on the differences of learners, and specifically, we walk away with some basic facts: each learner is unique, we each learn best in differing ways (auditory, visual, kinesthetic), learners possess different strengths, or levels of intelligence, varied by disciplines of thought (music, naturalist, interpersonal, etc.) All the theories that deliver these ideas to us are simply wonderful, but again, like the standards, what specifically are teachers to do?

Some suggest we assess each student, find their best modes to learn by, and target them. "Differentiation" is one buzzword some educators love. Practicing differentiation in the classroom is a skill that requires development time and comfort that is not unlike the integration of technology. Offering each student in a 20-30 student classroom a unique and tailored learning experience each and every day is a daunting proposition.

One area where focus is placed many times when technology is used is text: the word. "Read this webpage, find some answers," or as I observed last year, a teacher who prepared her notes using Microsoft's Power Point software. "I like to do my notes this way," she told me, "because I can easily change them, and if someone's absent, and they missed taking notes, I can run-off a copy on the printer." "What do your notes look like?" I asked. What I saw were striking orange backgrounds with white text. On each and every slide.

I tell you of this experience to demonstrate that text was the media, but also because the orange background was the one thing I actually remembered from her slideshow. I remembered the lesson was something about biology, but the orange color, that's what stuck in my mind. My point is this: I don't feel

we do enough in education with using visual prompts, imagery, and examples. If you are an educator, how often do you use pictures to teach? Diagrams, or diagramming tools such as Inspiration? How many opportunities do your students have to "see" what you're talking about? The words of language are an abstraction far removed from the reality of the natural world. Visual images are immediate, they are rich experiences that are more difficult to obtain, more difficult to manage than mere words.

I confess that I have some mental fondness for images. I think I tend to learn with images. While the use of imagery may not benefit all students to the same degree, they do help support the process of learning different ways, with different media. The learning experience is enhanced when we can approach a topic or concept from different angles, from different approaches. The model of differentiation I believe computer technology can definitely support well is where we present new concepts and ideas to students in a variety of ways. The repetition of information reinforces the concepts learned, and each student has the opportunity to experience a mode of learning that supports his or her strengths.

Notetaking is one way to try and assimilate knowledge. There are both good and bad ways to approach this, and I will confess that the method I recalled earlier was not the strongest. The next time you find yourself putting together a presentation in a program such as Power Point, either in the classroom or elsewhere, consider dumping the words. Say goodbye to the bullets. Instead, find illustrations, concept-maps, or simply stunning digital photographs to communicate the concepts. When students are being assessed for the knowledge they have hopefully gained, do not simply offer them the multiple-choice test. Ask for diagrams. Ask for drawings in notes. Ask for visual representations. The whole concept of visual literacy is one that can maximize the power and resources of the Internet and today's personal computers, and at the same time target another mode of presentation of new information.

Let Us Collect

Today, a search on http://news.google.com for "desktop search" reveals 764 results. Google took all of about 3 seconds to find these matches; they get delivered to my screen 100 at a time. You do not need to know a thing about "desktop search" to know it's something hot, something of interest. The choices we have had for searching the Internet since 1995 have been varied. In reading through a book I had to discard, from 1997, they detailed the virtues of various search engines. One, they said, "has 370,000 different webpages indexed." Think about it. Back in 1997, you could sit down, at a computer connected to the Internet through a service provider, and search for information through more than 370,000 different webpages. Today (and you may want to check this on the day you read this), Google reports that its index has records for over 8 billion pages. Last year when I trained new teachers in our school district how to use their new laptop computers, one remarked: "There is just too much stuff out there on the net, so much good stuff, but it's overwhelming. Don't you think?"

There is no question that one can feel overwhelmed considering the amount of information stored just on the publicly-available Internet, in English. There's also the hidden web, the so-called collection of webpages that are hidden from search indexes, usually by folks who sell the content held within. Then, there's the realm of finding what's on your own computer. That's where "desktop search" comes in: "help me find what I know I have, but cannot locate."

So, here I sit, on my computer, and I think... "Hmm... I loved learning about the tale of how Christopher sailed the ocean blue, wasn't that in 1492, and discovered Cuba, and all this land over here... I wonder what he looked like?" Imagine telling fifth grade students about this explorer, and speaking about him without pictures, without videos, without anything but your spoken word. I know when I was in the fifth grade, that curiosity was not at my fingertips. I longed to know what Chris looked like (incidentally, my teacher, Mrs. Salvador, did a fantastic job explaining the whole conquistador, explorer thing to us; interestingly enough, the thing I remember most was her standing in front of the map, showing us with her hands the routes the ships took, and her getting behind the map to show us how the Earth was really round... Another visual, eh?).

Google Images found a number of Columbus pictures in less than a minute. Less than a second. Sorting through webpages takes time (I have to read), but sorting through appropriate images takes no time at all; the first result looks like the guy I remember seeing on PBS some years ago, "yes, that must be him." Searching for Columbus' Spanish name (Cristobál Colón)reveals even more results.

Technology today offers us the ability to store massive amounts of data, and we also have tools that are progressing well, to search all this content quickly. Performing a "desktop search" on my own laptop reveals 30 hits for "Columbus." I did not even know I had a picture of Columbus installed (comes from my installation of the software program, *Timeliner* by Tom Synder Productions). Yet, there it is, just a couple seconds, and more Columbus available than I could imagine.

How can educators use this type of technology? I believe every example, every artifact of learning that can be collected, should be. Pack rats, unite! Not only student work, but also teacher work, reference materials, documents, photographs, media—a personal, but also a community, trove of digital artifacts.

By its nature, weblog content is archived in a database. If you and your students are weblogging, then you are already doing a good job at starting to collect digital artifacts. Too many times, however, we forget. I can still recall the last name of every teacher I had through elementary school, and most of middle and high, but my mother tells me by the time I'm her age, I will not remember these folks anymore. I gleefully confess that, beyond their names, I forget so much they taught me. I remember what I needed, and forgot the rest. Yet, those teachers, as a collective, did teach me one valuable thing that I did not know I was learning: how to find information I needed, myself, when I needed it. Call it problem-solving, call it self-education, call it "a desire to know." We build our entire lives around bodies of knowledge. Computer technology can help us contain more of that knowledge. What we learn does not need to be re-learnt.

I cannot tell you how many times I have begun to tell someone about something I have read, or experienced. What I forget, more times than not, are the details, or the source of my information. By searching through my weblog, I am able to pull-out the details, correct my misunderstanding or forgetfulness, and reinforce what I knew, or thought I knew. I can also pass along that website where I learned about whatever it was, in the first place.

Students need to return to prior learning. New learning should build upon old experiences. Technology, through the use of databases, simple storage of files on a hard drive, or through newer journaling systems such as a weblog, provide the means to collect the artifacts of learning and access this information quickly. Start collecting.

Practice Makes... Perfect

"Some of my special education students need to hear something up to 30 times to be able to recall it," reported one teacher to me. I asked her how many times, it must have been, for my grandmother to memorize all the states, or all the presidents by heart. "She knew them all?" Yes, she was quite proud of that skill... said, "Your Granny is still pretty smart."

Perhaps to my grandmother's generation, being able to recall facts was a measure of "smartness" to those in her generation. Having facts about something is only so valuable; the ability to create new understanding or solve problems based upon factual information is closer to what I'd call "smart" today.

Yet, just as my grandmother grew up in schools between 1910-1918 learning "what she needed to know," I believe the progress American education has shown is more emphasis on building skills to seek, create, and interpret knowledge. That's the role technology should be playing in education, anyhow. Yet, is there still a role for practice? After all, new knowledge has to grow from somewhere, as plants do from flowerbeds, tomatoes from gardens, and fruit from the branches of trees.

One piece of research I found recently reported that when technology was used in drill and practice, it was far less effective than more traditional, teacher-led executions of drill and practice. The conclusion was, "Technology is not best suited for drill and practice." Drill and practice gets a bad rap, too, for basic knowledge finding its way on bottom of Bloom's totem pole.

According to "Instructional Strategies Online," (http://olc.spsd.sk.ca/DE/PD/instr/strats/drill/) drill and practice "'promotes the acquisition of knowledge or skill through repetitive practice.' It refers to small tasks such as the memorization of spelling or vocabulary words, or the practicing of arithmetic facts and may also be found in more sophisticated learning tasks or physical education games and sports." It also tells us that drill and practice activities should be the building blocks for "more meaningful learning." Many instances of technology being used throughout the 1980s and 1990s in American schools focused on

this style of teaching: let the computer take the "tedious" out of repetition.

The perception that computer technologies can be used for tasks beyond drill and practice are legitimate. However, using technology as a differentiation tool, especially when different tasks and software applications are used, can be an effective learning experience. Drill and practice will always have a place in the way we learn, for as long as behaviorist theories of learning contribute towards our understanding of how humans learn. The stimulus-response style of learning is received much better in disciplines that require bodily movement, such as sports and music. It is not that higher-order thinking skills aren't involved in learning about, and appreciating music. However, we restrict our understanding of who musicians are to folks who can play, sing, or communicate musically. In the same ways, we do not call ourselves learned until we know we can recall basic facts and truths that lead to higher, more complex forms of understanding.

Drill and practice works well in situations where learners are self-motivated and enjoy working independently. With the variety of applications available today that incorporate multimedia content, the exercises presented in this league of software can be entertaining and well-received by students. The idea that technology ought to be used for tasks beyond drills is acknowledged, and each of the first four uses of technology in this paper reflect that through uses of technology that target higher-order thinking skills. Yet for students who need extra practice, time, and reinforcement in learning and acquiring basic skills, a drill and practice approach is sound, and using technology to implement this approach is also a worthwhile method for integrating technology. As with any use of technology, however, it may not be the best choice for the given situation. The best tool should always be sought when designing an instructional scenario.

Conclusion

Benjamin Bloom's taxonomies covered three domains for educational activities: cognitive, affective, and psychomotor. As educators we often enough focus on the first, focusing on the acquisition of knowledge. The higher levels of Bloom's cognitive domain include application, analysis, and synthesis. All three levels noted, including the preceding level, comprehension, can each be addressed through blogging. The key to blogging in education is allowing collaboration and sharing of knowledge through directed activities. Blogging can do much to develop skills in all subject areas, by fostering reflection on what is being acquired in the way of knowledge and experience. Blogging also fulfills a pragmatic need in developing digital literacy skills.

Using the Web as a research instrument towards problem-solving again touches upon many of Bloom's higher-order skills: application—what am I trying to figure out, analysis—what is it that I'm finding, what can I use, what should I ignore?, and synthesis: let's see what I found, and see if it works towards solving my problem. Perhaps a trial, or experimentation is required. When new meaning is achieved, synthesis has taken place.

Using visual imagery in instruction contributes to knowledge, comprehension, but also application. We can test understanding of a concept by asking students to show, demonstrate, and produce using mechanisms outside of language. Recent research has suggested that visual literacy is a natural process (http://www.ivla.org/pdf_files/Kenney_Moriarty_Intro.pdf), one that is more immediate than learned literacies. There is no doubt we live in a visually-rich time and society. Whatever your reaction to calling our students "screenagers," you may try using the technology available to you and your students to target those learners who enjoy drawing, doodling, and work with elements in color. Technology can also be used to target learners who have auditory and kinesthetic learning styles, but doing so is not as easy. Newer developments such as podcasting and video games that require physical movement of the body (*Dance Dance Revolution*), may be options soon enough for targeting a wider variety of learning styles.

Each of Bloom's levels can be applied to warehousing, or the collection of, learning artifacts. Technology is simply used here to make these artifacts available; to help collect, organize, and present data. The scaffolding power by one's own, handmade artifacts is rarely used as completely as is possible with the help of computer technology. Each of our years in school in the U.S. is compartmentalized, with teachers who sarcastically ask each fall, "Did they forget everything they learned last year, over the summer?" Tools now exist to take everything with us: our ideas, our sketches, our feelings, and our achievements. From day to day, season to season, we can build a lifelong portfolio of knowledge.

Finally, when we come to drill and practice, we target the lower-end of Bloom's taxonomy for cognitive development. While this area has traditionally been targeted with technology, a number of software applications exist that can fulfill this need when implemented in a program of instruction that best suits the needs of the learner. The use of computer technology in this realm can also build digital literacy skills that get reinforced later as other approaches, included those mentioned here, are used.

Today, in 2005, we are at a crossroads, if you will, at where computer technology is very innovative, but also much easier to use. The focus in many schools across the country is how best to integrate the use of computer technologies into instruction. Our school leaders want to see measurable results. When technology is approached not as a solution to an educational problem, but as a better tool for sound teaching practices that support student-centered approaches and problem-based lessons, the fruits of integration are often found. The five ideas outlined here focus on what technology, today, is best poised to do for us and our learners.

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