

# Demystifying Technology

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In April, 1997, I had the good fortune to attend Planning for Educational Change, a conference at Phillips Academy, Andover, MA. Most of the participants were school administrators or other decision makers who are considering or planning major change within their school. As participants on a panel in a session entitled "Demystifying Technology," we focused on identifying the right questions to ask when planning the integration of technology into the life of a school. We considered the following two questions:

Q1: In your experience, what are the three questions a school must consider when addressing issues of technology?

Q2: Imagine you are writing an article for the professionals in educational technology. What are three questions that the professionals really need to address?

This article is a summary of my conference presentation, and a few things I have learned over the last four years while participating on a parent/trustee technology planning committee, and as director of instructional technology for three of those years. By "technology" I assumed that we are primarily referring to "computer technology" and the related technologies of networking, multimedia, the Internet, etc. Although the applications of technology "appliances" (like television, calculators, audio equipment, telephones, etc.) also require planning, my responses may not apply to those applications.

There are two major categories of applications of technology in schools, those of teaching and learning, and those of school administration. While there are many overlaps when planning for computer technology, there are also special needs for each. My remarks attempt to take into account both categories.

Q1: In your experience, what are the three questions a school must consider when addressing issues of technology?

1. How can technology support the mission of my school?

A good mission statement embodies the shared values of the community to which all subscribe. Revisiting your school's mission statement is usually a good idea prior to planning for major changes.

Look for applications of technology first. How might technology allow you to do the same things better, or allow you to do things that you can't do currently?

Some examples in administration:

- \* To manage administrative tasks, e.g., parent/student databases, business office, admission, fund raising, compose and manage grade reports (and other aspects of portfolio management and assessment), etc.

- \* To enhance communication among parents, teachers, students, administration, and other members of the school community.

- \* To manage student and faculty schedules.

Some curriculum examples:

- \* To provide tools for students to compose and present the results of their work, to evaluate it, and to edit it.

\* To provide access to learning activities that actively engage students in such a way that is otherwise impossible or impractical (simulations, role-playing, etc.).

\* To provide the ability to acquire, analyze, manipulate, and present data.

To give students and teachers access to research materials outside of the school's walls.

Of course, there are many more examples than I can present here. I suggest that you visit model schools, to see living examples of technology-rich schools. Involve all of the stakeholders in these discussions. Who are the stakeholders? Teachers, secretaries, parents, students, trustees, administrators. Of course, involving everyone is impractical, but representatives from each group should be involved. The ultimate success or failure of your technology program depends upon whether the stakeholders "sign up" with this vision and are willing to work toward its goals.

2. Given the special nature of computer technology, what is the most appropriate organizational framework needed to define and support technology applications at my school?

By building a technology infrastructure, with a school-wide computer network, you are creating a mission-critical, enterprise-wide infrastructure. Plumbing is another example of a mission-critical, enterprise-wide infrastructure: If it breaks or is poorly defined and maintained, your school shuts down. Likewise, technology. The technology infrastructure can empower your faculty, staff and students to do wonderful work, and they will grow to depend upon it. The consequences of a badly designed and maintained technology infrastructure are far-reaching.

Computer technology is complex and fast-changing. This will continue to be true for the foreseeable future. Your school must have people who have many specialized skills if you are to be successful in implementing and sustaining effective use of computer technology.

Your school must have one or more people who can take on the following roles. (It is possible that one person can assume more than one role, and conversely, the same role can be played by more than one person, but all roles are required).

#### Director

The director is accountable for the success of your technology program. He/she has a keen interest in staff development, determines policy and decides what is done and what is deferred. Some schools separate this job into two positions, one for academic technology, and another for administrative technology.

The director understands both technology and school environments. He/she loves to see what other schools and teachers are doing with technology. He/she can eloquently communicate a vision to the rest of the school, providing focus on those aspects of technology which are most essential for your school. He/she encourages discussion and the eventual understanding and ownership of the vision by the entire faculty administration, and board of trustees.

A good director can make up for some deficiencies elsewhere in the technology program. On the other hand, a bad director is a major handicap. In other words, choose this person with care.

#### Evangelist/Champion/Pioneer

This person has an infectious nature and a "follow-me" attitude. He/she is a practitioner of the art, using computer technology effectively, and is a mentor, showing others how they can effectively use computer technology. He/she is a good listener, is patient, and commands the professional respect of peers. It is best to have more than one person in this role. When you find people leaning toward this role, support them. Hire new teachers who have the potential of taking on this role.

#### Constructive Skeptic

Computer technology can be seductive. It is easy to lose sight of your goals. You need someone who can ask the "why" questions in a constructive way. "Why should we computerize the cafeteria menu, when we haven't begun to address the way we do grades and comments?" "Is it better for my students to play the computer game Number Munchers, or should we do chip trading games with manipulative materials?" Schools usually have no trouble finding more than one person to play this role.

#### System Manager

A system manager is the person who defines and manages the day-to-day details of your computer infrastructure. He/she has a computer science background and must have a keen understanding of what the technology can and cannot do. He/she provides a secure environment in which sensitive computer files are accessible only to authorized people. All system-wide resources (file servers, network applications, printing, E-mail, etc.) are implemented and maintained by this person. The system manager holds the "keys" to all of the system files, even those which are very sensitive (like salary data, grades, private E-mail, etc.) The system manager determines and enforces system-wide technology policy, e.g., software installation, but her policies do not establish barriers between the technology-users and what they would like to do.

The system manager understands that students are curious and anticipates the likelihood that they will try to tamper with computers and software. He/she is prepared for this likelihood and has defined appropriate procedures to prevent it and/or to recover from it. He/she develops an infrastructure, an organization that can support it, and commitment to fund it.

#### Techie

A techie loves to work with screwdrivers, wires, memory modules, disk drives, and other hardware. Hardware breaks, and the techie fixes it. Some of this work can be "batched" and handled by an outside service, but a great deal must be handled immediately. The techie must be in close contact with the system manager.

Some schools suggest hiring one full-time techie per 100 computers. This can be highly variable, depending upon the types of computers and network you use, skills of your faculty, and the applications you use. Many schools assume they don't need a techie, but they risk turning good teachers into bad techies.

#### Application Support Specialist

An application support specialist understands both technology and the application of technology. For example, he/she understands teaching and the computer programs that teachers and students use. He/she is easily accessible, providing support to teachers, secretaries, students and others who use computers at school and home. He/she is the best person to provide training on the basics of using computers to get a job done.

Having more than one person who plays this role is a great advantage, since you can distribute your expertise more widely. Teachers are very busy people and often expect "just in time" training on skills that are highly specific to their personal situation. Some schools assume that a small number of one-shop workshops are sufficient support for teachers, secretaries, etc. My experience is that these kinds of workshops are useful, but insufficient.

#### Technology Librarian

The Librarian catalogs, stores, and disseminates technology resources. He/she manages the day-to-day borrowing of equipment, CD ROMs, and other technology-related items that can be shared. He/she also manages other shared resources like computer lab reservations. Existing librarians (or media specialists) typically expand their role to take some or all of these responsibilities.

Often, the system manager (rather than the librarian) takes responsibility for software licensing.

3. What will my technology program cost, now and in the future? If I can't fund it all, what are the most appropriate phases?

Implementing the technology infrastructure and program is not a one-shot deal. After initial costs, there are many ongoing costs (time and money). Your school must have a budget that is appropriately scaled to your program. If you can't afford to do everything, scale down your expectations or define phases of implementation. It is better to do a small number of things well, rather than a large number of things badly. On the other hand, a critical mass is also required. Falling short of critical mass may lead to committing dribs and drabs of funding with no apparent benefit. You may even create a demand or expectation that you can't fulfill, leading to frustration among students and staff.

Some common knowledge about paying for technology:

A rule of thumb I have heard is that schools should spend between 1% and 4% of their operating budget on technology (including personnel.) 1% is barely enough to do any good, and 4% will put your school on the "leading edge."

Paying for the hardware is just the tip of the iceberg. You must also pay for software, staff training, salaries, subscriptions (e.g. Internet Connection).

For the same amount of money, next year, you will be able to get 150% of the capabilities of the computers you buy this year. The most common first reaction to this is paralysis. "Why should I buy anything that costs so much and fully depreciates in three to five years?" Many schools regard it as the cost of doing business in today's world.

Q2: Imagine you are writing an article for the professionals in educational technology. What are three questions that the professionals really need to address?

1. What are the core standard technologies, and how can I evaluate what standards are best for my school?

It is important to determine a set of standards which will persist throughout the school, or at least through major portions of the school. For example:

Hardware platform (the ubiquitous Mac vs. IBM debate).

"Office productivity" applications (e.g. MS Works vs. ClarisWorks).

Network operating system (e.g., AppleShare, Novell, NT Server, etc.).

E-mail system.

Core administrative software (registrar's office, grade reporting, etc.).

If no technology exists now, or if you are essentially replacing an entire technology program, then this is considerably simpler than if competing technologies already exist. These debates are often heated, taking on the qualities of a religious war. They can sidetrack a technology program for months or even years. The worst cases of disruption come when schools address this issue before the crucial fundamental issues that I discussed above.

Choosing to support multiple standards may be appropriate, but supporting multiple standards is usually more expensive. Make sure you understand the "hidden" costs of supporting multiple

standards (e.g., training, hardware requirements, software licenses, inventory, multiple expertise required, technical complexity, etc.).

The cost of changing a core standard is high, since there are a lot of interactions among standards that may not be fully understood until they are in widespread use. However, you should build an infrastructure that supports the possibility of change. Nothing with respect to technology will remain static for the foreseeable future.

Your choice of good standards will significantly impact the success of your technology program. And, when necessary, your ability to gracefully manage the migration from one standard to another is equally important.

## 2. How can we best manage time and space to support the application of technology?

Poor time and space management can be among the biggest barriers to a successful technology program, more so in the academic area than administrative. School schedules often don't allow for adequate faculty training, experimentation, cooperation and sharing. Frequently, computer activities don't fit nicely into one-period blocks in which all students are doing the same thing. Changing schedules can be extremely complex, due to many interrelated dependencies.

Speaking to this issue of time management, among the significant barriers to the success of my own technology program are:

### Faculty training

When do faculty get the time to learn and to practice technology skills? How can we encourage the sharing of successes and the transfer of skills from one teacher to another?

I confess that when I initially set up our technology program, I succumbed to the "If I build it they will come" syndrome. I assumed that faculty would naturally be drawn to the technology. I underestimated the need for continuous faculty training and ongoing support.

What are some examples of successful faculty training models? How does faculty training differ from teaching children? How can I help faculty find the time to learn, practice, and collaborate with each other?

Keep in mind that computer technology is not a good way to fix "broken teaching." If one of your goals is to improve teaching at your school, then adding technology to those classrooms will most likely be insufficient, or may even make the situation worse. Good teaching is a fundamental skill that is independent of whether or not technology is present. Teaching well with technology is a refinement of strong basic teaching skills, and a skill that doesn't necessarily come naturally, even to good teachers.

### Over-scheduled students

Students have a strong desire to use computers in many interesting ways. Most of our students have little or no "choice" time, which would allow them to do extended projects, acquire new skills and practice new skills. Of course, the same can be said for faculty.

### Classroom management

Faculty frequently have difficulty managing technology-rich classroom activities. One needs a high degree of comfort with the technology tools in addition to new classroom management skills.

3. How does technology serve specific curriculum goals, and what is the most appropriate scope and sequence of technology skills? Given the rapid changes in technology, we are awash in "make it up as you go" curriculum. As the saying goes, "When you are a hammer, everything else looks like a

nail." Many of us see the tool and look for places to use it. Sometimes we lose sight of our goals because we are infatuated with the tools.

For many faculty, it is difficult to understand what they and their students need to know in the "grand scheme of things." What skills can they expect of incoming students? What skills will their next grade level teachers expect?

Unlike traditional curriculum, which has a scope and sequence that remains relatively static for many years, a technology scope and sequence must be somewhat dynamic. Technology changes rapidly, and as the technology changes, so do the skills required to use it.

A good scope and sequence would also suggest specific applications and lessons or activities that support curriculum for each grade or subject.

Developing such a scope and sequence is a problem for my school. It takes a lot of work to define, and a lot of ongoing effort to keep it up to date. Consequently, it is not written down, and is somewhat "soft."

#### Conclusion

As school administrators, planning for change with respect to technology puts you in a double bind. You are merging difficult cultural and pedagogical issues with an infrastructure that is both volatile and (most likely) foreign, even mystical. In this process, you may find yourself in an uncomfortable position, trusting the knowledge and common sense of others. The questions I pose here have no single set of answers, but I provide them to help you focus on some of the core high-level issues. One size does not fit all when it comes to school technology programs. Each school must grapple with its own set of questions and answers.

I am reminded of an old Chinese curse, "May you live in interesting times." As educators, we certainly do live in interesting times. Speaking as an educator who still can't answer all of his own questions, I wouldn't have it any other way.

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