

Getting It Right:

Aligning Technology Initiatives for Measurable Student Results

Presented by Ian Jukes

© The InfoSavvy Group, November 2005

Synopsis:

Twenty years and close to a hundred and fifty billion dollars on, we still seem to be making it up as we go. Large scale spending for technology has had little impact for measurable student results. Why is that?

It's best explained by the great American philosopher Yogi Berra, who once said, "If you don't know where you're going, you'll probably end up somewhere else".

Here's what I've learned - after having spend in excess of \$150 million dollars of others people's money, overseeing the purchase of more than 20,000 computer systems, installing more than 100 networks, and spending millions of dollars on software, netware and dadgets, I'm thankful there is a statue of limitations on stupidity because I've made just about every mistake you could imagine (and a few that you couldn't imagine) what I've learned is that if you take time to align your initiatives with intended learning goals, every minute spent planning and questioning will save an hour at implementation stage, not to mention huge sums of money.

This handout is designed to help teachers, educational leaders, and decision-makers wade through the complexities of technology planning. It outlines a simple, yet comprehensive 10-point strategy of Alignment that will ensure that technology initiatives are effectively aligned with instructional goals. This handout is intended to provide a overview of how you can address: state/provincial standards, improved test scores, meeting your curricular requirements, provide relevant staff development and providing measurable accountability for expenditures - while at the same time, ensuring that learners are effectively prepared with the skills and knowledge they will need to cope with the new realities of the 21st Century.

Table of Contents

PART I: GETTING IT RIGHT.....	page 3
Background.....	page 3
What the research shows.....	page 3
So what's the problem?.....	page 3
Now the honeymoon is over.....	page 3
Some teachers applaud this.....	page 4
We're chasing our tails.....	page 4
Time to deal with it.....	page 5
What have we learned?.....	page 5
PLANNING FOR SUCCESS.....	page 6
The principles of Alignment.....	page 6
What is a systems audit?.....	page 7
What's included in an audit?.....	page 8
Critical Steps.....	page 9
Critical Step #1: Maintain a primary focus on learning not technology.....	page 9
Developing effective vision statements.....	page 10
Critical Step #2: Build a broad based of understanding.....	page 12
Levels of Technology Usage.....	page 14
Bernajean Porter's Learning Spectrum.....	page 14
Literacy Uses.....	page 15
Integrating Uses.....	page 16
Transformative Uses.....	page 17
The effective use of technology.....	page 18
Critical Step #3: Make a long-term commitment to high levels of staff development.....	page 18
Critical Step #4: Focus on doing a few things well, rather than a lot of things poorly.....	page 19
The role of keyboarding.....	page 20
Critical Step #5: Proceed slowly.....	page 22
Critical Step #6: Focus on providing adequate resources.....	page 23
Networking.....	page 24
Developing critical mass by modifying current spending strategies.....	page 24
Formula driven spending.....	page 24
Hardware considerations.....	page 24
Replacement.....	page 26
Donations.....	page 26
Leasing.....	page 26
Software.....	page 26
Facilities.....	page 27
Technical support.....	page 27
A blended approach.....	page 25
Critical Step #7: Use assessment to steer your programs.....	page 29
Critical Step #8: Use organized abandonment.....	page 30
Critical Step #9: Learn lessons from the past.....	page 30
Critical Step #10: Use research to chart your paths.....	page 30
Ask good questions.....	page 31
Getting it Right.....	page 31
A friendly warning.....	page 30
For more information.....	page 43

PART I: GETTING IT RIGHT

Background

I'm frustrated!!! For more than 20 years I've been standing up in front of people waxing effluent, talking about the great promise new technologies hold for transforming education. Unfortunately, after all that time, we're all still waiting for things to start happening. With an estimated \$150 billion dollars spent K-12 during the past 25 years, including an estimated \$80 billion in the past decade and \$15 billion in '03-04, we have to ask a simple question - where is the long-awaited technological revolution in education? Has expenditure on these new technologies impacted education fundamentally and systemically? Have they transformed learning experiences for all learners?

Sadly, my observation is that with the exception of a few isolated pockets, this just hasn't happened. In my humble opinion, there remains a fundamental abyss of misunderstanding about the role that new technologies can and should play in learning. Twenty-five years on, and despite enormous efforts, the value and place of instructional technologies in learning is still being questioned.

What the research tells us

Over the course of the past few years, there have been literally dozens of studies examining the effectiveness of new technologies in enhancing learning. These studies have shown consistent results. The bottom line is that the vast investments in instructional technology have been largely ineffective. There has been little if any demonstrated widespread effect upon student learning, specifically based on the way these technologies are being used today. (The key part of the sentence being *based on the way it's being used today*.)

So what's the problem?

It's my view that the problem lies not with the tools but with use of the tools. You don't blame a pencil if a learner can't write. Experience has shown that *when* new instructional technologies are aligned to learning outcomes, when they are used appropriately as tools of discovery, new technologies can and do profoundly and fundamentally transform learning experiences.

Unfortunately, this hasn't generally been the case. For most educators, the use of technology remains on the periphery of education and educational practices. Even after years of use, there has been little discussion about the real role new technology should play in learning and about its potential to transform the learning cycle.

Now the honeymoon is over

Not surprisingly, in an age of standards, high stakes testing, and accountability for all, where limited budgets (and occasionally limited mindsets) have become common, the same kind of accountability that has been demanded of schools is being required of technology spending. Taxpayers and decision-makers are no longer willing to accept our word that using large amounts money to buy new technology will magically and dramatically change things and improve learning.

As a result, there is an increased call for technological standards tied to improved test scores nationwide. Just recently in Congress, in the debate leading up to the re-certification of the Elementary and Secondary Act (which shapes the federal government's investment of education) Secretary of Education Spellings outlined accountability measures that would tie federal dollars for technology directly to "*proven technology solutions*" and best practices for "*measurable student result*" - which I translate as improved test scores.

External sources are seeking an immediate and direct cause-effect link between investment in new technologies and instantaneously improved test scores. Unfortunately, there is no such thing! But many politicians, administrators and other decision-makers just don't understand this, which poses a great danger to sustaining funding and momentum.

Meanwhile, some teachers applaud this

They feel (with some justification) that the purchases of new technologies are disruptive, robbing classrooms of programs, books, materials, time and even staff. While they're right, these people don't get it either. They fail to acknowledge that there's no going back to the imagined perfection of Father Knows Best and Happy Days. Whether they (or we) like it or not, living in a technology rich society is a reality not an option. So preparing learners to live in a technology rich world isn't an option. The emerging role of technology in learning is a great challenge and threat to traditional educational institutions and instructional mindsets.

We're chasing our tails

While this happens, discussions continue to focus primarily on the tug-of-war between pro-tech nerds who want us to buy and use technology at all costs without properly thinking through the process of how it can be used effectively; and educational reactionaries who fantasize about the "good old days" and think that it's still 1963. To this point, there has been very little meaningful discussion about the purpose of education, or the important role new technologies can and should play in learning and instructional delivery.

Meanwhile, outside education, new technologies have had a pervasive and transformational impact upon our institutions and on learning. It's an undeniable fact that the world has changed and is continuing to change. This is seen in our personal lives, in our businesses, training centers and even universities, who are increasingly using on-line, interactive smart learning systems and distant learning models to transform their working and learning environments.

Public education is lagging well behind the changes happening outside education. Despite the dramatic changes brought on by new technologies and the related emergent trends, many educators still haven't really considered the power of instructional technology and seem unable or unwilling to accept that technology can and do positively change the nature of instructional delivery when used effectively.

This gap is seen by the way that, even after all the time and money, many teachers continue to largely shun the use of technology in the classroom. And even when it is used, the primary focus often remains on getting and installing the technology, and using it to reinforce traditional teaching and learning practices rather than using it to reinvent classroom-learning environments. My observation is that many schools and many districts continue to be stuck at the immature stage of implementation.

It's time to deal with this

We must act before the window of opportunity closes. Think of Jell-O. You boil the water, you mix in the crystals, you put in the ice cubes, and then you place it in a container. While the Jell-O is cooling down, you can shape it in just about any form you want. But once the Jell-O sets, it's set.

In much the same way, new technologies have tremendous potential to transform learning environments, but to date these technologies have primarily been used to reinforce old instructional models. It's the classic definition of insanity - doing the same thing you've always done, but *expecting, needing or wanting* completely different results. The danger is that if we continue to use new technology in old ways to reinforce old assumptions and practices about teaching and learning, it won't be long before the Jell-O is set and in the new digital environment, (with all that implies) we'll be stuck with the same old education and a great opportunity will be lost.

To move forward, we must get beyond the technical issues and move the conversation about the role of technology in education to a higher level. But to do this, we must move the discussion beyond *hardware* and software, cards and cables,

bandwidth, technodrool and technolust issues to the *headware* issues related to teaching and learning. That's the purpose of this handout.

What have we learned?

After spending billions of dollars buying equipment to connect schools and learners to the Internet, many districts are being placed in the uncomfortable position of asking why so much of their newly installed equipment is sitting underused or even unused.

At the same time, these same districts also asking what they might have done differently in the beginning to achieve a measurable return on their technology investment. And they're asking what they need to do differently in the future to get beyond technology and technology skills, *to improved student performance in reading, writing, language, thinking and computation.*

And more than anything else, before they proceed any further down the tracks, they want a confirmation that the large investments they have made or plan to make for instructional technology can help learners score well not only with the issues related to state/provincial standards and high-stakes tests, but also in preparing them for life beyond school.

At the same time, districts that were late adopters - who have proceeded cautiously, are designing new schools and beginning to build their technical infrastructures are asking many of the same questions. But they are wisely asking these questions before they finalize their plans or commit their funding. These districts want to learn from the experiences and mistakes of the districts that were early adopters. They want to avoid developing isolated islands of technological use, and strive for a broad-based acceptance by all teachers and learners to the sustained use of these new technologies. And they want to invest in new technologies not just to look good or progressive, but so they can build the strong grounding in information skills necessary for all learners as a basis for living, learning and working in the modern world. So how do we do this?

PLANNING FOR SUCCESS

Alignment

I typically begin my planning workshops by asking participants to stand up, close their eyes, turn slowly on the spot and then, with their eyes still closed, I ask them to point in the direction of North. Inevitably, when asked to do this, people end up pointing in every possible direction including north. I see this as a great metaphor for where we're at today relative to the use of new technologies in learning - we're all working at cross purposes to one another.

I then ask them to open their eyes, bring out a compass and show them where North actually is. With their eyes open, I ask them to point North. Then I ask them to close their eyes and point North again. Then with their eyes remaining closed, I ask them to repeat the previous activity, turning slowly on the spot. When asked to point North, almost all of them are able to do this quite easily. The reason for this is that the participants have become *aligned* to my voice and my directions, and know where North is relative to my voice. (Another great activity is to ask people sitting at a table to get up, pick up the table, close their eyes and then move it - until you show them which way to go, they will have a great deal of difficulty)

The great American philosopher Yogi Berra explained the secret of life when he once said:

"...if you didn't know where you were going, you'll probably end up somewhere else."

The principles of Alignment

The principles of Alignment suggest that the critical aspect of planning for success involves trying to figure out in advance where we are now so that we can then try to figure out where it is we want to go, and how we're going to get there. The building or working our way back from where we want to be to where we are now in order to figure out what we need to do now to get to where we want to be. (whew!)

Essentially, Alignment is about trying to make certain that our technology intentions are congruent or parallel with our teaching and learning intentions. It's a radical concept, but actually doing what we said we wanted to do and consistently "walking our talk" at the same time we're "talking our walk".

For those intending to develop effective models of technological usage for measurable student results, this means being consistent, logical and straightforward in getting planning, policies, decision making and actual

implementation aligned with each other, and all pointed at our teaching and learning intentions . We will only be successful when we purposefully and directly align our decisions, resources, structures and processes in harmony with the elements in our vision.

Without Alignment, both policy implementation and change efforts are likely to be inconsistent, illogical, unrelated, and/or haphazard. It's my observation that this is an unfortunate but prevalent state of affairs with respect to technology today.

But with Alignment, things are carefully designed to accomplish and reflect what you declare to be your key purposes, priorities and intended results. This is called vision building and it's the process we're now initiating.

Alignment is the compass and the standard. Are we being completely consistent with the things we said were important? Are we being consistent to our intended teaching and learning outcomes. Does this really match what we said we wanted to accomplish?

In his groundbreaking book *Results: The Key to Continuous Progress* (ASCD, 1999, ISBN 0-87120-603) and his new book *The Results Fieldbook: Practical Strategies from Dramatically Improved Schools* (ASCD, 2002, ISBN: 0871205211), Mike Schmoker tells readers that in order to get results in addressing any issue, whether it be student performance, attendance, substance abuse, community violence - whatever is desired - that we need alignment.

For example, to enhance current teaching and learning practices we need to be aligned. To be successfully aligned, we need to know four things.

1. where we are right now in terms of our existing assumptions and practices for teaching and learning;
2. where we're intending to go (described in graphic, visual, juicy terms that can be understood by all of those that will be affected by this initiative);
3. how we intend to get from where we are now to where we want to go;
4. and what benchmarks we're going to use to measure the passage from where we are now to where we want to be; as well as to determine what it will tangibly look like (in terms of measurable student and instructional performance) when we get there.

If I were king for a day, I would require every administrator, every decision-maker, and every teacher to read and discuss *Results*.

Performing an systems audit

In my experience the starting point for getting from where we are to where we need to be is a systems audit.

What is a systems audit?

A systems audit provides a snapshot that clearly outlines the current state of things - not just with respect to the technology issues such as inventory, platform, configuration, etc. - but also with respect to the current status of our instructional practices as well.)

A systems audit creates a snapshot of all of the factors that can and do influence successful technology planning for enhancing teaching and learning. In doing this, a systems audit lays the foundation for defining the gap analysis between what is (the now) and what could be by creating a visual map of all of the issues related to successfully implementing technology into the learning environment.

In addition to providing the baseline data to help us understand where we are right now, a systems audit also provides us with the necessary information needed to make yearly comparisons between where we were in the beginning, where we are now and where we want to be (our instructional and learning outcomes).

Beyond this, doing a systems audit creates a disturbance in the existing system by providing credible information capable of disrupting the status quo, as well as informing our decisions and aligning our actions to our intentions by allowing us to refine, revise and improve the effectiveness of existing technology uses to provide accountability in determining the payback on our investment.

What's included in an audit?

A systems audit is more than just a technical checklist of what equipment we have, where it's located, and how it's configured. It's a clear snapshot of the current status where our organization is - who's using technology, where they're using it, when they're using it, why they're using it, how they're using it.

More importantly, it also tells us who's not using technology and why they're not using it. What are the challenges and obstacles? More than anything, an audit is initially intended to give a clear picture of a system's readiness for change.

Elements that should be considered in any audit include such things as the current vision - the community commitment - administrative readiness - information tech readiness - the presence of innovators - the state of libraries as information

centers - current instructional practices - equability of opportunity - the existence of standards, policies, procedures - the status of the home/school connection - staff capacity (competency) - the state of staff development initiatives - tool capacity - connectivity - facilities - technical support - analysis of the budget process - and accountability factors.

This is a complex and essential task that is typically overlooked by leaders eager to hit the ground running and spend, spend, spend and/or install, install, install. It's certainly not something that can be properly addressed within the scope of this handout.

Once again, if I were king for a day, I would require that any decision maker absolutely devour THE best resource for developing a successful systems audit. That resource is *Grappling with Accountability 2002: MAPPING Tools for Organizing and Assessing Technology for Student Results* by Bernajean Porter, 2002, Bernajean Porter Consulting. (Information about *Grappling with Accountability* can be obtained at <http://www.bjpconsulting.com> or by phoning (303) 647-2383.

An extensive sample of elements of instructional and learning audit the InfoSavvy Group recently completed for a client can be downloaded in a 114-page document that can be found in the handouts section of the InfoSavvy web site at <http://www.ianjukes.com>

PLANNING FOR SUCCESS: THE DETAILS

Once an educational audit has been completed, once we've developed a clear snapshot of where we are, it's time to start planning for where we want to be - to start planning for success. What follows are some simple, yet critical steps that must be followed if you want to plan for success:

CRITICAL STEP #1:

Maintain a primary focus on learning not technology

The acquisition of technology and the building of technological infrastructures is not the goal. Both research and experience have consistently shown beyond a shadow of a doubt that the organizations who experience the *least* success are those who have inevitably poured all of their money, thinking and energy into what Jamie McKenzie calls "installation fever." Installation fever described a situation in which the primary focus is on acquiring equipment and designing networks rather than using them.

Receiving a meaningful return on your investment (ROI) as measured by *improved measurable improvement in student learning*, only comes to those who have been able to move beyond technology to a primary focus on learning. Success only comes when *learning* is the number one priority.

A focus on learning comes by first asking how we can best improve the reading, writing, language, math and thinking skills of *all* of our students - and how new technologies can be used to help achieve those ends. We must not use technology just for the sake of using technology, but only when these technologies are the most appropriate tool for that purpose. And this will only happen when we make a fundamental shift away from acquiring technology to improving learning.

To put learning first, we must start by looking to state/provincial and district standards. Standards ask learners to demonstrate deep understanding by answering demanding questions, by being lateral thinkers, and by applying knowledge in new and different ways.

In planning for success, we must first ask what learning experiences are most likely to build the essential inferential reasoning skills which learners will need to perform well on those tests. The primary value of the new technologies is in their ability to *align* usage of the technology with the intended learning outcomes so that the technology is utilized to enhance critical thinking, decision-making and problem-solving skills.

This will only happen in a widespread manner when *all* classroom teachers are able to leverage the power of the technologies and blend them effectively into the daily routines of classrooms, and where the primary emphasis is on learning not technical skills. It's the primary focus on technology enhanced learning - not cards and cables - that will translate into higher scores on the demanding new state/provincial tests, as well as most important test of all - their future success in life.

Maintaining a focus

As you work through the Alignment process, you must keep asking/reminding yourself of this question "*are we focusing on technology or are we focusing on learning?*" To be successful, your focus must be on learning. Learning *how to use* the technology is nothing more than an *incidental (but essential) byproduct* of the primary focus on learning."

Once there is Alignment, once there's a general agreement that the focus will be on learning, we must next develop clear goals within each content area for aligning technology-enhanced learning to state/provincial standards. And once again, this cannot be done in terms of espousing generalities. Rather, we must focus on measurable outcomes for student learning as they apply to each content area.

For example, can the learner use census data to determine the relationship between family income and life expectancy? Can the learner gather, organize and communicate compelling data to promote/prevent a waterfront development proposal? Can the learner build a rationale and budget to support an expansion and transition of a pet store to an exotic pet store? Can the learner create a presentation to outline to a community the problems related to protecting the community's water supply in a time of rapid growth?

It important to understand that the primary issue is not whether learners can use a spreadsheet; it's whether they can use a spreadsheet to solve complex problems and create "what ifs". It's not whether they can a word processor effectively; it's that they can demonstrate an excellent understanding and application of the writing process to create effective documents. It's not that they can use presentation software, it's whether they have effective communications skills.

In each case, we must ask the question "Are we teaching technology?" And the answer is... Yes we are...no we aren't. In reality, learning the hardware and software skills is merely an incidental (but essential) by-product of what's really important. What's essential is that the tools are used to help learners to become better thinkers, writers, communicators, problem-solvers, managers of InfoWhelm, askers

good question, able to effectively access, analyze and authenticate information that has been accessed, how to transform the data into working knowledge, how to apply that knowledge to solve real life problems using real life tools - and finally how to assess both what was learned and how it was learned.

Again, the question to be asked is - is the focus on technology? The answer here is no. Will they need to use technologies to complete the task. And the answer here is yes (when it is the appropriate tool). And finally, will they learn how to use the technologies? The answer here again is yes. But learning about the technology is simply an incidental byproduct of this process.

Developing effective vision statements that focus on learning

Only when we appreciate that the primary focus is on learning, not technology, will we understand the need to create a learning vision rather than simply a technical vision. A learning vision focuses on the skills, knowledge, attitudes, attributes and behaviors that we need to manifest in all learners if they are to be adequately prepared for a life that goes well beyond just the ability to do well on a multiple choice test.

Effective vision statements need to be future-focused for at least 5 plus years out that emphasize learning not technology usage; and they have to cultivate a vision that challenges and stretches organizations to reach for new learning and working practices well beyond what currently exists.

As Bernajean Porter says, a learning vision must be "juicy". It must have enough clarity so that it can be translated into actual classroom practices - it must be something that provides a compelling sense of what could be.

To do this, learning goals must move from VIP (vision into practice) - learning goals must be specific, measurable goals about LEARNING results - and they must be specific, measurable outcomes that are applicable for *all* learners and staff and organized around instructional themes.

These learning goals must create an environment where those affected by the vision can not only hear the theory about why the vision is important, but will also see how the vision would look in daily practice. And for this to happen, a juicy vision is something that must be broadly communicated and include ample opportunity for feedback.

Often vision statements are silent when it comes to learning - or they are tied to vague or lofty goals related to the workplace or the future rather than daily practices. Our experience has shows that vague vision statements translate very poorly into daily classroom realities. As Bernajean suggests, vague vision statements would be things such as:

- technology will raise student achievement
- technology will enrich/enhance student learning
- students will be life-long learners
- students will be technologically literate
- students will have 21st C skills
- technology will be integrated into the curriculum
- 100 teachers will be trained - 300 computers will be purchased - 2 networks will be installed...

If the focus is on learning not technology, and if our intentions are aligned to our juicy vision, then the critical question becomes: if 100 teachers were trained, if 300 computers were purchased, if 2 networks were installed, what would this do to students' learning? What would it look like? What skills and knowledge and habits of mind would be manifested by students and educators?

Educators will make the connection between technology and learning only when they are given a sense of how these new technologies can be used to improve the way students learn and think in SS, English, Science and Math. Only when they have a compelling, juicy vision of what this will look like will they start to pay attention and begin to make significant use of new tools as transformative agents.

Successful districts focus on creating engaged learning environments as the purpose of technological acquisition. Engaged learners are responsible for their own learning. Learning energizes engaged learners. They are strategic learners. They are collaborative learners. Engaged learning challenges teams of learners to use information technologies to investigate authentic, relevant problems - problems that parallel curriculum questions and topics. In the end, the goal must be to show learners how to solve problems and make decisions.

From this perspective, technology is not the end; it's simply the means to end. Successful districts put student learning at the forefront of planning to create instructional plans not just tech plans. Plans that combine comprehensive curriculum development with the best staff development practices and strategic hardware acquisition, installation and support. (more on this later)

A friendly reminder

Remember that you can only proceed with creating a compelling vision after you have completed your audit and collected your baseline data as well as created the budget needed for on-going assessment. It is our experience that at least 10% of your technology budget needs to be set aside for this purpose.

CRITICAL STEP #2:

Build a broad based of understanding

By now I must sound like a broken record. Hardware and software are not the primary issues...these are HOW issues - with educators we must first address the WHY issues. Unless we first address the philosophical WHY issues, the motivation to change is external. This is often the reason why technology is underutilized - we've all seen it - the person behind the vision, who has been supporting individual users providing the external motivation burns out or moves on and there is no internal commitment to continue. Sixty to zero follows in short order.

A primary focus on the WHAT and HOW issues is a classic example of shooting first and then asking questions - classic "ready, fire, aim" or "ready, aim, backfire". It leads to the technological con job (TCJ). You've heard the TCJ - politicians and people in the computer industry who regularly wax effluent about the knowledge economy and wired schools, but who have little if any understanding of the reality of schools today, the nature of learning, the new environment of accountability, nor the multitude of new expectations placed upon educators.

The TCJ is the reason that many educators remain skeptical. In many places, a large amount of time and huge financial expenditures have been spent on building powerful technological infrastructures, but these efforts have failed to show any dramatic payoff for using technology in classrooms every day in terms of improved student performance.

Assumicide

This is a classic case of Assumicide. Many have simply *assumed* the effectiveness of introducing new technologies as part of osmotic and proximal adoption. Osmotic and proximal adoption assumes that if we put the hardware, software and/or the Internet close to educators and learners, that by some magical process of osmosis, all teachers will follow eventually and transform their longstanding teaching and learning practices because it's the latest and greatest direction of the day. Well this is just plain wrong! Research and experience tells us that nothing could be further from the truth.

In order to plan for success, we must work diligently to marshal support, understanding, and enthusiasm of classroom teachers or frequent use of new technologies by committing heavily and wisely in professional development that focuses on the Why.

The primary focus can no longer be on technology for sake of acquiring technology. It's not about technology for the sake of looking good - and it's certainly not about more tech classes and using more technology for the sake of using technology and looking progressive.

What this is about is aligning the thinking of educators and aligning our use of technology in order to bring critical thinking and information fluency skills into the daily practices of science, math, language, art, music classes. If we really want to have an impact, must commit to far more focus on curriculum and learning opportunities and instructional strategies rather than tech training.

To go there, our staff development models must move well beyond cards, cables, hardware, software, and routers. There is no good evidence that widespread introduction of networked computers in and of themselves into classrooms enhances learning of students. On the contrary, there is mounting evidence that by itself, new technologies have little if any impact. The research tells us that just putting technology in classroom won't impact teaching and learning styles - that teachers will simply mold the use of technology to support their existing beliefs.

The research identifies specific learning activities that are highly successful when combined with constructivist classroom approaches and the thoughtful use of new technologies - these activities include problem-oriented learning activities that are relevant to student interests, that use a highly visual formats, that focus on active not passive learning. These are learning environments that use a wide variety of learning resources designed to encourage creativity and collaborative and cooperative group work, learning through exploration, a focus on process skills, problem solving, critical thinking, decision making, useful failure and evaluation skills plus the use of authentic assessment

The research tells us that there is a strong relationship between teaching style and classroom practices with new technology. Just making technology available won't transform teacher practices. At the present time, there does not appear to be a high level of constructivist practice by many teachers and particularly by reluctant, skeptical, late adopters. Traditional approaches to teaching and learning are

commonly associated with low levels of technology use by learners. To expand upon this, let's take a closer look at different types of usage of technology.

Levels of Technology Usage

Let's consider for a moment how technology is used today. First, think about what happens "out there". Outside education, technology is seen as a tool, as a means to an end - simply a vehicle to make individuals more productive. It's something that is seamlessly woven into the fabric of everyday life. It's also not used unless there's a reason to use it

Now consider what happens in education. Although there are notable exceptions, typically, we see the decontextualized use of technology in the curriculum - technology is seen as the end not the means - it's seen as a separate curriculum - an add-on - and in many cases as someone else's job to teach!

This is a classic left hand/right hand issue. It results from the fact that curriculum revision plans are regularly developed separately from technology plans. Educational reformers are often not aware of the powerful technology tools that are available to be used to transform teaching and learning experiences.

At the same time, many technology reformers are not aware of new educational initiatives and the new instructional strategies this requires. This typically leads to irrelevant curriculum - technology skills taught in isolation from classroom learning - labs devoted to designing cool report covers rather than information gathering - term papers with fancy typefaces but where the writing and research is awful.

What many people don't understand is that just because they're computer literate doesn't mean that they can apply those literacy skills to solve complex, curriculum-based problems.

What do we need to do?

We must align our available technology with our teaching and learning intentions, which is not the norm for educational technology. We must make a substantive link between the technology and learning for measurable student results. We must understand that it is just one tool of many that should be used to achieve learning goals quicker and more effectively - and that it is not there to be used just for sake of using it. So what are general levels of usage that technology needs to support?

Bernajean Porter's Learning Spectrum

Bernajean Porter's continuum of technological use (copied with permission - you can go to <http://www.bjpconsulting.com> for a detailed look) identifies 3 broad categories of technology uses for teaching and learning. These are:

1. Literacy Uses
2. Integrating Uses
3. Transformative Uses

LITERACY LEVEL USES

At the Literacy Level, technology is viewed primarily as an object of instruction. If you walked into a room where technology was being used and listened to the instruction and learning conversations, the focus would be primarily on technology stories rather than learning stories - you would hear word processor stories, spreadsheet stories, hardware stories.

Literacy experiences are often optional - they're often taught by specialists and are usually scheduled into labs separate from students' other coursework; or are viewed as an alternative activity that can be undertaken when real work is done.

Typical Literacy activities include:

1. keyboarding
2. computer literacy classes
3. "doing computers"
4. computer programming
5. computer applications

Typical Literacy staff development focus

1. designated experts tend to be self-initiating in learning on their own
2. other interested staff mostly learn on their own time and own dime

An example of a Literacy Scenario would be:

Johnny goes to the computer lab every Wednesday. He learns word-processing, spreadsheets, and how to create pictures with a paint program. A computer teacher taught him keyboarding last year. He expects to take keyboarding again before the end of the year to be able to type even better. Johnny is also putting together a great slide show on UFO's. It's his first quarter computer project. Johnny would like to use computers more but the lab is usually full with other classes in it. However, Johnny's classroom has a computer this year so when he finishes his "real work," his teacher lets him play "SimCity" or "Math Blaster" or make a crossword puzzle with his vocabulary words. He really likes playing the new "Oregon Trail."

Even though they studied the westward movement last year, "Oregon Trail" is still fun and interesting. Johnny has discovered he really likes computers so next year he has signed up for the two new classes, robotics and web design.

The place for Literacy-based teaching and learning

It must be stressed that there's absolutely a place for Literacy-based uses of technology and Literacy-based teaching and learning. You wouldn't give the keys to your car to your son without first providing them with driver's education - teaching them how to drive, so they could become driving literate (and hopefully driving fluent). According to Jay Becker from University of California, Riverside, about 60% of technology usage K to 12 is at the Literacy level.

INTEGRATED/AUGMENTATIVE LEVEL USES

At the Integrated/Augmentative Level, the students already have some degree of technological literacy. They know how to turn the computer on. They know how to use specific pieces of software. They know how to open, use and save files...And this level of understanding allows the teachers to integrate specific hardware and/or software usage into the curriculum to augment or extend teaching and learning activities.

At this level, teachers normally initiate the technology and learning uses. Assignments generally support traditional tasks and assessment strategies as well as traditional teacher and student roles. In other words, we maintain the same basic relationship between teacher and student, teacher and content, student and content, and assessment models that we use to determine learning.

Determining Integrated/Augmentative level teaching and learning

Basically it's the same type of classroom as we have traditionally seen although there is use of technology to integrate/augment learning. If you walked into the classroom you would basically here the same educational stories you would have always heard, but now the students would be using new tools. At the Integrated Level, the use of technology is generally viewed as being optional and interesting, but not necessary to achieve the current curriculum goals.

Typical Integrated/Augmentative activities include:

1. drill and practice
2. instructional games
3. integrated learning systems
4. word processing to write themes
5. content-related software

6. teachers using software to calculate student grades
7. teachers using computers as productivity tool

Typical Integrated/Augmentative staff development focus

1. participation & support in staff development, while encouraged is still optional as well as unfocused
2. funding is inadequate, typically less than 10% of total technology budget
3. interested staff mostly learn on their own time and own dime

An example of an Integrated/Augmentative Uses scenario would be:

Akhito uses a computer in her classroom or in the computer lab to help her with her schoolwork. Because she is having trouble with equations, her teacher suggests special drill and practice software when she is in the lab. Akhito also uses the SAT software to prepare for her SAT test next month. When their class goes to the library, Akhito and her friend, Safia, research their earth science report together with on-line research tools. Her science teacher made a research "template" on disk and expects it to be completed when the class goes to the writing lab tomorrow. In the computer lab, a special software program prompts them through scientific report questions. Their prompted answers import into a word processor, then a spreadsheet graph of their data collected is inserted in the document, and finally a spelling checker is run before printing out their assignment. Akhito is glad to have these tools to make her schoolwork even better.

The Integrated/Augmentative litmus test

A litmus test that helps to determine whether usage is at the Integrated Level would be to walk into the classroom and ask the teacher the following question:

"You've been using this technology in the classroom for a period of time. Now, if the technology were to be removed, will you the teacher be able to continue to teach in generally the same manner you did when the technology was there? Would the learners be able to continue to learn in the same manner that they did when the technology was in place?"

And at the Integrated/Augmentative level, the answer to this question is YES, because the technology is just seen as a complementary tool to reinforce what was being done. It's using new tools for old teaching. The technology is basically being used to reinforce, augment, and extend old teaching and learning strategies. This of course begs the question, if we can do this with out technology, why are we spending limited dollars to use this technology?

The part that concerns me the most is that many teachers, when they get to this level, think that they've arrived. I'm not saying that there isn't a place for Integrated/Augmentative uses of technology - there is! It should be used to reinforce, to extend, to augment traditional teaching and learning. But it doesn't stop there. According to Jay Becker from University of California, Riverside, about 35% of technology usage K to 12 is at the Integrated/Augmentative level. (and I think he may be understating it)

TRANSFORMATIVE LEVEL USES

At the Transformative Level, the students already have some degree of technological literacy. They know how to turn the computer on. They know how to use specific pieces of software. They know how to open, use and save files...And this level of understanding has allowed the teachers to integrate specific hardware and/or software usage into the curriculum to augment or extend teaching and learning activities while maintaining the same traditional relationships between teacher, student, content and assessment of learning.

However, at the Transformative level, teaching and learning goes well beyond traditional practices. Here students and teachers work together to create innovative learning tasks that would be quite impossible without technology initiate technology and learning uses. At this level, the primary focus is on developing skills in collaboration, self-directed learning, complex thinking, communications and use of electronic information. In this case, the technology is used to transform the learning culture.

Typical Transformative activities would include:

1. using technologies as complex learning and thinking tools
2. students at different sites using telecommunications to gather, process and report on a common project
3. students working together to solve real-world problems using real-world tools
4. students having opportunity to demonstrate learning beyond standardized tests through performance based assessments

Typical Transformative staff development focus

1. a learning focus rather than a technology focus
2. the consistent use of the principles of alignment - the essential skills & practices are articulated, expected & measured for all aligned with the organizations teaching and learning intentions
3. 30% of the total technology budget for training

An example of a Transformative Uses scenario would be:

Jose, Ruby, and Gregory have chosen to design a school project researching a river front development using landfill. They plan to present their findings to the mayor's planning commission at the end of the term. When their civics, science, language arts and math teachers approved their second semester community project and assessment process, they began their collaborative task to research the environmental and economic development issues that would help to formulate a recommendation. They are able to do their work from school, the community library, home, and their local college using laptops with modems to connect to each other and resources as needed. On-line digitized text and graphic resources support their research. They also use teleconferencing with a network of researchers their teachers joined last year as well as a shared database designed for group resource sharing. With continuous review and guidance by their teachers and some peer technical assistance in preparing their presentation with multimedia tools, they complete their project. When the team finally presented their findings, the planning commission valued and utilized the knowledge created by this student team while deciding the city's zoning issue. The students' findings and successes will be published electronically on an environmental home page on the town's website for others to reference in the future.

The Transformative litmus test

A litmus test that helps to determine whether usage is at the Integrated Level would be to walk into the classroom and ask the teacher the following question:

"You've been using this technology in the classroom for a period of time. Now, if the technology were to be removed, will you the teacher be able to continue to teach in generally the same manner you did when the technology was there? Would the learners be able to continue to learn in the same manner that they did when the technology was in place?"

At the Transformative level the answer to this question would be NO. We can't do things we do with access to the technology because the technology has allowed the learner to go places and do things that quite simply cannot be accomplished without access to, and use of the technology

Transformative uses combine skill building (questioning, planning, thinking, communications, information skills) with electronic tools and information in order to draw conclusions and make generalizations based on information gathered - to communicate using a variety of media and formats - to access and exchange information in a variety of ways - the ability to think critically, problem, solve, make

decisions - compile, organize, analyze and synthesize information - what we call the 21st Century literacies.

The effective application of technology

The goal for effective usage of technology is a mixture of Literacy, Integrated/Augmentative and Transformative uses, with the literacy and integration being used to support or underpin Transformative practices. As Bernajean says, Transformative usage is not do something, do anything just use it!

The goal is not technology for the sake of using technology - this is putting the cart before the horse. Rather, the goal is relevancy. The goal is to use information and select appropriate tools to solve problems. The goal is to know content and be able to locate and use additional information as needed - to become self-directed learners - to collaborate and cooperate in team efforts - to interact with others in ethical, honest and appropriate ways - to learn basic skills within context, where the primary focus is on HOTS (higher order thinking skills) not just LOTS (lower order thinking skills) and - that focus on both individual and group skills - and activities that articulate with adult roles.

CRITICAL STEP #3:

Make a long-term commitment to high levels of staff development

Today, less than 10% of budgets are allocated to staff development. Henry Becker's research indicates that the average teacher receives only 5 hours of primary technology-based training each year and that most of it is at the Literacy Level.

Research and experience tell us that success will only happen when we make a long term commitment to a wide variety of learning opportunities that are designed to support different levels of expertise and differentiated learning styles that align with our vision and learning goals.

What the research tells us.

If workshops are used as the sole source of learning, we can develop up to 80-90% skill mastery for participants - but this will only impact on instructional practices by 8-10% because not all that were trained will be interested and not all that were trained will be successful initially.

If we really want to transform the learning environment, we must provide powerful incentives, adequate budgets, visionary leadership and accountability for all. These are all critical sustainable elements of successful initiatives.

The most powerful strategies to promote staff commitment and competence are a balance of formal and informal learning opportunities. Instead of using the traditional full frontal lectures, successful districts offer a rich menu of learning opportunities that match diverse learning styles, interests, and the differentiated skill levels of the educators.

Beyond this, if we want teachers to teach in a constructivist manner, they must be introduced to the use of technology in same manner that we want them to work with learners. The research tells us that if we teach them in the traditional lecture manner, educators will in turn typically teach their students that way. To do this, we must develop a variety of models including:

- professional growth plans
- workshops
- pull out sessions
- mentoring
- self-paced learning
- virtual learning
- students as instructors
- study teams
- curriculum coaches on-site
- action research teams
- learning mortgages

A point that bears repeating

This is not something that happens overnight. We didn't learn to ride a bike, or drive a car, or play golf overnight (if ever). We each went through our own continuum from illiteracy to literacy to fluency. (or not!) In exactly the same way, it takes time, effort, and money to build the cadre of trainers of trainers aligned to our teaching and learning intentions needed to move forward. And it takes a great deal of time, effort, and money to help our teachers get align their thinking to our intended teaching and learning outcomes.

CRITICAL STEP #4:

Focus on doing a few things well, rather than a lot of things poorly

Have you been to a smorgasbord recently? What inevitably happens? We eat too much - right? And we try a little of this, and a little of that, and a little of this, and some of that. So what do we end up with? Exactly - indigestion!

Instead, a more effective strategy might have been to order an single entrée from the menu instead - it would probably have tasted better - it would probably be cooked better - it would probably cost less - you might have enjoyed it more - and there would undoubtedly be room left over for a piece or two of cheesecake.

The digital smorgasbord

Think about the digital smorgasbord that's been spread in front of us these days - there's desktop video, web design, word processing, graphical arts, desktop publishing, programming - the list goes on and on - being pushed on us. So what do we inevitably do? Right - we try a little of this, a little of that, a little of this and some of that. And what do we end up with? Exactly - digital indigestion.

While all of the applications are wonderful, a more effective strategy might be to focus on doing a few things well rather than a bunch of things poorly. What if we went into our use of specific technologies deep rather than wide? What if we were able to identify a few things that aligned well with our instructional intentions, so that to begin with, we could go deep rather than wide?

Where might we begin? Well, it's different strokes for different folks - and here's where I show my biases (at least some of them) but once such continuum would be to focus on the keyboarding, word processing, writing process, and research continuum. Even though speech text is coming, keyboarding remains a fundamental process skill that learners (and teachers) need to have. Let me elaborate:

The role of keyboarding

Briefly, there have been in excess of 2000 studies done on the impact of keyboarding instruction, some dating back to the late 1800's (I have a stack of them somewhere at home.) The research conclusively shows that teaching children keyboarding has a significant positive impact upon many aspects of language, including understanding of grammatical structure, spelling, punctuation and even handwriting skills.

Primary keyboarding

Our experience is that most kids are not physically or language capable to learn formalized keyboarding until grade 3. Initially, we want young children to learn "keyboard relativity" which means that we want them to learn the relative position of the keys on the keyboard. We use a strategy based on Marilyn Ferguson's Brain Mind research where we photocopy keyboards, divide the keyboard into left and right hand, and sometimes, develop color schemes - (i.e. space bar level as brown keys for earth, next row as green keys for grass, next row as yellow keys for

flowers, and the top row as blue keys for sky) and then we help the kids develop neural patterns by laminating the keyboard, and placing it in the upper left corner of the student's desk. We then ask teachers to practice sequence skills - alphabetical, reverse alphabetical, new words, etc - for 5 minutes twice a day. Even if they don't do any practice, because of the position of the keyboard on the upper left edge of the student's visual field (which is where you should look while you repeat a phrase or name that you want to memorize), we learned that within a short period of time (a couple of weeks), the students memorize the relative positions of the keyboard. Again, we do not teach formalized keyboarding until at least grade 3, because we find that students have neither the language skills nor the physical skills to learn formal keyboarding

Touch-typing

From grade 3 up, we aim to have the students keyboarding at 1 1/2 their printing or handwriting rate. Typically that's 5 to 8 wpm for a grade 3 and 20 to 25 wpm for a grade 6. We actually measure their printing/handwriting speed (just as you would keyboarding speed) before we begin teaching them to keyboard.

I do not use keyboarding software like Mavis Beacon, Typing Tutor, or Slam Dunk Keyboarding, I use a word processor (so that they can learn the keyboard and basic word processing skills at the same time) - after teaching the home keys, I don't teach more than four keys at a time (and preferably two) and I have the students writing words and sentence from the very beginning - our aim is to have them reach the goal of 1.5 times their handwriting speed on the alphabetic keys within 6 hours of training - and we set this as our goal because I believe in the principles of payback - that if I'm going to take time from a time limited environment, students need to gain a payback, that allows them to communicate quickly and accurately.

I set it up so that the kids spend no more than 15 minutes focusing on keyboarding and I view it as performing the same function as stretching does before exercise - the lessons are driven by the teacher - with the teacher calling out letter patterns that focus on develop neural linguistic patterns inside the students' heads - I play instrumental up tempo music (like Santana, jazz fusion, flamenco or Caribbean) to energize the kids - and I create a 15 minute tape that has a bong or bell every minute for the 15 minutes so that students can take speed tests any time they want - I ask the students to print out what they have been working on and I save it to a file - there's a lot more details to this, but that, in essence is the assumptions based on research and observation.

By the way, the research also tells us that if there is not follow-up in the form of word processing practice, that 60 to 70% of the speed will be lost within 3 weeks - I also do not have our students transcribe (i.e. copy handwritten text) but want them to compose at the computer - and I absolutely stress the 5 stage writing process that emphasizes editing, proofing and publishing.

The keyboarding - word processing - writing process - research continuum

You see, the primary intention is to make the keyboard transparent - where the primary focus is not on the keyboard, but using the keyboard to enhance communications skills by learning to effectively implement the 5 stages of the writing process and to extend it into effective research strategies. Using the computer, the Web, and assorted pieces of software is simply an incidental by-product of the process of making learners better thinkers and communicators.

Clarification - why this continuum?

This is not to say that I don't recommend uses beyond this continuum. It's just that success is better built on success than on failure. If you step back for a moment, you will begin to see why I have identified these elements.

It's because they are part of the central process taught in all schools today. As such, by focusing on doing a few things well rather than a number of things poorly, I can align our technology usage to our stated learning outcomes - having a deep understanding of the keyboarding, word processing, writing process research is foundational to all areas of study.

If this is our primary focus, and if our vision, instructional model and staff development strategies are all aligned towards this end, it becomes the responsibility of all teachers at all grade levels and in all subject areas - and the skills are not taught in isolation, but rather embedded into all learning experiences for all learners.

CRITICAL STEP #5:

Proceed slowly

By slowing down, we avoid installation fever. My experience is that the technology bandwagon (some vendors and other misguided souls) has long been pressing schools to wire before we're even certain of the learning benefits. Stop for a moment and consider that the vast majority of vendors have a very narrow and limited understanding of learning and the real issues in education today. Most are primarily focused on product and low-level skills - a really basic level of awareness.

Combine this with the 18 to 30 month (or less) obsolescence cycle that has been cultivated by hardware, network and software vendors, and increasingly schools are finding themselves on a replacement treadmill so costly that it's almost impossible to maintain standardization in our hardware, software or networks - leaving us in a constant catch-up mode.

What I've learned through the years

As I wrote earlier, over the course of the past 25 years, in my haste to be a "man of action" I've made more than my share of I-D-Ten-T errors (read that as I-D-1-0-T) primarily because I have suffered from occasional bouts of IDS - Intelligence Deficit Disorder in making purchasing decision. That's why I'm very thankful that there's a statute of limitations on stupidity. Even the most careful planner can have an occasional lapse in judgment.

One way to avoid such mistakes is to stop long enough to take a breath, and consider what our assessment tools are telling us, as well as to remind ourselves of what our learning focus is before proceeding. When we stop and take the time to consider, it gives us the chance to ask good questions about what steps we need to take next to get from where we are to where we want to be. When we do, the need to wire and equip every classroom is quickly replaced with a primary focus on aligning our hardware and software acquisitions with our teaching and learning intentions.

In a wonderful movie "What About Bob?" eminent psychologist Richard Dreyfuss' advice to terribly neurotic Bill Murray is that in order to overcome his problems, he needs to take "baby steps" - to take small and careful steps rather than giant leaps - to go slowly rather than utilize "ready, fire, aim" thinking. Motivational speaker Tony Robbins calls this CANI - constant and never ending incrementalism.

Taking baby steps/using CANI, if we were to take half as much equipment, locate and support it strategically, and provide extensive and ongoing staff development carefully aligned to our teaching and learning intentions, it would have far more impact than a much larger amount of equipment hurriedly installed and poorly supported. And with the recent appearance of inexpensive, portable, durable, wireless networked technologies, this approach becomes even more appropriate.

CRITICAL STEP #6:

Focus on providing adequate resources

There seems to be a misguided fascination with placing a small number of networked computers in each classroom. The assumption here is that doing this will lead to equity of access for all learners and teachers. In reality, this leads to the dilution of limited resources. Taking this approach, each classroom is provided with 2 or 3 networked computers. Unfortunately, while it may be done with the very best of intentions, the number provided is too few to do much good - it's like having one or two pencil for 30 learners and expecting them all to be pencil literate - it works in theory but not in real time.

Experience tells us that at the elementary level, we need to have a critical mass of at least 6 to 10 computers, and at the middle school/secondary level at least 10 to 15 computers before we will see any significant usage. In fact, my personal experience is that if a handful of computers are placed in a classroom without clearly defined expectations as to how they are going to be used and how it is expected that they are going to transform the learning environment, that equipment will typically be used less than 15% of the time for instructional purposes.

Critical mass

We can optimize our results by moving equipment around to where it will be used intensely for shorter periods of time, then sending it on to other classrooms when the technology-enhanced, technology-intense unit is finished. Even if the teacher is both prepared and inclined to use technology, districts must deliver "critical mass" in order to see regular and effective use. This model works particularly well when wireless technology is used.

Oh, and by the way, critical mass involves more than just an adequate number of computers - it also requires a sustained staff development model and adequate support in the form of technical assistance.

Networking

This is a very complicated area well beyond the scope of this handout. Here are my recommendations. Make an inventory of the existing services and technologies that are available to students and teachers right now. Then develop a vision of desired services (voice, video, data capabilities). Consider how these services will be delivered to students and educators and how access by students and teachers to these services aligns with the District's teaching and learning intentions. Then

consider the maintenance and upgrade costs of telecommunications. Remember to keep the alignment of technology with teaching and learning in mind at all.

Everyone's needs will be different - each site will require you to address issues related to LAN - Intranet - Internet - your solutions will include some hybrid combination of copper, fiber and wireless. Again, a very complex subject .

My recent experiences with constantly changing network standards tells me that the best approach is to visit lots of sites using the networking infrastructure you are considering, ask lots of questions of both educators and students about the systems and how they deliver the goods, and carefully examine how they support intended teaching and learning goals. Once you feel comfortable, hire a qualified network expert with a proven record, and then plug your ears, because no matter who you hire, someone will be second guessing you.

Recommended resources include *Process for Identifying District Technology Standards* at www.etc.wednet.edu/techplans; *Networking Guide for K-12 Common Schools* at www.netc.org/; and *Computer Networking For Educators* by Ted McCain and Mark Ekeland - available from www.tcpd.org/ or (ISTE) - 1-800-336-5191

Developing critical mass by modifying current spending strategies

Here are my personal observations - over the course of the past 20 years, I have been responsible for the purchase of over 35,000 workstations; I have installed or supervised the installation of over 300 networks. Over that time it's been my experience that the hardware costs have only represented approximately 30-35% of total cost as the initial cost of hardware is only a small part of the considerations.

Formula driven spending

I use formula driven planning based on a ratio of 2:2:1:1:1:1- this translates to approximately 2 parts hardware (30%) to 2 parts staff development (30%) to 1 part software (approximately 10%) to 1 part technical support (approximately 10%) to 1 part facilities (approximately 10%) to 1 part assessment facilities (approximately 10%)

Hardware considerations

Avoid religious wars over what platform to use. If hardware is the answer, then what is the question? Headware not hardware is the solution. Consistency of platform is critical. It's not just about the computer de jour. Purchases need to be made based upon agreed standards aligned to teaching and learning intentions.

These must be reviewable standards. And remember that curriculum and learning drives hardware and software purchases, to the other way round.

Consequently, what's needed is not necessarily the most expensive or newest. If hardware acquisition is aligned with instructional and learning intention, perhaps we don't need a Ferrari when a Volkswagen might do.

I recommend wherever possible that you take a toaster technology approach and buy equipment that is plug and play rather than plug and pray (how big is a toaster manual anyway?)

A blended approach

It's not the technology but its application that's the most critical issue. Thus the focus should be on hardware that students and teachers can use rather than hardware that they can learn to use. Worshipping at the altar of industry standards leads to the feeling of always being behind. Like I described earlier, try to approach hardware as an entree rather than as a smorgasbord. Focus on trying to do a few things well rather than a whole bunch of things poorly.

Personally, I use a multiple tiered strategy. Consider the 90:10 rule. Technological cycles are too quick and we just can't replace stuff every year - yet when we buy, we tend to want to buy the fastest and biggest even if that exceeds the needs for 90% of users and 90% of what we do - the difference between a 1.5 GHz machine and a 2.500 GHz machine is barely evident for anyone but a power user. Teaching and learning intentions not technodrool must drive purchasing strategies, but to do this you must get beyond the technology to application and alignment of the technology. An excellent strategy is to take a 3 tiered approach to purchases.

Tier 1

Buy a few, very high powered, fast process cycling, large storage device, lots of RAM devices - use them to make direct Internet access, to be the servers for the school Intranet, use them for image scanning and editing, for sound capture and editing, for video capture and editing. These computers are not for everyday use. They are reserved for special tasks, not typing reports. Learners use these tier 1 devices to create and edit their work and then they save their files to the Intranet. Once the heavy lifting is done, students then use their tier 2 classroom and media center computers that are connected also connected to the Intranet server. While these are less powerful computers (and hence less expensive) they can easily be used to assemble the final product

Tier 2

In the lab(s), classrooms, libraries (and wherever else the technology is placed) purchase less powerful and less expensive machines for everyday use. Whenever possible, buy machines that are 2 cycles (60 to 90 days) removed (make sure they have LOTS of RAM and big hard drives) - again the difference between a 1.5 and a 2.5 GHz machine for most users is barely noticeable for most tasks. By buying 2 cycles-removed equipment, they can typically be purchased for about 60% of the price of high end equipment. But in doing so, you will have saved enough money to buy the high end machines for free.

Tier 3

The third leg of the stool is to purchase network devices/thin clients that are used for specific or dedicated purposes. Depending on what you buy, they may or may not have all the capacities of a desktop. But, they are devices that are purchased with technical capabilities which are aligned to teaching and learning intentions.

These could be laptops, thin clients or increasingly they could be handheld devices with a word processor and email/web searching capability because they can typically be hooked up wirelessly to the intranet and Internet. At the same time, they are also relatively cheap because they have no hard drive and use flash memory. If you are able to afford one class set of these devices for every 6 to 8 classrooms in a school, you can easily provide 30 to 40 minutes of hands on time for every learner in the school.

And if you align the use of this technology to your intended teaching and learning outcomes, and if you focus on doing a few things well rather than a bunch of things poorly, then instead of bringing the learners to the lab (with all of its costly infrastructure) you can start bringing the lab to learner - and then suddenly the lab becomes a classroom, a library or a pond. And instead of requiring state-of-the-art equipment, you may be able to use less expensive, less complex technology.

Replacement

You have to deal with aging inventory - to do this, you need to have standards for all platforms as well as "life-cycle" policies. Today, in the real world, products are lucky to have 12 months as a shelf product; they are typically used for 2-3 year in businesses and can be used for 5 years for the originally defined functions. You can add on another 2-6 years with creative re-purposing. You need to develop specific criteria for upgrading or repairing" - as a rule, spend no more than 30% of the cost of replacement and only spend it if this can extend usage by at least two years.

Donations

Donations are fantastic - but watch out! You may just be inheriting someone else's problems. Ask yourself - is the technology out of date? Will it talk to the network? What will it take to install and support these devices? If it's still a go, ensure the technology is upgraded to today's standards and make certain that it has a large enough hard drive and enough RAM to operate.

Leasing

Leasing used to be impractical but now when you add up the costs of hardware, software, tech support, networking, upgrades and so on, it may now be worth a second look - as long as the equipment purchase and support come from the same company - otherwise you will be plagued by excuses and finger-pointing. Check out "To Lease, or Not to Lease" in *School Administrator*, April 2003

Software

Again, teaching and learning intentions must drive selection. Just like with hardware, you need reviewable standards - it's not just about buying the software de jour - not necessarily the most complex - at all costs, avoid buying or upgrading to bloatware that immediately slows your equipment to a crawl - remember that version 5 of Word is still more than enough for most learners and educators.

In all cases, focus on acquiring plug-and-play rather than plug-and-pray software. Purchase software that users can use, rather than software that users can learn to use. And develop a software toolkit of recommended and supported software across the school or district. If you have a limited budget, focus on applications aligned to teaching and learning, rather than drill and kill.

Absolutely try to make the interface consistent so that users can easily move from one piece of software to the next without having to reengage the learning curve. Buy a Swiss army knife (Works) rather than a dedicated steak knife (Word) - if we consider that the 90:10 rule applies equally as well to software, then you can appreciate that 90% of users use less than 10% of the power of the software.

It's not the software but how the software is used in to align with our instructional intentions. Again, we must try to focus on doing a few things well rather than a lot of things poorly. An excellent place to start is Jamie McKenzie's *Strategic Teaching in Concert With New Technologies* - From Now On - Dec. '02 at <http://www.fromnowon.org>

In much the same way as with hardware considerations, there should be a focus on

ensuring consistency with the software being used. It is not always necessary to have the most modern, complex or expensive software. Often complex software requires inordinate amounts of time to train people to effectively use, rather than applying the time to solve real time problems.

Instead, it may be better to purchase software that can be learned quickly and used effectively by a large number of people. While it may not butter bread particularly well, a Swiss army knife also has a great fork, spoon, corkscrew and a myriad of other tools. In much the same manner, a single piece of integrated software containing a word processor, spreadsheet, database, graphing tool and a telecommunications component can be highly versatile while also being far simpler to learn.

Facilities

Planners often view facility issues and the related costs as an afterthought. Such factors are a hidden, but nonetheless important element that must be factored into all spending equations. When factoring in facility costs, you account more than just the cost of desks, but also power, lighting, networking, ventilation, flooring, noise reduction, location and wall space for now and the future.

Any cost estimates related to a technology plan should contain an inclusive formula that takes into account all of the various elements related to not just facilities, but hardware, software, curriculum, training and support.

Too often, planners only consider the cost of the computers and software, without considering the associated expense for servers, shared printers, related peripherals, network connection and the like. Many novice planners are surprised to discover after the fact that the hardware component may only represent 30% of the total cost for implementation.

Technical Support

Yet another element often overlooked is the need for responsive, reliable and helpful technical support. This too can be a make or break element. However, it is often one of the most difficult elements to sell to decision-makers.

Those with a capital acquisition mentality have little problem in spending money on "things" that will be on show, but balk at putting out money to support other components, particularly elements that are "intangibles." As a result, users often give up in absolute frustration when trying to rely upon balky devices that have an operational complexity well beyond the individual's personal abilities. Even where

technical support is provided, tremendous anxiety can be created by technicians unwilling or unable to communicate with users. Success depends not just on having techno-weenies that speak English as a seventh language, but on individuals with real communication skills, an educational and instructional context to the use of technology and a willingness to share their knowledge rather than build personal empires of control.

Levels of support

Support for initiatives must come from three levels: district, school and community. At the district level, support must be both moral and financial nature. It is difficult to succeed if the plan is not understood and publicly supported by the superintendent, the school board and district personnel. This support cannot just be implied, but must be explicitly recognized and profiled as important at the district level through such means as inclusion in a district's annual goals, or broad-based profiling or showcasing of programs. If support is not there, it's often interpreted by those in the trenches as just another example of rhetoric and posture rather than substantive and meaningful commitment to a plan.

At the school level, successful initiatives, while not usually directly lead, must be strongly supported by administrators. The extensive and varying demands placed upon administrators often do not allow them the necessary time to effectively drive the initiative. Instead, what is needed is the existence of a cadre of school-based champions with ownership of the initiative, time to facilitate it and financial and emotional support needed to make things happen at both the operational and conceptual levels. As is the case with technical support, it is important that this group include individuals who sincerely believe in empowerment and the cultivation of a sense of shared ownership rather than individuals that would build personal empires.

At the community level, a broad-based understanding for the initiative as well as how it impacts upon the educational community is critical. Planned events such as open houses, public demonstrations, informational talks and community training provide excellent opportunities to showcase the program. It's critical that a concerted effort be made to connect in a substantive way parents, seniors, young families, "childless" families, businesses, politicians as well as any other potential constituents whose support and understanding may be needed in the future. Directly related to this, it is imperative that every opportunity be taken to profile the program through the local media. Essentially, a kitchen sink approach should be used to ensure that current initiatives are effectively profiled and it's particularly important to appreciate that if constituents don't come to you, you must go to them.

CRITICAL STEP #7: Use assessment to steer your programs

Management guru Tom Peters tells us that what gets measured gets done and conversely, what doesn't get measured doesn't get done. If you don't measure it, it's not going to happen.

ROI (return on investment) can be determined by building assessment tools into budget as part of the feedback loop. ROI assessment serves two purposes. First, it becomes your baseline data that helps to tell you where you're at right now. If you don't first know where you are, then how can you figure out where you're going? Once you have baseline, this becomes the foundation for clearly determining, in advance, how you can support your teaching and learning intentions and how you will measure their effectiveness.

Then, in subsequent years, the assessment tools can be used to identify the current state of progress towards the stated goals (by assessing the level of student and staff usage/competencies) relative to the baseline data. This, in turn, allows us to adjust and re-align future efforts towards our intended learning outcomes

Using assessment tools to determine our return on investment is the basis for providing large-scale accountability. The question that needs to be addressed is what's happening for ALL learners - both students and teachers alike. How have the technology related expenditures helped make a difference in moving toward our teaching and learning goals?

Understand that assessment cannot be an optional aspect of the program. And, while not trying to sound like a broken record, it must focus on learning not technology.

If I haven't hammered it home enough yet, here it is again. Equipment acquisitions don't equal student/teacher benefits. Measurable student learning does not happen by osmotic or proximal adoption and can't just be measured through intangibles. Measurable student learning must be determined through clearly stated and measurable objectives developed in advance.

Questions to ask

1. How will the new technologies be utilized in the school curriculum?
2. How will the new technologies be infused into student evaluation cycle?
3. How will the use of new technologies be reviewed on a cyclical basis?
4. How will the new technologies affect student achievement and progress toward student performance?

5. How and when will progress towards learning goals be assessed?
6. Who will be responsible for determining benchmarks and collecting data?
7. And how will this be used to update our instructional plans?

CRITICAL STEP #8:

Use organized abandonment

We need to be willing to let go of those things that aren't working. Some districts deny that technology isn't being used or that it's being used ineffectually. Others continue to suffer through outbreaks of screensavers disease and use denial. They are content to see computers being used for almost anything as long as they're being used. This is sometimes described as "doing computers" - using technology for the sake of using technology with no pre-determined intention or strategy in mind.

We won't see a ROI in the form of improved student performance unless we're willing to acknowledge what's working and what isn't. Once we've done that, we must be willing to abandon strategies and activities that contribute little and align poorly to our teaching and learning intentions and that waste valuable time and resources. Rather, we must align our energies where they will do the most good and have most impact

CRITICAL STEP #9: Learn lessons from the past

During the past twenty years, we've heard many grandiose claims and listened to many promises about the miraculous impact of new technologies...but we've seen few of these promises delivered. After all this time and all the broken promises, we've got good reason to join skeptics anonymous and to keep a tight hand on district purse strings.

New technologies will only have an impact on our teaching and learning environments when we demand better data, more pilot programs, more models, and more demonstration projects.

Going back to Bill Murray in *What About Bob*, we must make baby steps. We must carefully and methodically inch forward rather than plunge headlong into the night.

CRITICAL STEP #10:

Use research to chart your paths

Learn from my mistakes. It's currently fashionable to ignore decades worth of education research on what it takes to make change in schools. This is the technological con job. Vendors want us to believe that their boxes, wires, and software will make change happen and they would prefer that we ignore the accumulated wisdom of the past 30 years. Schools that ignore research are prone to pursue folly and fashion and will inevitably repeat/compound their errors

Use the work of Michael Fullan, Sparks and Hirsch, Bernajean Porter, Jamie McKenzie, David Thornburg, David Sousa, Jason Ohler, Willard Daggett, Ted McCain, Alan November and many others who suggest that broad-based acceptance of new technologies requires much more than just the purchase of computers and software.

And finally...

Ask good questions of everyone (parents, educators, administrators, the public, vendors...) who might influence the process. As David Thornburg says, questions might be most powerful technology we have ever invented. Good questions enable us to explore new ideas while protecting us from being stupid. We are constantly surrounded by "experts" and vendors who would love to see us move forward in a ready, fire, aim manner without knowing quite why we're doing it, or where we're heading or how we're supposed to get there.

Even when you don't understand technospeak, technospeak and the technical advice we're being given or the destination we're being sold, we can still ask tough questions to test the value of proposition:

1. How does what you recommend align with our teaching and learning intentions?
2. How will using this technology translate into student performance?
3. What data can you provide to support the recommendations you've made?
4. Where can I see the effect on learning of your advice
5. What mistakes have you made in the past?
6. How will I know three years from now if this was a good move/bad move?
7. How will this decision provide equity of access and experience to all learners and educators?

Getting it Right

All starts with an audit - a snapshot of what is - of where we are - which provides baseline data, which can become the basis for the development of a yearly of where we are. This comparative snapshot profiles the gap between where we were, where we are and where want/need to be.

Once we've done this, we must invoke the principles of Alignment by first creating a clear, juicy, compelling vision that has a primary focus on learning not technology. We must then build a broad-based understanding of why we are doing this by aligning our curriculum intentions with a compelling vision as to where we want to go and couple this with a long-term commitment to a staff development model that will support the instructional strategies needed to align our vision results with our teaching and learning intentions.

This includes a blend of literacy, integration & transformative uses of technology with a strong emphasis on the transformative uses that align with our learning outcomes. Although there is a tendency to do it all at once, focus on doing a few things well rather than many things poorly and proceed slowly to make sure where you're actually going is aligned with where you want to go. Understand that success is better built on success than failure

Focus on providing adequate resources that create the critical mass needed to have an impact on learning - then align your networking, hardware, and software acquisition strategies to support intended outcomes. Use baseline, formative, summative assessment to steer programs and to keep things in Alignment. And be willing to let go of what's not working learn from your and others mistakes

Planning for success is not about building a technology plan, it's about building an instructional plan - it's about looking at big picture not just some of the various pieces. It's about getting beyond technolust and technodrol to how technological infrastructures can help in renewing education

A friendly warning

This said, you will never be "completed" - excellence and a restructured educational system is a journey not a destination - it's an ongoing, ever-changing, never-ending enterprise

For more information contact:

Office Phone: 250-717-0998

Office Fax: 250-717-0999

E-mail: ijukes@shaw.ca (Lori Anderson is the office manager)

FOR MORE DETAILS CONTACT:

Phone: 250-462-0767

Fax: 250-490-4969

E-mail: ijukes@mindspring.com

Check out the Committed Sardine Blog at:

<http://homepage.mac.com/iajukes/blogwavestudio/index.html>

Web sites

www.infosavvygroup.com

www.ianjukes.com

www.thecommittedsardine.net

OFFICE MANAGER

Lori Anderson

Office Phone: 250-717-0998

Office Fax: 250-717-0999

E-mail: ijukes@shaw.ca (Lori Anderson)

Handouts

All of the handouts containing the text for my various presentations (and more) as well as the funny pictures I use before my presentations can be accessed and downloaded at <http://www.thecommittedsardine.net> or <http://www.ianjukes.com> - unfortunately, as I explain in my presentations, due in part to copyright and in part to the size of the files (they're absolutely HUGE!!), I can't provide you with the PowerPoint version of presentations, but I think you'll still find plenty of interest.

When you get to my site, simply click on "Handouts". If you don't already have it, first download the free version of Adobe Acrobat Reader that is appropriate for your type of computer. This will then allow you to open all my different handouts on your computer without needing to have the specific piece of software with which I created the files. You might want to carefully look through what's on the site as I currently have more than 40 different handouts that range in size from 10 to 100 pages.

© The InfoSavvy Group, 2006

Copyright Policy: Materials published on The Committed Sardine web site may be duplicated in hard copy format for educational, non-profit school district use only and must include this copyright policy. All other uses, transmissions and duplications are prohibited unless permission has been expressly granted. If you have questions, please contact Ian Jukes at ijukes@mindspring.com