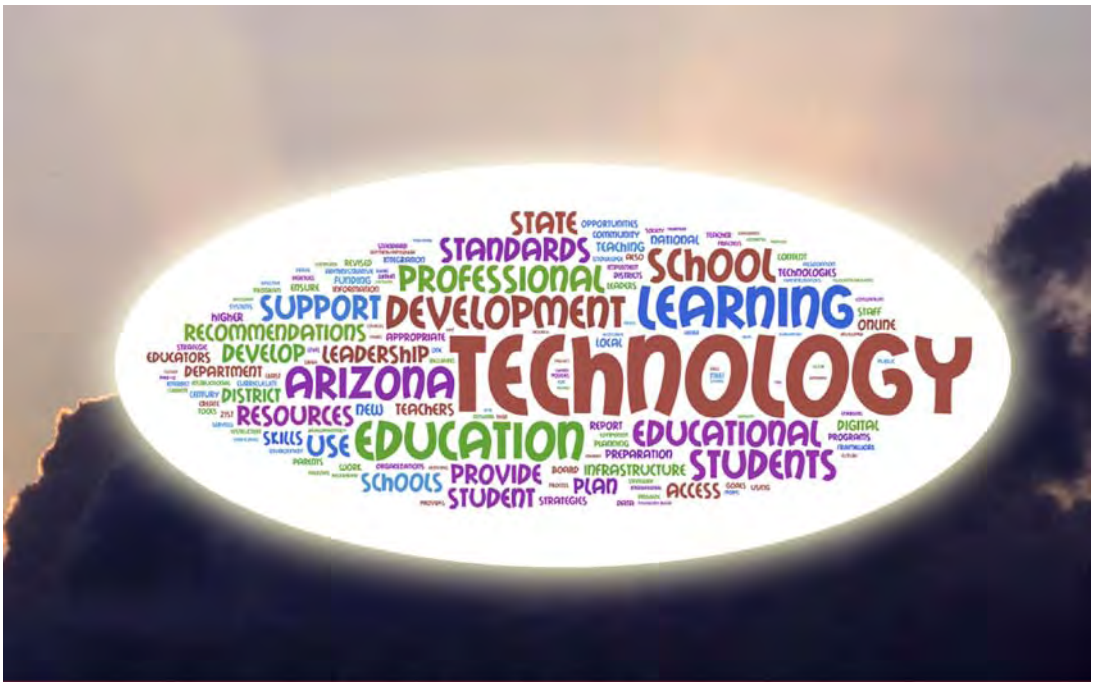
# Transforming Education:
## Enabling Learning for All Arizona Students




# The Arizona Long-Range Strategic Educational Technology Plan

Approved by the Arizona State Board of Education

April 27, 2009

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## Enabling Learning for All Arizona Students

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Prepared for the State Board of Education

**Tom Horne**

Superintendent of Public Instruction

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# Forward

Society today is marked by accelerating change. We live in a connected world where technology and digital resources enable routine tasks, even highly complex routine tasks, to be completed anywhere in the world using knowledge and expertise from around the globe. Our students respond differently to learning opportunities than did their parents and even their older siblings. They are accustomed to accessing information they need online, processing that information through interactive digital communication tools and structures, and working with that information in real time together with peers and experts to make new meaning and put these new learnings to work for better decisions, for effective digital-age communications, or for efficient problem-solving. The competitive environment which our students enter, and for which our education systems must prepare them, is dynamic and it presents demands that have long since by-passed our industrial-based model of education.

This is no longer the 1990s, and Arizona schools cannot afford to continue as if it were. We know technology and digital resources, implemented well, can improve student engagement and learning. They can make learning opportunities available in our most remote settings that were never available before. And we know that with the tools and strategies available to us in digital-age learning environments students are better prepared for their futures and for a lifetime of learning. We also know that transforming learning, school change and sustaining innovation in education is not simple. In fact, it takes vision, committed leadership and system-wide, coordinated and sustained effort.

The plan that follows is the result of a highly inclusive process facilitated by the Arizona Department of Education in which critical stakeholders from across the state considered local, state, regional and global data and information to outline a strategic, long-range plan for ensuring educational technology is leveraged in Arizona schools to effectively enable learning for all Arizona students. The recommendations to an array of institutions and stakeholder groups are concrete and reasonable and will enable educators across this state to engage and prepare students and position Arizona well to thrive as we move into the second decade of this 21st Century.

Don Knezek
Chief Executive Officer
International Society for Technology in Education (ISTE®)

# Executive Summary

It is hard to argue that America is facing a number of significant changes. The world's economy is shifting to a global economy that requires its participants to be creative, collaborative problem-solvers who know how to communicate with multiple cultures around the world. As Daniel Pink states in *A Whole New Mind,* the left-brained skills of the industrial age are no longer sufficient in today's world. If students wish to survive and prosper in a world of abundance, where work that is routine will be automated or sent overseas, they must develop a set of skills that focuses on creativity and innovation. Pink calls for matching the still important left-brained analytical skills with the creative and innovative skills of the right brain.

Other organizations and reports also call for the transformation of the American educational system. The Gates Foundation calls for new and innovative high schools. The Partnership for 21st Century Skills provides a framework with which schools, districts, or states can begin to transform their curriculum. And the International Society for Technology in Education has developed a set of standards for students, teachers, and administrators to guide the creation of 21st century schools.

Along with dedicated professionals in the classroom and leading our schools, a network of professionals who understand the role of technology in supporting learning of these new skills and a robust technological infrastructure are needed to support the development of our 21st century learners. As Dr. Mary Ann Wolf, Executive Director of the State Educational Technology Directors Association (SETDA) states. "As in business, technology can help develop sustainable programs with short and long-term academic and economic benefits." For example, *SETDA's 2009 National Trends Report* found that

> The implications of integrating technology into all aspects of education extend to real improvements in state economies. By increasing high school graduation rates, technology can greatly increase states' return on investment. Alabama, for example, increased high school graduation rates by 10% after introducing a technology-rich curriculum. Should this trend continue, the state could see over a billion dollars in additional wealth. According to a 2007 report from the Alliance for Excellent Education, an increase in high school graduation rates could add $1.6 billion to Alabama's economy.

Therefore, the purpose of this plan is to develop the statewide framework necessary to build and support robust 21st century environments. It does so by making strategic recommendations to a variety of stakeholders from state leadership to classroom teachers to students and parents. It makes these recommendations in four interrelated areas that are necessary for the success of all Arizona Learners: Student Learning, Leadership, Preparation and Development of Professionals, and Infrastructure.

> We live in a connected world where technology and digital resources enable routine tasks, even highly complex routine tasks, to be completed anywhere in the world using knowledge and expertise from around the globe. The competitive environment which our students enter, and for which our education systems must prepare them is dynamic and it presents demands that have long since by-passed our industrial-based model of education.
>
> *Don Knezek, CEO, International Society for Technology in Education*

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- Pendergast School District
- Statewide Instructional Technology (SIT) Project and the County School Superintendent Offices
- Educational Technology Group, Texas Department of Education
- Educational Technology Group, Virginia Department of Education

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# Introduction

> On a continent bounded by two oceans, our society has often employed nautical metaphors to generate evocative images. National political leaders used to speak, for example, of the "ship of state," and President John F. Kennedy, in arguing the case for economic growth in the early 1960s, claimed that "a rising tide lifts all boats." Given our country's growing demographic diversity, however, perhaps it would be more appropriate now to imagine our nation as a convoy. Some of the boats are large, well built, and able to ride out the heaviest of seas. Others are somewhat smaller, less well-equipped, but still quite sturdy. But many are fragile, meagerly equipped, and easily swamped in rough waters. That convoy — the individuals, families and communities that make up our nation — is in the midst of a "perfect storm," the result of the confluence of three powerful sets of forces: divergent skill distributions, a changing economy, and demographic trends….
>
> …We are in the midst of a perfect storm in which these three powerful forces are combining to generate waves that already have had a considerable impact on our nation. Unlike the perfect storm chronicled in the novel written by Sebastian Junger, the forces behind this storm continue to gain strength, and calm seas are nowhere in sight. We can't hope to ride this one out. If we continue on our present heading and fail to take effective action, the storm will have a number of predictable and dire implications for future generations, with consequences that extend well beyond the economic realm to the ethos of our society. On the other hand, if we respect the storm's power and change course appropriately, we still have a chance to help more Americans share in any future prosperity. Surely, our nation will be different than the one that sailed into the storm more than a decade ago — but it will retain many of the characteristics that have distinguished it from those of other countries. If, as a nation, we agree that strengthening the convoy and preserving its distinctiveness are important, then (perhaps) we will act more in concert with our ideals of a nation having real opportunity for all.
>
> *America's Perfect Storm: Three Forces Changing Our Nation's Future*

How will Arizona weather this perfect storm? This is the critical question facing our students, teachers, legislators, and citizens of the state.

Authors such as Thomas Friedman have described a world in which technology is "flattening" the world of work. Daniel Pink, in *A Whole New Mind*, warns that any work that is "routine" will either be sent overseas or put on a computer. Pink expands on this idea, explaining that, while the analytical skills we currently teach are still important, "first among equals" will be an understanding of concepts such as creativity, meaning, story, design, and empathy; concepts that are not normally taught in schools today. Industry leaders have identified aptitudes such as creativity, critical thinking, collaboration, and global literacy as the key skills of today's workforce. Thus, students who have a strong foundation in content knowledge and process *and* have creative, collaborative, and communicative skills are the future of Arizona. If we fail to educate them in these skills, we will have failed the citizens of Arizona.

Friedman offers the following advice to those entering the world of workforce of today.

> There is one message. You have to constantly upgrade your skills. There will be plenty of jobs out there in the flat world for people with the knowledge and ideas to seize them. I am not suggesting that this is simple, it will not be. There will be a lot of other people out there also trying to get smarter.
>
> *Thomas Friedman, The World is Flat*

Supporting the learning that must take place if Arizona's economy is to survive and prosper requires a framework, both human and technological, that empowers students, teachers, and school leaders to meet this approaching storm. The purpose of this plan is to define that framework and make a series of strategic recommendations to build the educational system to allow teachers to create the environment where students can learn and excel at the skills, aptitudes and processes they will need to succeed in today's economy.

## Purpose of the Plan

> Since it is a matter of State interest to see Arizona students achieve and excel, then it is a matter of State responsibility to see that the schools we build for them are places designed to nurture their level of performance, and enrich their educational experience. The schools Arizona will build for the 21st Century ought to be expressions of our aspirations for our children and the future they will create.
>
> This next generation of schools for the digital age should reflect the innovation, and motivation for excellence that will be required of this current generation of students, and of those that will follow, if they are to succeed in the interconnected reality of the global economy.
>
> *School Facilities Board's 21st Century Schools Report*

The purpose of The Arizona Long-Range Strategic Educational Technology Plan is to map the future of the "education support systems" necessary for Arizona's children to succeed in today's world. Through a collaborative process, the Educational Technology Advisory Committee has developed a vision of what education, supported by the use of current and emerging technologies, can provide all Arizona students. The Committee then developed goals to achieve this vision and a set of strategic recommendations to bring about the necessary changes. The plan details goals and strategies for policy makers, the State Board of Education, the State Department of Education, Institutions of Higher Education, Local Education Agencies, and the community at large. The strategies are presented in four components that focus on supporting the human framework – *Student Learning*, *Leadership*, and *Preparation and Development of Educators* – and the *Infrastructure* necessary to support learning.

Each component is interrelated with the other components and no single element by itself has the transformative effect as it does when combined with the other three elements. It is important to note that schools throughout Arizona will be at different places along a continuum of attaining the ultimate vision of this plan. Therefore, while the plan presents a variety of short-term and long-term strategies, they are not presented in a priority order. The individual organization — be it a charter or private school, small district, or large district — must evaluate where it is in this process and then the school or district can adopt the strategies that are appropriate, with the ultimate goal of providing a uniform educational experience for all of Arizona's students.

While some recommendations outlined below may be dependent on the actions of others, each organization or constituent will find actions they are capable of implementing and that can help them achieve the overall plan goals. To ensure organizations have the flexibility to adapt the plan recommendations to their specific needs, the plan leaves the "tactical" decisions of when and how to implement the chosen strategies to each organization.

## Outline of the Plan

The purpose of this plan is to provide a roadmap of strategic recommendations for the Arizona Department of Education to create the technology infrastructure that promotes student learning for all students in the state of Arizona. The following recommendations, presented in four components, examine the human framework and physical infrastructure necessary to support students, educators, administrators, and the general public in accessing up-to-date instructional materials, strategies, and support. The Department of Education will provide leadership throughout the state to implement these recommendations.

The human framework outlines recommendations to support *Student Learning*, guided by *Leadership* and discusses the resources and structures to support the *Preparation and Development of Educators* necessary to implement an integrated system to support Arizona's learners. The *Infrastructure* explores not only the hardware and software necessary to support student learning, but also examines the support staff, policies, and other structures needed to maintain complex technological systems. Each component contains recommendations for Arizona's State Leadership, the State Board of Education, the Arizona Department of Education, Local Education Agencies, Higher Education, and the community.

The reader should note that, for the purposes of this plan, a *Local Education Agency (LEA)* is defined as a public authority, legally constituted by the state as an administrative agency, to provide control of and direction for Pre- Kindergarten, kindergarten, and grades one through twelve in public educational institutions. *State Leadership* is defined as all governmental officials from the Governor to state, local, county, and city government. Local School Boards have separate recommendations. *Higher Education* is defined as the state universities, community colleges, and adult education providers involved in the initial preparation of teachers or on-going professional development.

In addition to the recommendations made to the stakeholders detailed above, a separate tool will be developed to help LEAs of all sizes create technology plans to implement the appropriate recommendations. This online tool will be designed to help an LEA conduct a technology strategic planning process, tied to the LEA's overall strategic plan that is compliant with both E-Rate and Title I-D program requirements. The tool will then suggest ways to carry out these strategies. The tool will be customizable for use by small or large LEAs in both urban and rural settings.

Finally, it is important to reiterate that, while we have numbered the components to facilitate discussion, each component is interrelated to each of the other components, that none can exist without the other, and that all the components are of equal importance. Also, while the recommendations present either short-term or long-term strategic recommendations, they are not presented in a priority order.

## A Vision for the Future

> The significant problems we have cannot be solved at the same level of thinking with which we created them.
>
> *Albert Einstein, Physicist*

> The best way to predict the future is to invent it.
>
> *Alan Kay, President of the Viewpoints Research Institute*

This plan proposes a very simple, though powerful, vision for all learners that facilitates

> ***students'*** *active participation in authentic learning experiences that foster collaboration, critical thinking, and problem solving that are personalized according to the needs of the learner facilitated by…*
>
> ***educators*** *with the skills, understanding, and resources to use developmentally appropriate technologies to prepare Arizona's future citizens with the skills necessary to succeed personally and professionally in a global society in…*
>
> ***robust school environments*** *that provide anytime/anywhere access to quality digital content, tools, and strategies to facilitate student learning.*

In order to ensure that all students have the skills and capacity to solve the complex problems facing society today and in the future, this strategic long-range plan makes a series of recommendations that guide efforts to enhance student learning through technology, prepare educational professionals and provide continued development throughout their careers, develop leaders with the skills and philosophy to support an educational process facilitated by technology, and provide the framework that supports a technology-enable learning process.

To accomplish this vision, the committee makes strategic recommendations for the following interrelated components: 1) Student Learning, 2) Leadership, 3) Preparation and Development of Educators, and 4) Infrastructure. A summary of the goals for each of these components can be found below.

The following three scenarios demonstrate this vision.

### Scenario One: A New Way of Learning

> The cure for boredom is curiosity. There is no cure for curiosity.
>
> *Dorothy Parker, US author, humorist, poet, & wit*

Kelley arrives at her school early to try out her presentation on creatures of the Sea of Cortez that she will give at tonight's Science Exploration Night. In sixth grade now, she has been fascinated with sea life since third grade when her teacher took them on a virtual field trip to the Great Barrier Reef in Australia. Since that time, she has been in contact with researchers at four universities around the world and various student groups who are interested in the world's

oceans and her electronic portfolio is full of projects about environmental issues related to the world's oceans. Kelley has come in early because she wants to make sure that all of the resources in her presentation work on the interactive white board and that her videoconference with her team leader, Daniel, and a researcher in Mexico she has been communicating with, is working. She likes Dr. Talanquer, a member of the Sea of Cortez Research Institute, not only because he is helping with her learn how to be a scientist, but also because he helps her with her Spanish.

Her teacher, Mr. Walling, has been monitoring Kelley's progress on his class "dashboard," a new reporting system the district uses that gives him up-to-the-minute reports on student data. He is pleased to see that Kelley is on track to exceed the state standards in reading, writing, science, and math — although she could stand a little improvement in social studies. He has also been monitoring the reports from Kelley's team leader, Daniel, and is happy that the dashboard alerted him to Kelley's upcoming presentation so he could make sure to email her parents to invite them to attend.

Daniel, Kelley's team leader, is a high school student at a school in her district. As part of his senior year internship with the Fin Foundation, he has been working with ten students — six elementary students and four middle school students — to study the world's oceans. He is glad that his science teacher, Ms. Williams, put him in touch with the foundation as part of his internship for the year. He videoconferences frequently with his "team," the ten students, the Director of the Foundation, a university professor in Marine Sciences, two researchers in Mexico, and a fellow high school student doing a similar project in the Caribbean.

Like Kelley, Daniel has been interested in marine wildlife for many years and has participated in a number of real and virtual experiences in middle and high school. Perhaps the best was his junior year field experience helping to tag sea turtles in a marine conservation program. Not only was he able to practice the scientific processes he learned in class, but he was also able to complete two of his required courses through online classes, and he formed some great friendships with students that he IMs regularly. Daniel is working on his blog posting that's part of the reflective practice component of his internship when a videoconference request comes through from Kelley. Daniel smiles at his "scientist in training," as he likes to call his team members, accepts the call, and begins working with her as she reviews her presentation for tonight.

## Scenario Two: A New Way of Teaching

> I never try to teach my students, I only attempt to provide the conditions in which they can learn.
>
> *Albert Einstein, Physicist*

Robert Walling has been teaching for ten years now. Sitting at home after a rewarding day with his students, Robert is preparing to watch a webinar on "Melding Science, Math, Social Studies, and Language Arts in Virtual Worlds." He remembers back to when he first began teaching when it was almost impossible to participate in a learning activity like this. The webinar is a cross-curricular professional development opportunity provided by the International Society for Technology in Education, The National Science Foundation, the National Council for Social Studies, and the Modern Language Association, and is part of a semester-long series of webinars

on strengthening Science, Technology, Engineering, and Mathematics initiatives. His principal has been very supportive of his participation in these activities and has included what he learns in these webinars in his evaluation plan for the year.

While he waits for the webinar to begin, he opens his reflective journal blog. He is glad that he was introduced to blogging and reflective practice in his initial preparation program during his college years. While initial preparation programs now include a variety of technology-facilitated instructional practices, this did not happen often during his pre-service courses. He begins by first checking the comments from his professional learning community. His blog allows him to extend his reflective practice to include not only his face-to-face meetings with colleagues and his principal, but also to get input from teachers with similar interests from around the world.

The first comment is from Ruth, a retired educator who joined Robert's community two years ago. Robert has been struggling with how to differentiate the leaning activities in his classroom on a particular concept that he would like to teach next week. He wrote about his struggles a few days ago and Ruth has found a set of resources that are exactly what he needs to challenge his excelling students while not overwhelming the students who are struggling.

Robert has an hour before the webinar, so he pulls up the resources Ruth has provided on his home computer. He appreciates that the district has provided him with his laptop and network access so he can work at home. A bit of a night owl, Robert is often up late at night talking to a colleague in New Zealand. As he reviews the resources Ruth has found he finds a set of assignments that is perfect for next week's concepts. He wonders what he would do without this contact with experienced teachers like Ruth.

He opens his class dashboard to check his students' progress. The dashboard is tied to his grade book so he checks how his students are progressing. The dashboard makes it easy to tailor assignments, targeted to his students' needs, so he creates a few targeted messages to send to his parents and hits the send button. He is grateful that the district's technology staff provides the dashboard, as it lets him get a daily picture of his students' understanding and helps him keep his parents informed of their students' progress.

He's also glad that the district tech coordinator, Peggy, working with local libraries, helps parents access these resources both at home and at locations around town and gives him the tools he needs to do his job. From his dashboard, Robert sees that Andrew will be gone next week visiting relatives elsewhere in the state. But with the statewide information network that was implemented several years ago, Robert knows Andrew will still be able to participate in the assignment with his partners John, Jennie, and Ryan. So he writes an email to both Andrew and his parents detailing what he needs to do. Looking at the clock, he switches to the webinar and sits back to be inspired once again.

## Scenario Three: A New Way of Leading

> An empowered organization is one in which individuals have the knowledge, skill, desire, and opportunity to personally succeed in a way that leads to collective organizational success.
>
> *Stephen Covey, Author*

While attending the girls' basketball game, Sabrina Cruz, the principal at Kelley's school, receives an alert on her phone. The District security team has identified a threat to the school on the school's network and contacted the Police Department. The Department had then activated the Community Alert Network and her phone was automatically warning her of the threat.

Sabrina leaves the game and pulls up the administrator dashboard on her phone. Standing outside the gym, with the help of the Emergency Procedures and Contacts page of her dashboard, she contacts the appropriate school and district personnel. On a conference call with the Police Department and her staff, they develop a strategy to meet the threat. Fortunately, an hour later she receives another message on her phone saying that the student who made the threat had been found and there was now no reason to worry. She sends out an automatic announcement to her staff to let them know of the latest development. The game is over so she heads home.

Since she is still up, Sabrina decides to review her tasks for the next day. She brings up her schedule on her laptop and sees that she has an evaluation meeting with Robert Walling the next day. On her dashboard, she reviews his progress. She then taps in to the statewide data network to check that his students are all performing well against district and state benchmarks.

She then pulls up the district's instructional evaluation tool and reviews the entries on Robert. As expected, she has nothing to worry about. She enjoys her meetings with him and is always glad to hear what new things he is learning in his online professional development activities. She checks her dashboard to see which webinars he has taken and sends him a note to remind him of the meeting and ask him to tell her about what he learned in his last webinar.

Chris, on the other hand, causes her some worry. A recent graduate from out of state, Chris is struggling with the instructional practices of her school. Unfortunately he is not as well trained as her hires from Arizona schools, where teachers are prepared with not only the skills to use the technology-based tools the district offers, but also with the philosophy and pedagogy necessary to create the authentic learning experiences that are a trademark of her school. She pulls up the statewide professional development network and maps out a series of activities for Chris. She also checks his reflective practice network and sends him an email suggesting he contact Helen, a veteran educator, to add her to his professional learning community.

The next morning she heads to school. Arriving early, she locks her car and turns to enter school. At the door she sees Kelley, waiting to get in to Robert's classroom. Not surprised to see students here early, eager to get started with the day, she says hello to Kelley and wishes her well on her presentation that evening. She then heads to her office to check in with the staff and get ready for the administrators' videoconference later that morning. They'll be meeting with some folks from the State Department to discuss some exciting digital resources being made available through the statewide network and Sabrina can't wait to share them with her teachers.

## Long-Range Strategic Goals

### Student Learning

**All learners will:**

- have access to authentic learning activities appropriate to their development whenever and wherever they need.
- use appropriate strategies and technology to collaborate, construct knowledge and develop solutions to real-world problems.
- communicate effectively with global audiences.

### Leadership

**All leaders will:**

- model, implement, and assess appropriate technology use at all levels of the teaching and learning process.
- have access to the appropriate tools and resources to guide instructional and administrative practice.
- implement a dynamic technology planning process that expands curricular and instructional opportunities to students.
- provide opportunities for sustained, relevant, timely and effective professional development

### Preparation and Development of Educators

**All educators will:**

- complete their initial preparation with the pedagogy, practical knowledge and skills to use technology to enhance every student's learning.
- have access to research-based professional development opportunities whenever and wherever they need.

### Infrastructure

**The goals above will be achieved through an infrastructure that provides:**

- secure and reliable anytime/anywhere access to a variety of current and emerging technologies.
- just-in-time assistance to support the use of technology for administration, teaching and learning.
- policies and procedures that ensure equitable access to all users.

## Guiding Principles

The Educational Technology Advisory Committee created the following principles to guide the development of this plan.

The plan should:

1. *Outline* a unified vision and guidelines for using technology in teaching and learning to help prepare all students to be productive and competitive participants in our 21st century global society.
2. *Assess* the current state of technology across Arizona schools and provide a strategic framework and vision for technology use that can adapt to the rapid changes in technology that will occur over the term of the plan.
3. *Establish* a baseline of realistic expectations for the use of technology in any school or district and *identify* or *provide* funding streams adequate to meet those expectations.
4. *Provide* a flexible model for technology planning that incorporates best-practice technology plan elements, such as goals, needs analysis, evaluation, and accountability that schools and districts of any size can effectively utilize.
5. *Coordinate* the efforts of various education stakeholders, connect common interests, and leverage existing resources and assessments to accomplish and evaluate plan goals.

## Essential Conditions

In order to restructure education throughout the State of Arizona, a set of essential conditions must be in place. The committee adopted a series of conditions developed by the International Society for Technology in Education (ISTE) as a starting point for a discussion of the conditions necessary in education.

**Shared Vision:** Proactive leadership in developing a shared vision for educational technology among all education stakeholders including teachers and support staff, school and district administrators, teacher educators, students, parents, and the community

**Empowered Leaders:** Stakeholders at every level empowered to be leaders in effecting change

**Implementation Planning:** A systemic plan aligned with a shared vision for school effectiveness and student learning through the infusion of Information and Communication Technologies (ICT) and digital learning resources

**Consistent and Adequate Funding:** Ongoing funding to support technology infrastructure, personnel, digital resources, and staff development

**Equitable Access:** Robust and reliable access to current and emerging technologies and digital resources, with connectivity for all students, teachers, staff, and school leaders

**Skilled Personnel:** Educators, support staff, and other leaders skilled in the selection and effective use of appropriate ICT resources

**Ongoing Professional Learning:** Technology-related professional learning plans and opportunities with dedicated time to practice and share ideas

**Technical Support:** Consistent and reliable assistance for maintaining, renewing, and using ICT and digital learning resources

**Curriculum Framework:** Content standards and related digital curriculum resources that are aligned with and support digital-age learning and work

**Student-Centered Learning:** Planning, teaching, and assessment center around the needs and abilities of students

**Assessment and Evaluation:** Continuous assessment, both of learning and for learning, and evaluation of the use of ICT and digital resources

**Engaged Communities:** Partnerships and collaboration within communities to support and fund the use of ICT and digital learning resources

**Support Policies:** Policies, financial plans, accountability measures, and incentive structures to support the use of ICT and other digital resources for learning and in district school operations

**Supportive External Context:** Policies and initiatives at the national, regional, and local levels to support schools and teacher preparation programs in the effective implementation of technology for achieving curriculum and learning technology (ICT) standards

# Funding the Successful Integration of Technology

Consistent and adequate funding to "support technology infrastructure, personnel, digital resources, and staff development" is one of the Essential Conditions mentioned in the previous section. While the ETAC has embedded recommendations related to funding throughout the plan, the committee felt it was important to address the overall issue of funding as a single issue, given that adequate, consistent, and sustainable funding is critical to the success of this plan.

Currently, Arizona depends solely on Title II-D funds as the only dedicated funding stream to support the use of technology in education and it is intended to supplement existing programs. Unfortunately, these funds have been steadily decreasing since the 2004-05 fiscal year. As can be seen in Figure 1, Arizona received approximately $12 million in funding in 2004-05. That amount has dramatically decreased over the past four years. This has had a significant, and often adverse, impact on the ability of Arizona schools to provide infrastructure, professional development, and support of technology. For example, while Arizona scores well on *Education Week's 2009 State Technology Counts* report for use of technology (Arizona received an A while the national average is B-) it received a C on its "Capacity to Use Technology" and a D- on its "Access to Technology." While Federal stimulus funds will help offset this decrease for 2009-10, other revenue sources must be identified if Arizona is to remain competitive.

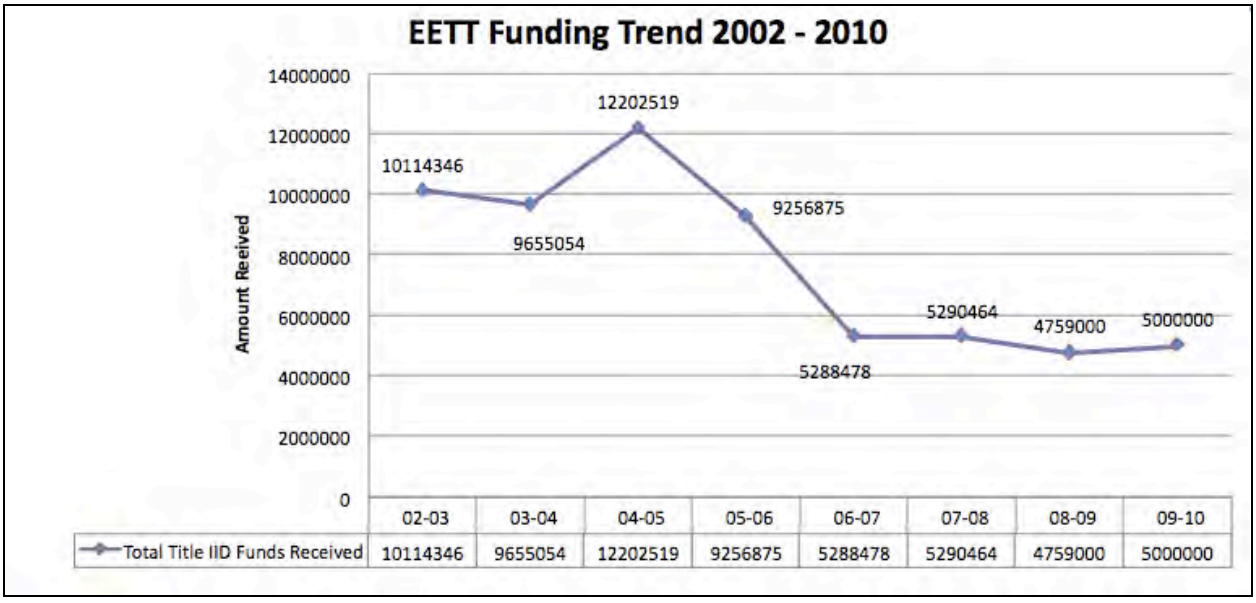


**Figure 1: Title IID Funds Received by Arizona Since 2002**

However, receiving funding, no matter how little or how much, is only one part of the equation. It is important for school leaders to determine the Total Cost of Ownership in order to ensure that LEAs maximize the use of the funding they receive. But determining this cost can be difficult. In the introduction to *Taking TCO to the Classroom*, published by the *Consortium for School Networking*, the authors note that

> … when a school district purchases computers or installs a network, the cost of the hardware is only one small part of the expenses it can expect in subsequent years if it is going to use those technological resources effectively.
>
> In this, a district's technology budget is no different from its transportation budget. When a school district buys a new bus, the expense doesn't stop with the cost of the vehicle. There is gasoline to keep it running, maintenance to keep it well tuned, repair bills when it breaks down, increases in insurance premiums and the salary of an additional driver—expenses that all must be covered year after year.
>
> If school districts don't do this kind of planning for their technology budgets, there may not be enough money available to provide teachers with adequate training, to maintain new computers or to replace them when they become obsolete. Districts may fail to budget for increases in power consumption or necessary improvements in their physical plant. They may connect their computers to the Internet, but forget about the additional telecommunications costs associated with making that connection. As a result, America's investment in educational technology could fall short of its expected return—or even produce a backlash against spending additional dollars on new technology.
>
> *Taking TCO to the Classroom: A School Administrator's Guide To Planning for the Total Cost of New Technology, p.3*

Therefore, the recommendations embedded in this plan call for the implementation of methods for determining Total Cost of Ownership. However, the plan goes beyond simply determining TCO and contains recommendations to also determine the Value of Investment.

> …The focus of VOI is to project the costs and related benefits of specific proposed technology projects. On the cost side, while anticipated budgeted initial and ongoing costs are very important, the anticipated project TCO is critical for determining all of the anticipated project costs over the life of the project. Benefits include any dollar savings, efficiencies or additional revenue generation, but also need to take into account qualitative benefits that relate directly to school mission, goals and mandates.
>
> *Consortium for School Networking 's Value of Investment Leadership Initiative*

In business, securing adequate funding to support a project is often the critical component of the success of that project. Therefore, this plan calls for the development of a consistent revenue stream that is adequate to support not only successful Total Cost of Ownership but also to ensure a maximum return on the Value of Investment that Arizona is making on its future citizens. To accomplish this, Arizona must continue to maximize its use of federal funding. However, this source, even if it were to increase through stimulus packages or other increases, is not enough. State leaders must work to build adequate, consistent, and sustainable funding to support all aspects of infusing technology into Arizona's schools. This is not simply an investment in hardware and wires, it is a fundamental investment in our children and, ultimately, to the economic health of the state.

# Component 1: Student Learning

> The illiterate of the 21st century will not be those who cannot read and write but those who cannot, learn, unlearn, and relearn.
>
> *Alvin Toffler, Writer and Futurist*

This component covers issues related to the developmentally appropriate use of technology to enhance learning in the classroom and the support of learning that takes place at a distance; be it in a face-to-face class or a totally online experience. It includes the systems that need to be in place to help teachers provide data-driven, quality instruction, facilitated by technology. It also discusses the systems needed to support student access to this instruction. The *International Society for Technology in Education's National Educational Technology Standards for Students* and the newly revised *Arizona State Educational Technology Standard* guide the development of this component.

## Goals: Student Learning

The goals of this component are to ensure that all learners:

- have access to authentic learning activities appropriate to their development whenever and wherever they need.
- use appropriate strategies and technology to collaborate, construct knowledge and develop solutions to real-world problems.
- communicate effectively with global audiences.

## Defining "Student Learning"

> For Arizona students, proficiency in 21st century skills – the skills, knowledge and expertise students should master to succeed in college, work, and life – should be the outcome of 21st century education. To be "educated" today, students must master core subjects, 21st century themes and 21st century skills.
>
> To help students achieve proficiency in 21st century skills, teachers and administrators need education support systems that strengthen their instructional, leadership, and management capacity. And both students and educators need learning environments that are conducive to results.
>
> *Teaching and Learning for the 21st Century: Report and Recommendations of the Arizona Summit on 21st Century Skills, 2008*

The term "student learning" has evolved over time. However, with the advent of digital technology, this evolution has taken on the same speed as the evolution of the technology itself. In other words what students should know and be able to do is evolving at a breakneck speed. So how do you define student learning in a world where a "knowledge worker" must interact creatively and collaboratively in an increasingly connected global environment?

Organizations such as the Partnership for 21st Century Skills, the American Library Association, the International Technology Education Association, and the International Society for Technology in Education (ISTE) have all identified a variety of skills and disciplinary

knowledge that students need to thrive in the new economy. A review of these organizations' recommendations, along with many others, shows certain commonalities in the skills students will need to be successful, but there are sometimes significant differences. To complicate the issue even further, research in cognitive science is finding that current and emerging technologies not only facilitate the ability of a learner to demonstrate these skills, but is also, in fact, shaping new ways of thinking. Thus, what students should know and be able to do will continue to evolve.

Whose definition of student learning should drive the development of a technology plan for Arizona? Millennials, 21st Century Learners, Digital Natives, and Net Genners were all terms discussed and careful consideration was given to the characteristics identified by the various organizations that defined these terms. Upon reflection, the committee members realized that, just as technology increasingly provides the resources and infrastructure to support current teaching and learning anytime or anywhere, it also facilitates the new, emerging skills that are being identified by these other organizations no matter how they are defined. Therefore, this plan provides recommendations to ensure that the human framework and technical infrastructure necessary to support student learning as an evolving concept are available in Arizona. Our intent is to design a fluid framework that will adapt over time to meet the needs of students and educators.

Ultimately, instead of adopting a single organizations' definition, the committee decided to define the **Student Learning** as *the development by an individual of the skills, knowledge, strategies and disciplinary practices to be successful in today's global society so that students can demonstrate, **in a developmentally appropriate way**, the ability to identify, analyze, and propose solutions and work collaboratively to solve the complex problems facing our society.*

## Trends in Student Learning

> I imagine a school system that recognizes learning is natural, that a love of learning is normal, and that real learning is passionate learning. A school curriculum that values questions above answers…creativity above fact regurgitation…individuality above conformity… and excellence above standardized performance… And we must reject all notions of 'reform' that serve up more of the same: more testing, more 'standards', more uniformity, more conformity, more bureaucracy.
>
> *Tom Peters, Author*

> How has the world of the child changed in the last 150 years?' … the answer is. 'It's hard to imagine any way in which it hasn't changed…. they're' immersed in all kinds of stuff that was unheard of 150 years ago, and yet if you look at schools today versus 100 years ago, they are more similar than dissimilar.
>
> *Peter Senge, Director, Center for Organizational Learning, MIT Sloan School of Management*

### Call for Change

There have been many changes to society throughout history that have been brought about by the invention of a single technology. Here, technology is used in its broadest terms as being the use of a tool to make life simpler and/or better. However, never before has this change been so rapid as in the past 20 to 30 years. From the development of the first main frame computers to today's

web-enabled cell phones, technologies have radically changed the way people around the world conduct business, interact with each other, and learn.

Organizations and businesses across the country are acutely aware of these changes and are calling for a transformation in American education to prepare future citizens. For example, Bill Gates, through the work of the *Bill and Melinda Gates Foundation*, is calling for a revolution within our high schools and higher education. Gates, in his 2009 *Annual Letter from Bill Gates* states

> Our goal as a nation should be to ensure that 80 percent of our students graduate from high school fully ready to attend college by 2025. This goal will probably be more difficult to achieve than anything else the foundation works on, because change comes so slowly and is so hard to measure. Unlike scientists developing a vaccine, it is hard to test with scientific certainty what works in schools. If one school's students do better than another school's, how do you determine the exact cause? But the difficulty of the problem does not make it any less important to solve. And as the successes show, some schools are making real progress.
>
> *2009 Annual Letter from Bill Gates: U.S. Education*

## Student Skills for 2020

Why set a date for developing skills of 2020? The reason is simply that 2020 is the year that students who are currently entering kindergarten will graduate from high school. Therefore, this plan addresses the skills that students will need across their entire educational career. And anyone who has watched a child whip out their cell phone and send five text messages (without even looking at the keypad!) in the time it takes an adult to write one knows that today's students are different. As Don Tapscott states in *Grown Up Digital: How the Net Generation is Changing Your World*, today's students are "a generation bathed in bits." Tapscott defines eight net generation norms that are significantly different from their parents. These norms are:

1. They want *freedom* in everything they do, from freedom of choice to freedom of expression.
2. They love to *customize,* personalize.
3. They are the new *scrutinizers*
4. They look for *corporate integrity and openness* when they decide to buy and where to work.
5. The Net Gen wants *entertainment and play* in their work, education, and social life.
6. They are the *collaboration and relationship* generation.
7. The Net Gen has a need for *speed* – and not just in video games.
8. They are the *innovators.*

*Donald Tapscott, Grown Up digital: How the net generation is changing your world, pp 34-36.*

Julie Evans, Executive Director of Project Tomorrow, has categorized these students as "Free Agent Learners." Contrary to the popular conception of these students as lazy, disconnected, and uncaring, the results of the Speak Up surveys show that they are self-directed learners who believe in the power of personal connections. In fact, their networks are far more intricate and meaningful to them than those of most corporate CEOs as they are experts of personal data aggregation and creating new communities. What makes them so misunderstood is that they are active content creators rather than passive content recipients who feel that process is as important

(and sometimes more important) than knowledge gained. Therefore, they are un-tethered to traditional school, just as they are un-tethered to physical networks as they search for experiential learning opportunities to "make it real." Thus, these new Free Agent Learners challenge us to find new ways to engage them in active, creative, and innovative learning of 21st century skills.

And what are these new 21st century skills? Organizations such as the *American Library Association* (*Information Power: Information Literacy Standards for Student Learning*), *International Society for Technology in Education* (*National Educational Technology Standards for Students, Teachers, and Administrators*), and the *United Nations Educational, Scientific, and Cultural Organization* (*Information and Communications Technology Standards*) have identified the skills, processes, and strategies students need to be successful. The Partnership for 21st Century Skills has furthered this work by creating a framework within which educators, parents, and the general public can form a consensus around the skills that need to be taught in today's schools. Arizona is revising the state's *Educational Technology Standard* (one of the State Content Standards) and aligning the new standards with the National Educational Technology Standards for Students, which in turn are aligned with the work of the Partnership.

> Kids are very rich content developers today through their social network sites. They are big communicators through email and instant messaging and text messaging and yet all of those things are banned from their schools.
>
> *Julie Evans, Executive Director of Project Tomorrow*
> *Learning to Change, Changing to Learn*

## Arizonans Speak Up

Since 2003, Project Tomorrow has been collecting data on students', teachers', administrators', and parents' views on the use of technology to improve learning. Through the *Speak Up National Research Project*, the project has identified a number of national trends. The report characterizes today's students as "early adopters and adapters of new technologies, creating new uses for a myriad of technology products to meet their sophisticated needs. They serve as technology trendsetters for their peers and, increasingly, for their parents and educators. The technologies they use in their personal lives slowly infiltrate their schoolwork, and many of these technologies ultimately have found a home in their school day, even with their teacher." (*Speak Up* 2008, p. 1) However, the report also points out "even as students utilize technology at increasing rates to support their personal interests and learning, many students are unable to fully realize the power or the benefits of using these tools at school during the school day. Through *Speak Up*, students consistently report they are inhibited from effectively using computers or the Internet at school. (*Speak Up* 2008, p. 2)

Arizona's results in the *Speak Up* survey indicate some interesting trends. For example, approximately 40% of the kindergarteners through second graders indicated that they had access to a cell phone with an equal percentage having access to a computer. (*Speak Up* 2008, Grades K-2 Results) This access to technology continues to increase such that approximately 80% of the ninth through twelfth grade students surveyed indicated that they have a cell phone and computer for their own use and this increase is expected to continue. (*Speak Up* 2008, Grades 9-12 Results)

Arizona's students also have a clear view of what information and media literacy skills will be important for their future. When asked to identify the most important skills, the ninth through twelfth graders replied:

| Skill | Arizona | Nationally |
|---|---|---|
| Ability to identify a research question | 53% | 52% |
| Ability to identify information sources and locate resources | 51% | 51% |
| Ability to organize information | 58% | 57% |
| Ability to prepare written or verbal reports of research | 52% | 51% |
| Ability to produce blogs, vlogs, podcasts, digital storytelling, or video reports | 39% | 38% |
| Know how to analyze and interpret stories, commercials, or ads in the media (TV, magazines, newspapers, blogs etc) | 48% | 47% |
| Know how to detect bias, censorship or propaganda in resources | 43% | 41% |
| Know how to evaluate my own work to improve my effectiveness | 50% | 50% |
| Know how to summarize research | 52% | 51% |
| Know how to use technology and digital content responsibility. | 49% | 48% |
| Understand how to evaluate the relevance, authenticity, and credibility of resources | 43% | 42% |

However, when the ninth through twelfth graders were asked "Besides not having enough time in your school day, what are the major obstacles to using technology in your school?" they indicated "School filters or firewalls block websites I need to use" (51%), "Teachers limit our technology use" (40%), and "There are rules against using technology at my school" (27%). In other words, our students are using technology-based tools, know what skills they need to succeed, and are not gaining the access to tools and support they need during school.

> Personalize everything, more flexibility, and Online courses- allow students to become more technologically savvy and interface with technology more so than the tiny tip-of-the-iceberg amount we do now. Give students of today a jump start into the future.
>
> *11th Grade Boy, Perry Hall High, MD*
> *Dear Mr. President, Letters to incoming President Obama*

## Enhancing Education Through Technology (Title IID, NCLB)

With the enactment of the No Child Left Behind Program, specifically Title II Part D, Enhancing Education Through Technology, Arizona has been exploring ways to provide teachers and students the skills they need to succeed. The primary goal of Title II Part D is to improve student academic achievement through the use of technology in elementary schools and secondary schools. The provision also has the following additional goals: 1) To assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes the eighth grade, regardless of the student's race, ethnicity, gender, family income, geographic location, or disability and 2) to encourage the effective integration of technology resources and systems with teacher training and curriculum development to establish research-based instructional methods that can be widely implemented as best practices by state educational agencies and local educational agencies.

Arizona made strides in achieving these goals through the Enhancing Education Through Technology 2008-09 competitive grant cycle. Districts that applied, and were awarded funding, agreed to several priorities. All of the grantees focused on data to support their projects. The data elements came from their school/district improvement plans and AIMS and/or District level data to create an area of focus for the respective projects. These priorities enabled consortiums to build capacity through peer coaching and collaboration with multiple partners, as well as adopt a variety research-based impact models such as eMints, the Intel Teach program, and GEN-Y.

## Conclusion

The voices are clear. Business requires a new worker. One who is knowledgeable not only about the fundamental concepts of a discipline, but also someone who is a creative and innovative problem solver who can communicate and collaborate with others on a global scale.

And our students want to use the devices with which they are familiar. Instead of cutting them off from these devices during the school day, we must expand their use to let learning expand anywhere and any time. However, while we know our student use these devices, they often do not use them well. The recommendations that follow will allow Arizona schools to build such structures at all levels that support the safe, ethical, and wise use of technology to truly facilitate learning

## Recommendations to State Leadership

1. Revise the current school funding formula to provide for the support of current and emerging models of face-to-face, online, and hybrid student learning.
2. Create a statewide effort to expand beyond the current Technology Assisted Project-Based Instruction (TAPBI) program structure that manages and provides multiple forms of online instruction for PreK-12 that is accessible to all students.
3. Develop a structure and funding model to support online courses so that all students shall be able to participate in at least one core course (English, mathematics, science, or social studies) in an online environment by the time they graduate. While elective courses may also be taken online, it is important for students to take at least one core learning experience online.

## Recommendations to the State Board of Education

1. Require mastery of the *Arizona Educational Technology Standard* for all students by the eighth grade as embedded into the content areas of the *Arizona Academic Standards* to meet current and future federal legislation.
2. Develop a structure to ensure the articulation and reciprocity of credits for online learning provided by traditional PreK-12 institutions and online learning providers.
3. Develop a structure and funding model to support online courses so that all students shall be able to participate in at least one core course (English, mathematics, science, or social studies) in an online environment by the time they graduate. While elective courses may also be taken online, it is important for students to take at least one core learning experience online.

## Recommendations to the Arizona State Department of Education

1. Ensure that the elements of the *Arizona Educational Technology Standard* are embedded or cross-referenced in all other standards during the content standard's normal revision cycle.
2. Continue and expand assessment of student mastery of the *Arizona Educational Technology Standard* to include all eighth grade students.
3. Continue with a position within the Arizona Department of Education to coordinate the activities of the various systems of education (classroom, school, district, legislature/governor/governance boards, Department of Education, and colleges/universities) to lead an innovative transformation based on educational technology.
4. Continue the statewide development of resources to provide students with equitable access to digital content, courses, instruction, assessments, and other self-learning resources in an online learning environment with access to hybrid and online courses.
5. Encourage and support the development of innovative programs that promote parental involvement, increase communication with parents, and increase community access to learning resources.
6. Partner with other entities, including higher education and the private sector, to identify model sites of new and emerging technologies in major metropolitan areas and in rural areas.

## Recommendations to Local Education Agencies

1. Provide district policies, curriculum, and resources to ensure that every student has the tools for an individualized, collaborative, and authentic learning experience.
2. Select and deploy a variety of technology-based tools to provide differentiated instruction for every child by monitoring student assessment and suggesting developmentally appropriate content.
3. Embed the *Arizona Educational Technology Standard* within the curriculum at each grade level.
4. Select and utilize local, commercial, and open source digital content, aligned to state standards, to provide online access to specialized, rigorous, dual enrollment, credit recovery, and remedial courses.
5. Provide curriculum and resources that ensure personal safety for students in a digital world and policies that specify expectations of appropriate behavior and rules for students, parents, staff, and teachers.

## Recommendations to Higher Education

1. Expand collaboration between LEAs and Higher Education to develop innovative course delivery and virtual credit acquisition including, but not limited to, dual enrollment courses.
2. Partner with private sector and public entities to develop and provide web-based instructional resources and services across PreK-12.
3. Partner with Local Education Agencies and schools to pursue grant opportunities that enhance and support technology integration.

4. Collaborate with school systems to develop strategies, methodologies, and tools for assessing the level of information literacy skills among students.
5. Cooperate with school systems to develop comprehensive educational technology integration programs.
6. Partner with the Department of Education and the private sector to identify model sites of new and emerging technologies in major metropolitan areas and in rural areas.

## Recommendations to the Community

### School Boards

1. Develop policies to ensure that the *Arizona Educational Technology Standard* is embedded in all district curriculum and that all students meet this standard.
2. Develop policies that ensure personal safety and ethical behavior in a digital world that specifies expectations and rules for everyone that comes in contact with district resources. This includes, but is not limited to, the development of Acceptable Use or Discipline Policies that takes into account the unique nature of emerging technologies in an educational environment.
3. Provide a sustained funding stream to support the deployment of digital content and resources within the district.

### Parents

1. Monitor online usage to ensure that students are using web-based resources safely and securely.
2. Assist students in using anytime/anywhere digital resources such as the *IDEAL: Home Edition*, the Public Library system, and other online resources.
3. Volunteer to tutor or assist students at your local school on using technology resources.

### Professional Organizations

1. Promote the use of technology to enhance student learning within the organization's aims and goals.

### Private Sector

1. Participate in collaboration with representatives from PreK-12, Higher Education, parents, businesses, and the community to share resources and services.
2. Provide students opportunities to experience technology's role in the workplace by providing technology-based work experiences through internships and other means.
3. Provide incentives to students to master the *Arizona Educational Technology Standard*.
4. Provide flextime for community volunteers to tutor or assist students in using technology resources.
5. Participate in partnerships to develop and provide low-cost, web-enabled products, services, curriculum, and content to support technology-rich learning environments.
6. Develop Open Source content, curriculum, and products that are compliant with standards such as the Sharable Content Object Reference Model (SCORM) and School Interoperability Framework (SIF).
7. Partner with the Department of Education and Higher Education to identify model sites of new and emerging technologies in major metropolitan areas and in rural areas.

# Component 2: Leadership

> We need to be the authors of our own life.
>
> *Peter Senge, Director, Center for Organizational Learning, MIT Sloan School of Management*

> I skate to where the puck is going to be, not to where it has been.
>
> *Wayne Gretzky, Professional Hockey Player*

This component covers the leadership at all levels necessary to successfully carry out and support technology implementation in today's schools. This component also provides a plan for the use of data to guide this implementation. The *National Educational Technology Standards for Administrators* guide the development of this component.

## Goals: Leadership

The goals of this component are to ensure that all leaders:

- model, implement, and assess, appropriate technology use at all levels of the teaching and learning process.
- have access to the appropriate tools and resources to guide instructional and administrative practice.
- implement a dynamic technology planning process that expands curricular and instructional opportunities to students.
- provide opportunities for sustained, relevant, timely and effective professional development.

## Trends in Leadership

> Only one-third of high school students who participated in this year's Speak Up poll think their school is doing a good job preparing them for the jobs of the future (in fact, even fewer numbers of their parents think that). Yet, a majority of school principals (56 percent) say their schools are doing a good job. This disconnect is symptomatic of the larger issue at work here—our students' vision for learning is dramatically different than the environment we are providing.
>
> *Speak Up 2008*

> It turns out that leadership not only matters: it is second only to teaching among school-related factors in its impact on student learning.
>
> *How Leadership Influences Student Learning*

There can be no doubt that education is facing a fundamental change in structure and function. As has been discussed previously, business leaders are calling for a different, and more complex, set of skills from today's students. And these business leaders are looking to schools to prepare students to prosper in today's knowledge-based economy. To guide this change, we must prepare and support school leaders who not only understand the change process, but who also have the skills and knowledge to use 21st century tools to lead this change, have the pedagogical

knowledge to evaluate the integration of technology into the curriculum, and understand the complex infrastructure to support this integration.

> Integrating technology throughout a school system is, in itself, significant systemic reform. We have a wealth of evidence attesting to the importance of leadership in implementing and sustaining systemic reform in schools. It is critical, therefore, that we attend seriously to leadership for technology in schools.
>
> *Don Knezek, ISTE CEO*

Given the current economic environment and the constantly changing business landscape, school leaders are grappling with the issue of what constitutes leadership in an era of "School 2.0." However, they do not have to be alone in their struggles. Several organizations such as the *National School Boards Association (NSBA),* the *State Educational Technology Directors Association (SETDA),* the *Consortium for School Networking (CoSN)* and the *International Society for Technology in Education (ISTE)* provide leadership and resources to help school leaders navigate the hazardous waters ahead.

Some of these resources are targeted to specific audiences, such as superintendents or school boards. For example, the *NSBA's Technology Leadership Network* has been providing local resources with technology planning resources since 1987 and the organization's *Education Leadership Toolkit* provides a variety of planning resources to help school boards and other school leaders make decisions on technology planning.

For broader perspectives, organizations such as the *Consortium for School Networking* provides resources and leadership on topics such as Budgeting with Total Cost of Ownership, Data-Driven Decision Making, Emerging Technologies, Green Computing, IT Crisis Preparedness, Empowering the 21st Century Superintendent, and Policy and Leadership for Web 2.0 in Schools. CoSN has recently partnered with the *New Media Consortium (NMC)* to develop the *Horizon Report: 2009 K-12 Edition*. The *Horizon Report*, modeled on a similar report that has been prepared for Higher Education for the past several years by the NMC and the *EDUCAUSE Learning Initiative,* examines emerging technologies and their impact on schools in the one year or less, two to three year timeframes.

Providing leadership at the state level, the *State Educational Technology Directors* Association promotes national leadership in educational technology by providing professional development in educational leadership and builds partnerships by providing leadership and learning opportunities such as leadership forums. The state of Arizona plays a strong role in SETDA as Cathy Poplin, Deputy Associate Superintendent for Educational Technology, currently serves on the Board of Directors. This allows Arizona to not only take advantage of all the SETDA has to offer, it also allows us to have an impact on setting policy on the use of technology to promote learning.

Finally, providing guidance in all aspects of using technology to enhance learning, the *International Society for Technology in Education* provides a framework for leadership development through the *National Educational Technology Standards for Administrators (NETS-A).* Organizations around Arizona have used the current 2002 version of the NETS-A to create professional development opportunities for school leaders. In June of 2009, ISTE will

release a revised NETS-A that has been developed with input from educational and industry leaders from around the world. Several members of the ETAC have been involved with the revision and review process and this plan recommends adopting the new standards to guide the development of school leaders.

In Arizona major leadership development initiative is *AZ LEADS*$^3$ (Arizona Leaders in Education for the Advancement and Development of Student and School Success). The mission of *AZ LEADS*$^3$ is "to collaborate on training and support for preK-12 education leaders in order to create school environments in which all students achieve at high levels. Our goal is to support principals and superintendents in all school settings throughout the state in their efforts to improve student achievement." (*AZ LEADS*$^3$) Since 2006, *AZ LEADS*$^3$ has provided training to over 200 Superintendents, Principals, Assistant Principals, and Aspiring Principals from around the State (*AZ LEADS*$^3$ *Fact Sheet)*

Finally, starting in 2008, nearly 100 school leaders have participated in the Intel® Teach Leadership Forum. These forums, offered by the Senior Technology Integration Specialist Trainers "provides face-to-face professional development focusing on the importance of leadership in promoting, supporting, and modeling the use of technology in instruction. Through the forum, participants explore relevant research and behaviors related to supporting effective technology integration and associated professional development. (*Intel® Teach Leadership Forum*)

## Conclusion

Arizona has been making great strides in preparing leadership for the 21st century through efforts such as *Professional Development Leader Academy* and *AZ LEADS*$^3$. However, the need for leadership has never been greater than in these times of unprecedented change and economic challenges. Therefore, it is time for Arizona to train and support a new leader. Arizona needs leaders at all levels from the legislature to the school who not only understand how to lead change in rapidly changing times but who also understands how access to robust and consistent technology is the fundamental underpinning of 21st century learning. The following recommendations are designed to provide leaders with the tools they need not only their daily tasks but also provide them with the tools to provide visionary leadership.

# Recommendations to State Leadership

1. Provide a sustainable funding stream for the continued development of school leadership from the principal to superintendent that supports Student Learning as detailed in the *Arizona Educational Technology Standard.*
2. Use the results of the *eLearning Task Force* to guide the transformation of PreK-12 learning by making recommendations to the Department of Education and the *Educational Technology Advisory Committee*.
3. Create revenue streams that provide continued professional development and incentives for new and veteran educators to become technologically literate.

## Recommendations to the State Board of Education

1. Embed the *ISTE National Educational Technology Standards for Teachers* into the Arizona Professional Teaching Standards.
2. Embed the *ISTE National Technology Educational Standards for Administrators* into the Arizona Professional Administrative Standards.

## Recommendations to the Arizona Department of Education

1. Develop and support initial preparation and professional development of school leaders from the principal to the superintendent, including Chief Technology Officers and district technology staff, to help them become fluent with the use of technology for instruction and administration to support the core educational values of a school system.
2. Provide leadership and vision in planning for the effective integration of technology into teaching, learning, school, and district operations and support local leadership including the development and implementation of an online *Technology Strategic Planning Tool* that assists districts in conducting technology audits and strategic planning tailored to the needs of large and small urban districts and large and small rural districts.
3. Expand services to provide school leaders with resources and technical assistance on technology planning; facilitate and assess the use of technology in teaching, learning, and administration; and use technology tools to facilitate research-based data-driven decision-making for the collection and management of data to meet local, state and federal reporting requirements
4. Continue to support the Intel® Teach Partnership and promoting the Intel Leadership Forum.
5. Continue to utilize the *Educational Technology Advisory Committee* to conduct external reviews of state education technology initiatives and to make recommendations to the legislature and Department of Education.
6. Partner with other organizations to provide district leaders with opportunities to increase their skills and to meet and share best practices about the use of technology in education.

## Recommendations to Local Education Agencies

1. Develop assessments of district leadership in meeting the *Revised Professional Administrative Standards*.
2. Develop and implement a comprehensive Strategic Technology Plan, tied to the district's strategic plan and school improvement plans, that ensures the instructional and administrative use of technology at the classroom, library, campus, and district level.
3. Adopt the *Consortium for School Networking's (CoSN) CTO Skills Framework* for the hiring and evaluation of Chief Technology Officers.
4. Develop incentives for new and veteran educators to become technologically literate.
5. Include community input into the planning and support for the integration of technology into teaching and learning.
6. Coordinate the use of electronic data in district planning to support research-based decision-making focused on student success.
7. Participate in collaboration with representatives from PreK-12, Higher Education, parents, businesses and community to share planning resources and services.

8. Support and encourage leaders to attend and present at local/state/national educational technology conferences.

# Recommendations to Higher Education

## Educational Leadership Programs

1. Require all candidates seeking a degree in educational leadership to be proficient in the *Revised Professional Administrative Standards.*
2. Develop programs that prepare future leaders with the skills and knowledge to lead educational transformation that is facilitated by technology.
3. Require that all faculty members in educational leadership programs are proficient in the *Revised Arizona Professional Teaching Standards* and the *Revised Professional Administrative Standards* and incorporate these standards into their instruction.
4. Develop and implement a program that meets the *Consortium for School Networking's (CoSN) CTO Skills Framework.*

## Higher Education in General

1. Share expertise and technology planning resources with the State Department of Education and Local Education Agencies.
2. Develop online courses housed in Management Information Systems programs that support the *Consortium for School Networking's (CoSN) CTO Skills Framework.*
3. Expand continuing education programs to include technology leadership training for leaders.

# Recommendations to the Community

## School Boards

1. Hire or develop a Superintendent who understands the role of technology in teaching, learning, and administration.
2. Direct the Superintendent to recruit, promote, or develop school leadership who understand the role of technology in teaching, learning, and administration.
3. Require district personnel to develop and maintain a *District Technology Plan* that is in compliance with the *Technology Strategic Planning Tool.*

## Parents

1. Request participation in the technology planning process and development of appropriate policies to promote student learning through the use of developmentally appropriate technology.
2. Provide financial as well as volunteer support for Local Education Agencies.

## Professional Organizations

1. Provide resources, professional development, and support in developing technology plans and appropriate district policies.

2. Provide resources, professional development and support to school leaders on how to create, implement, and assess the developmentally appropriate use of technology to promote student learning.

## Private Sector

1. Participate in the technology planning process and development of appropriate policies to promote student learning.
2. Provide access to industry-based standards for the development and support of technology systems.
3. Create a *Loan a Professional* program to assist schools and districts with technology planning.
4. Provide technology leadership training.
5. Sponsor grants that focus on technology leadership training.

# Component 3: Preparation and Development of Educators

This component covers all areas of educator preparation and development including initial teacher preparation and the development of practicing professionals. The *Arizona Professional Teacher Standards*, ISTE *National Educational Technology Standards for Teachers (NETS-T)*, and the *National Staff Development Council Standards (NSDC)* guided the development of this section of the component.

This component also covers the preparation of school leaders and Chief Technology Officers and their staff to support the use of technology to facilitate student learning. The *Arizona Professional Administrator Standards*, ISTE *National Educational Technology Standards for Administrators (NETS-A)* and the *National Staff Development Council Standards* guided the development of this section of the component.

It is important to note that there are two critical components to these recommendations. The first focuses on the *initial preparation* of the teaching professional. This activity is currently carried out in universities and community colleges around the country as well as in other post-secondary institutions. This may be through an undergraduate program that prepares new professionals or through a post-baccalaureate or graduate program that prepares professionals from other fields who have chosen to enter education.

The other component of these recommendations focuses on the *continued professional development* of current practitioners who wish to enhance their teaching through the use of new and emerging technologies. These professional development activities may be developed and offered at a building, district, regional, or state level in either formal or informal settings.

## Goals: Preparation and Development of Educators

The goals of this component are to ensure that educators

- complete their initial preparation with the philosophical background and practical knowledge and skills to use technology to enhance every student's learning.
- have access to research-based professional development opportunities whenever and wherever they need.

## Trends in the Development and Preparation of Professionals

### Initial Teacher Preparation

> Technology integration is critical to our nation's educational success and preparing students for the global economy. Teachers must be able to monitor achievement at the individual student level, generate timely feedback to students, address gaps in student understanding, and provide enrichment and acceleration where students have demonstrated success. Further, teachers must be able to embed technology within the curriculum in order to develop student mastery of technology and 21st Century skills. This systemic technology integration requires effective professional learning that includes on-going training and resources that are available anywhere at anytime. This integration of technology

> into the curriculum is vital in engaging today's students who have grown up in a technology-rich environment. These digital-age learners deserve a school curriculum rich in technology that supports student created content and fosters the development of life-long learners.
>
> *Class of 2020: Action Plan for Education, State Educational Technology Directors Association*

Currently before teacher preparation programs become certified as Arizona State Board Approved Professional Preparation Programs, they must submit a Technology Standard Matrix. The programs must address the National Educational Technology Standards for Teachers (NETS-T). In the matrix, the institution is required to report which courses are aligned to each standard and how the standard is integrated into the course.

## Providing Sustained Professional Development

> School systems must provide teachers with on-going support to help maximize the potential of each teacher and ultimately every student. Training is critical in helping teachers utilize the resources and applications necessary to provide quality instruction and increase engagement to improve student learning. Technology can help teachers engage in on-going and job embedded professional development through access to professional learning communities, online courseware, and education portals with resources, best practices and lesson plans. In addition, master teachers or coaches can be an essential tool for supporting teachers by providing feedback and allowing for the sharing of best practices. Finally, teachers need access to relevant, engaging and up-to-date digital resources to complement their instruction and individualize their teaching based on student need
>
> *Class of 2020: Action Plan for Education, State Educational Technology Directors Association*

The National Staff Development Council has developed a set of Standards for Staff Development. The Arizona Department of Education currently requires that professional development conducted by the Department adheres to these standards and encourages other professional development providers to also adopt the standards. The Standards are divided into three areas, Context, Process, and Content, and are designed to create consistent and sustained professional development. The standards can be found at [www.nsdc.org/standards/index.cfm].

While the standards are used for professional development within the Department of Education, data does not exist to determine if school districts, professional organizations, and commercial providers of professional development are using the standards. Therefore, the quality of professional development across the state varies depending on the capacity of the organization providing and supporting the use of professional learning. The more knowledgeable and the more involved the district professional coordinator is with NSDC standards, the more likelihood that teachers will be exposed to quality professional development

## Current Status of Professional Development

The National Staff Development Council's Report *Professional Learning in the Learning Profession: A Status Report on Teacher Development in the United States and Abroad* stated that ninety-two percent of all U.S. teachers participated in some form of professional development on a variety of content specific topics and "specialty" topics such as the integration of technology. The vast majority of these professional development opportunities (91%) occurred in workshops and conferences. (p. 20) However, according to the 2008 *Speak Up* data reported that Arizona teachers have a higher than national average preference for online learning; 51% of respondents reported that they had taken an online course (the national average was 33%).

Nationally, the report found that 65% of the teachers received some professional development on the use of computers for instruction. In Arizona, this number rose to 93%. While Arizona uses a variety of different professional development methodologies, from district provided workshops to statewide conferences such as the Microcomputers in Education Conference and the Arizona Technology in Education Alliance's three-conference series, a major source of professional development is through the Arizona Department of Education's Statewide Instructional Technology Integration (SIT) Project. In 2009, over 9,700 participants received professional development through a variety of activities through the SIT Project's Technology Integration Specialists, located in each county in the state. These Technology Integration Specialists have provided training to 451 administrators, 7,160 teachers, and 2,147 other participants on a variety of technology integration topics though activates that range from workshops and conferences to one-to-one coaching and mentoring. In addition to the SIT Project's activities on technology integration, in 2007-08, teachers, administrators, and support staff participated in development activities on the following: Training on the Use of IDEAL (1,665), Thinkfinity (809), Intel Teach® (263), Internet Safety (967) and Videoconferencing (282), for a total of 3,986 participants.

In addition to the SIT project activities, over the last eight years, nearly 100 teams comprised of four members (the principal and teacher leaders) have completed the Arizona Department of Education's Professional Development Leader Academy (PDLA). This program was created to teach school teams how to design, implement and evaluate database professional development that meets NSDC standards.

The Title II-A 2141 Initiative currently has 43 districts working on the recruitment and retention of highly qualified teachers. The 2,141 teams are comprised of 10-20 people (district level representatives, principals, and teachers). All of the teams are introduced to the Standard Assessment Inventory (SAI). For the 2008-09 school year, over 38,000 educators out of 55,000 have taken the assessment.

## Integrated Data to Enhance Arizona's Learning (IDEAL)

IDEAL is Arizona's education web portal for school improvement resources, online professional development, formative assessments and digital resources aligned to the Arizona Content Standards. As of March 2009, there are nearly 50,000 active users in IDEAL representing all corners of the state. (See Figure 2) The top resources accessed were: curriculum resources, AIMS support resources, and collaborative applications. The total number of registrants in IDEAL online courses since Jan 7, 2008 is approximately 6,650. The Structured English Immersion (SEI) course has had approximately 4,250 registrants during that same time. Since IDEAL's beginning, it has provided access to only administrators and teachers. Beginning July 2009, students will be involved in a pilot project preparing the way for all students to have IDEAL access. Access to IDEAL by other stakeholder groups such parents, legislators, and researchers will be coming by the end of 2009.

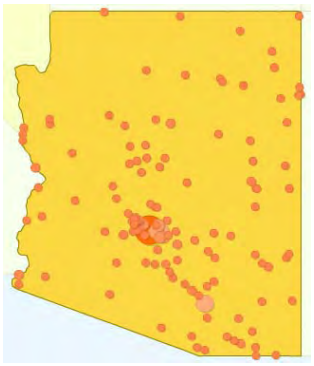

**Figure 2: Statewide Coverage of Current IDEAL Users**

> The use of technology should be widely incorporated into all areas of the curriculum. If teachers are not using that, then they must be trained before they can continue teaching.
>
> *12th Grade Girl, Calhan High School, CO*
> *Dear Mr. President, Letters to incoming President Obama*

## Conclusion

In order for students to learn 21st century skills, they must have access to the tools that facilitate these skills. We know that students already have access to many of these tools; they just do not know how to use them safely and effectively. Therefore, they need teachers who have the skills and knowledge to integrate these technologies into their teaching. These teachers must be lead and supported by leaders who have the knowledge to map out the future, obtain the resources, implement change in troubled times, and then effectively evaluate the learning that is taking place. While Arizona is making advances in this area through its current efforts, the following recommendations are designed first to prepare teachers to enter the profession and then refine their craft through sustained professional development. The recommendations also offer strategies to prepare and support school leaders in their path as well.

## Recommendations to State Leadership

1. Revise the current school funding formula to provide for initial preparation and continued professional development for administrators, teachers, and support staff that provide the skills necessary to create and implement multiple forms of technology-based instruction for PreK-12.

## Recommendations to the State Board of Education

1. Develop a structure to ensure that all Educators be required to demonstrate proficiency of the *Revised Professional Teaching Standards.*
2. Develop a structure to ensure that all School Leaders be required to demonstrate proficiency of the *Revised Professional Administrative Standards*.
3. Develop a structure to ensure that all Chief Technology Officers be required to demonstrate proficiency of the *Consortium for School Networking's (CoSN) CTO Skills Framework.*

## Recommendations to the Arizona Department of Education

1. Embed the *ISTE National Educational Technology Standards for Teachers* into the *Arizona Professional Teacher Standards*, Components 1-5, 8, and 9.
2. Embed the *ISTE National Educational Technology Standards for Administrators* into the *Arizona Professional Administrative Standards.*
3. Support LEAs with the implementation of the *Consortium for School Networking's (CoSN) CTO Skills Framework.*
4. Develop model assessments for the *Revised Professional Teaching Standards, Revised Professional Administrative Standards,* and *Consortium for School Networking's (CoSN) CTO Skills Framework* that include performance-based, on-line assessments, and/or electronic portfolios.
5. Develop and support high-quality professional development that is easily accessible and as free or nearly free as possible to the professional. These development opportunities should be based on the National Staff Development Council's Standards for Staff Development, which supports the *Revised Professional Teaching Standards* and the *Revised Professional Administrative Standards.*
6. Provide information, models, training, and technical assistance on the identification and effective use of developmentally appropriate technologies.
7. Expand *IDEAL's* services as a clearinghouse of development and innovation resources that provides anytime/anywhere access to information such as model instruction and assessment strategies, online and face-to-face training, and technical assistance on the identification and effective use of developmentally appropriate new and emerging technologies that facilitate student learning.
8. Partner with professional development providers (Arizona Technology in Education Alliance (AzTEA), ISTE, K-12 Center, Association for Supervision and Curriculum Development (ASCD), National Staff Development Council (NSDC), Intel®, Public Broadcasting Stations and/or other professional development providers) to develop programs that maximize the use of technology to enhance teaching and learning.
9. Create and support an Educational Technology Endorsement that certifies professionals who have demonstrated exemplary use of technology to facilitate student learning.

## Recommendations to Local Education Agencies

1. Provide access to professional development opportunities to meet the *Revised Professional Teaching Standards, Revised Professional Administrative Standards,* and *Consortium for School Networking's (CoSN) CTO Skills Framework.*
2. Prepare administrators and district professional development personnel to conduct consistent observations of classroom use of technology using a technology integration observation form to determine levels of technology integration and effective use of technology that incorporates this observation into all formal professional evaluation.
3. Develop and maintain funding models and budgets that support participation in statewide, technology professional development opportunities for all teachers and administrators.
4. Develop and maintain professional learning communities that use appropriate technology to support learning and reflection by instructional personnel.
5. Develop and maintain partnerships with Higher Education to pilot new instructional strategies for integrating technology.

6. Encourage and support teacher participation in the Educational Technology Endorsement program.
7. Utilize innovative strategies for anytime/anywhere delivery of ongoing professional development, including online and other distance learning models and digital content delivery services to meet the diverse and personal learning needs of all educators.
8. Provide instructional coaches and mentors to support technology integration efforts to improve learning in core curriculum areas.
9. Provide professional development on the impact of non-compliance with district policies regarding the use of technology and include compliance with these policies as a component of teacher evaluation and observation instruments.
10. Use grants and, where possible, district funds to host and cosponsor regional and statewide technology symposia and training that promote the sharing of instructional strategies and techniques.
11. Work with parents and higher education to develop opportunities for parents to learn how technology can enhance their child's learning.

## Recommendations to Higher Education

### Initial Teacher Preparation and Educational Leadership Programs

1. Require that all teacher candidates be proficient in the *Revised Professional Teaching Standards* including the knowledge and skills to utilize technology in face-to-face, hybrid, and online learning environments.
2. Require that all faculty members in Initial Teacher Preparation Programs be proficient in the *Revised Professional Teaching Standards* and incorporate these standards into their instruction.
3. Provide pedagogical support for transforming teaching and learning based on research and proven models for systemic change in the classroom.
4. Require that all candidates seeking a degree in educational leadership be proficient in the *Revised Professional Administrative Standards* including the knowledge, strategies, and skills to use and evaluate the effective use of technology in the classroom.
5. Require that all faculty members in educational leadership programs be proficient in the *Revised Professional Teaching Standards* and the *Revised Professional Administrative Standards* and incorporate these standards into their instruction.
6. Develop and implement a program that meets the *Consortium for School Networking's (CoSN) CTO Skills Framework.*
7. Collaborate with PreK-12 and other institutions, organizations and states to eliminate barriers to professional development delivered via online and other distance learning technologies.
8. Support field-based educator preparation and development on the integration of technology into teaching and learning.

### Higher Education in General

1. Model administrative leadership of the use of technology throughout Higher Education institutions.

2. Encourage the utilization of online and other distance learning as an instrument for delivery of professional development and degree programs by Higher Education institutions.
3. Work with local LEAs to develop opportunities for parents to learn how technology can enhance their child's learning.

## Recommendations to the Community

### School Boards

1. Annually review district professional development activities to ensure alignment with the *Revised Professional Teaching Standards* and *Revised Professional Administrative Standards.*
2. Review, develop, and implement strategies to provide professional development that moves professionals in the district to at least the *Target* level of technology use on the *Revised Professional Teaching Standards*.
3. Review all board policies, regulations, procedures and practices across the district to create consistent goals and process to improve student learning facilitated by technology.

### Parents

1. Work with local school districts to support professional development activities by providing funding or volunteering to help coordinate an activity.
2. Seek out and participate in learning opportunities to develop knowledge of how technology can be used to enhance learning.

### Professional Organizations

1. Identify grants that support professional development.
2. Provide sustained professional development aligned with the *National Staff Development Council: Staff Development Standards* to promote the effective use of technology.
3. Create opportunities to encourage social/professional networking among educators related to the integration of technology to improve student learning.

### Private Sector

1. Participate in collaboration with representatives from PreK-12, Higher Education, parents, businesses and community to share professional development resources and services.
2. Collaborate with classroom teachers to extend learning opportunities outside of the traditional Higher Education model.
3. Provide a pedagogical training program as part of software purchases.
4. Provide educators opportunities to experience technology's role in the workplace by providing technology-based work experiences through internships and other means.
5. Provide internships and other opportunities for educators to remain current in their discipline related skills.

# Component 4: Infrastructure

> The U.S. Department of commerce ranked 55 industry sectors by their level of IT intensiveness. Education was ranked number 55, the lowest. Below coal mining.
>
> *Keith Krueger, CEO, Consortium for School Networking (CoSN)*
> *Learning to Change, Changing to Learn*

While the previous three components provide the human infrastructure necessary to implement the effective use of technology, this component covers the hardware and software systems necessary to support the other three components. To support the human components of this plan, all public, private, and charter schools throughout the state should provide an infrastructure that provides learners with access to digital content, curriculum, tools, resources and assessment using a variety of current and emerging technologies. Educators should be provided with digital access to their students anytime and anywhere and the research-based digital resources they need to facilitate their student's learning. In addition, educators at all levels from initial preparation to retirement should be provided with access to the research-based digital resources and professional development opportunities they need to learn and develop their craft. Finally, school leaders from assistant principals to the superintendent and technology support staff should be provided with the tools and resources they need to support the instructional and administrative core business practices of their organization by promoting anytime/anywhere learning and supporting the administrative activities of the organization through data-driven decision making.

The Essential Elements section of the ISTE (*National Educational Technology Standards for Students, National Educational Technology Standards for Teachers,* and the *National Educational Technology Standards for Administrators*) Standards and the *School Facilities Board's 21st Century Schools Report* guide the development of this component.

## Goals: Infrastructure

To accomplish this, the infrastructure should provide:

- secure and reliable anytime/anywhere access to a variety of current and emerging technologies.
- just-in-time assistance to support the use of technology for administration, teaching and learning.
- policies and procedures that ensure equitable access to all users.

## Trends in Infrastructure Development and Support

> The one thing that I would change about schools would be access to modern technology. I think that technology use should be expanded so students can get used to it and be able to compete in the twenty-first century.
>
> *12th Grade Boy, Vallejo High, CA*
> *Dear Mr. President, Letters to incoming President Obama*

> I would give every school the technology they need. We live in a time where technology runs almost everything. This isn't the 60's where everyone listened to the radio and used a typewriter. This is the 21st century! Technology is found almost everywhere!
>
> *7th Grade Boy, Kamehameha Schools Kapalama Campus, HI*
> *Dear Mr. President, Letters to incoming President Obama*

When examining trends in infrastructure there are a variety of organizations and reports that provide information on trends, resources, and personnel necessary to support the use of technology in schools today. Two of the most influential reports are the *America's Digital Schools* (ADS) report for 2008 and the *Horizon 2009 K-12 Edition* Report.

## America's Digital Schools

The *2008 America's Digital Schools (ADS)* report details several "trends to watch" when considering the technology infrastructure needed in today's schools.

**Large Scale 1:1 Implementations**
The report finds that 1:1 implementations are now relatively widespread in education. With 27% of districts reporting their involvement in 1:1 computing, this trend has moved into the mainstream. Arizona reflects this national trend, with almost 23% of school districts reporting that they have 1:1 implementations in place. Sustained funding and adequate support staff for this level of technology are important items that must be considered as schools move forward with 1:1 projects.

**Learning Management Systems Go Mainstream**
The percentage of school districts using a Learning Management System (LMS) has climbed to almost 50%, with another 19% indicating plans for future implementation. Arizona trails slightly in regards to this trend with 40% of districts reporting use of an LMS. Almost half of Arizona schools with LMSs host them on in-house servers. As more districts take advantage of this learning tool, schools need to ensure they have the support staff to maintain the reliability of these systems.

**Online Assessment Is Replacing the No. 2 Pencil**
In 2007, there was widespread use of online assessment in schools for the first time, with 30.4% of districts reporting their use. The 77-year dominance of No. 2 pencils and bubble paper tests appear to be coming to an end. Providing a sufficient number of computers or other hardware to take online assessments will increasingly move schools towards 1:1 or near 1:1 student to computer ratios, which increases the funding and support concerns associated with these type of projects.

**The Student Computing "Mobility Race" Accelerates**
The use of student-owned handheld devices is on the rise. The report saw use of traditional PDAs with a rise in the number of "Smart" phones and web-enabled devices. The use of Mp3 players such as the Apple iPod has also exploded. Technology staffs are increasingly challenged to adequately plan infrastructure and policies to accommodate the expanding use of these devices both inside and outside of school networks.

**Interactive Whiteboards**

Interactive whiteboards (IWBs) have moved well beyond the initial adoption stages and are increasingly viewed as standard equipment in schools. Teachers quickly come to find them essential. There has also been increased integration of IWBs with other classroom technologies, including student response units and mobile computing devices. The findings of the *ADS* report are confirmed in the *2007 Speak Up Survey* where teachers and students were asked to design their "ultimate school." The results can be found in Figure 3. It is interesting to note that 1:1 computing received the highest percentage with interactive whiteboards a close second.

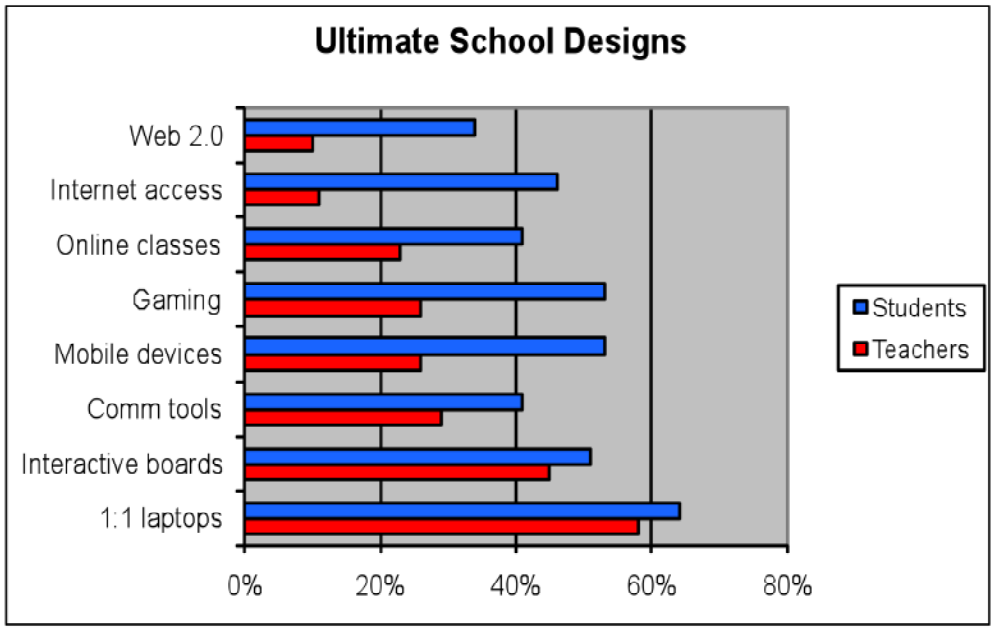


**Figure 3: Speak Up Results on the "Ultimate School"**

## Broadband Crisis

The previous five trends as identified in the *ADS* report are having a positive impact on learning. However, the sixth trend is not. The report found that there is a crisis in Internet bandwidth within the United States and specifically within its schools. While schools across the country do have connections to the Internet, these connections are often inadequate to support the amount of data transfer needed to promote the use of the tools discussed elsewhere in this section. Therefore, the most critical issue related to teachers and students utilizing the full potential of the Internet are the development of a robust statewide broadband infrastructure to all schools, both urban and rural.

The vast majority of schools (over 95%) in Arizona are connected with local networks and, in districts with multiple locations, with networks that connect multiple school locations. Likewise, schools and districts report that over 98% of schools have access to the Internet. This represents significant progress in getting schools connected both internally and to the Internet. Additional data elements demonstrate, however, that there is more work to be done in increasing the

capacity of those connections between schools in a district and to the Internet. The *State Educational Technology Director's Association* (SETDA) recently released a broadband whitepaper, *High-Speed Broadband Access for All Kids: Breaking Through the Barriers*, which provides a breakdown of bandwidth requirements for different educational activities. SETDA analyzed that data and produced a recommendation for increasing bandwidth capacity at schools to:

**In a technology-rich learning environment for the next 2-3 years, SETDA recommends:**

- An external Internet connection to the Internet Service Provider of at least 10 Mbps per 1,000 students/staff
- Internal wide-area network connections from the district to each school and between schools of at least 100 Mbps per 1,000 students/staff

**In a technology-rich learning environment for the next 5-7 years, SETDA recommends:**

- An external Internet connection to the Internet Service Provider of at least 100 Mbps per 1,000 students/staff
- Internal wide area network connections from the district to each school and between schools of at least 1 Gbps per 1,000 students/staff

*High-Speed Broadband Access for All Kids: Breaking Through the Barriers, p 2.*

Perhaps the most important element from SETDA's broadband report is their recognition that bandwidth capacity has to be considered in terms of the number of students using the networks or Internet. Currently, over 50% of Arizona's schools have a 10 Mb or less connection to the Internet. Of the remaining 50% with 10 MB or greater connections, the number of students in the district would indicate that those connections per student are also far below the recommended levels of broadband. It is essential that schools' broadband infrastructure have the capacity to take advantage of the dynamic, digital resources available for teaching students, to deliver and track student assessments, and to enable classrooms to connect with learning opportunities around the globe.

## Horizon 2009 K-12 Report

In 2009, the *New Media Consortium* partnered with the *Consortium for School Networking (CoSN)* to develop a report for K-12. The report, *Horizon 2009 K-12 Edition*, offers predictions on six technologies that will have an increasing impact on teaching and learning. The report offers insight into key trends and challenges facing education. The report also articulates two central themes that face educators in the coming years. These themes are assessment and filtering.

> Assessment continues to present a challenge to educators at all levels, particularly in the context of new media and collaborative work; evaluating student work that includes blogs, podcasts, and videos, or establishing how much an individual student contributed to or learned from a collaborative project, is difficult. Further, translating assessments of this nature into the metrics measured by standardized tests is not at all straightforward. The issue of assessment touches every topic in this report.

> Likewise, the practice of filtering — limiting the kinds of online content and tools that students have access to while at school — is intimately related to each of these topics. At many schools today, the technologies named here cannot be used because they are blocked by content filters. The Advisory Board recognized the need for new tools for filtering that do a better job of keeping objectionable content out of the way while allowing useful tools and content to be accessed.
>
> *Horizon 2009 K-12 Edition (p. 2)*

**Horizon 2009 K-12 Report - Technologies of Interest**

In making its recommendations, the ETAC also considered many technologies and their potential impact on student learning and the infrastructure required to support it. Of particular interest were the six technologies identified by the Horizon report:

- Collaborative Environments
- Online Communication Tools
- Mobiles
- Cloud Computing
- Smart Objects
- The Personal Web

The technologies that are moving quickly into the mainstream are collaborative environments and online communication tools. Mobile devices for learning and the use of the "cloud" to store data and run applications also appear to offer schools greater, and perhaps more cost-effective, options for 1:1 learning They also provide access to learning resources and applications whether at home, school, or traveling.

From an infrastructure perspective, mobile devices increase support responsibilities for already understaffed technology departments at schools. A significant issue to be considered in the deployment of mobile devices or 1:1 projects is sustained funding for both technology support and professional development. Cloud computing, on the other hand, offers the potential promise of offloading hardware and technical support for data storage and some applications, while increasing access to students, teachers, and administrators. However security concerns are one potential drawback to the expansion of data and applications into the "cloud".

Supporting these collaborative tools, increased use of digital curriculum, and anytime access to a learning environment means ensuring every student has access to a computer or other digital learning device. Currently Arizona has an average student to computer ratio of between three or four students for every computer. This ratio has increased considerably from the *2000 School Facilities Board (SFB)* initial standard of eight students for every computer. The increased use of learning management systems, personalized learning opportunities, and the embedding of digital learning activities has required schools to ensure that more students have access to computers on a regular basis than was possible with a standard of 8:1. Businesses would find it hard to imagine an effective working environment, in which three or four employees are expected to share one computer, and one computer for eight employees is inconceivable, but this is the reality for Arizona's students today.

The data also shows that, in order to increase the student-to-computer ratio from 8:1 to just over 3:1, schools have had to maintain computers for much longer than is recommended. The data shows that:

- Over 25% of districts indicated that their computers are all 3 years or older.
- 20% of districts indicated that their computers are all 5 years or older.
- All but 38 districts reported that at least some of their computers were 5 years or older.
- The lower the bandwidth capacity reported, the older the computers being maintained.
- Low bandwidth was reported across the state in both rural and urban locations.

*Taken from 2008-2009 ADE Educational Technology Survey*

## Conclusion

Maintaining aging technology significantly increases support costs for schools in both time and money in an area that is already widely underfunded and understaffed. The combination of increased support requirements and aging technology contributes to the frustration teachers and students feel about lacking the technology tools needed for today's learning environment, or their ability to use them effectively. To combat these challenges, schools are attempting a variety of strategies, including exploring the use of low-cost thin client computers, net books, or lease arrangements. The recommendations below offer a series of strategies that will maximize the infrastructure necessary to support a robust learning environment. This environment, supported by a dedicated, adequate funding stream, will allow all schools to provide the required support and hardware to use technology effectively in today's classrooms.

## Recommendations to State Leadership

1. Develop a multi-agency effort in cooperation with the appropriate public and private sector entities including the Arizona Telecommunications and Information Council (ATIC) and Government Information and Telecommunications Agency (GITA), to enhance statewide high-speed broadband access to the Internet with sufficient broadband capacity and capability to support a digital learning environment.
2. Develop a statewide high-speed network that provides all PreK-12 schools and districts with access to up to at least 100 Mbps Internet bandwidth per 1,000 student/staff. (Adapted from *High-Speed Broadband Access for All Kids*)
3. Create sustainable long-term financing to ensure that all Arizona schools have equitable access to hardware and software that is refreshed on an industry-standard basis.
4. Create sustainable long-term financing to fund new school construction and retrofitting of existing schools to create a technology infrastructure necessary to support a digital learning environment.
5. Create sustainable long-term funding to provide a 1:1 learning environment for $6^{th}$-$12^{th}$ grade students and at least a 3:1 ratio for students below $6^{th}$ grade. (ETAC has avoided using "computer to student ratios" because other digital learning devices, i.e. net books or smart phones, might describe these ratios)

## Recommendations to the State Board of Education

1. Charge the State Department of Education with the development of a set of *Recommended Standards of Technology-Based Resources* for districts to set a baseline level of developmentally appropriate technology that supports standards for instructional systems (hardware, software, and infrastructure).
2. Charge the State Department of Education with the development of an *Arizona Technology and Readiness Chart*, similar to that developed by the *CEO Forum STaR Charts* to establish benchmarks for the use of developmentally appropriate technology to promote student learning.

## Recommendations to the Arizona State Department of Education

1. Work with agencies and organizations to create and disseminate a *Recommended Standard of Technology-Based Resources* to set a baseline level of developmentally appropriate technology that supports anytime/anywhere access to an environmentally safe digital learning environment (hardware, software, and infrastructure) for all students.
2. Work with agencies and organizations to create and disseminate an *Arizona Technology and Readiness Chart*, similar to that developed by the *CEO Forum STaR Chart* to establish benchmarks for the use of developmentally appropriate technology that promotes student learning.
3. Develop and disseminate models of long-range educational technology planning that are consistent with federal regulations such as the NCLB Title IID and E-Rate programs.
4. Develop and maintain a common standard for the storage of student data that is safe, secure, and recoverable.
5. Participate in the collaboration between public and private entities to provide anytime/anywhere equitable access to robust broadband network resources for all students, educators and parents.
6. Collaborate with private entities (including non-profits such as AzTEA) to develop face-to-face and online opportunities for support staff from districts with common size, interests, and technologies to meet and share best practices in infrastructure support.
7. Work with LEAs, higher education, the private sector, and organizations such as the *State Educational Technology Directors Association* and the *Consortium for School Networking* to develop a methodology to determine *Value on Investment (VOI)* for technology expenditures.

## Recommendations to Local Education Agencies

1. Annually review the *Recommended Standards of Technology-Based Resources* provided by the Arizona Department of Education for district alignment with these standards and work to bring district technology to <u>at least</u> these recommended levels by retrofitting existing facilities and, where possible, build the capacity to adapt to new technologies.
2. When constructing new school facilities, insure that these facilities meet <u>at least</u> the *Recommended Standards of Technology-Based Resources* and, where possible, build the capacity to adapt to new technologies.
3. Review, develop, and implement strategies to move all educators within the LEA to <u>at least</u> the *Target* level of technology use on the *Arizona Technology and Readiness Chart*.

4. Develop and implement new strategies and practices for the funding, purchase and support of technology infrastructure and services.
5. Provide a 1:1 learning environment for 6th-12th grade students and at least a 3:1 ratio for students below 6th grade. (ETAC has avoided using "computer to student ratios" because other digital learning devices, i.e. net books or smart phones, might describe these ratios)
6. Maintain a connection to the statewide broadband network to connect the LEA to the Internet. (Adapted from *High-Speed Broadband Access for All Kids)*
7. Maintain an internal wide area network that provides connections from the district to each school and between schools of at least 100 Mbps per 1,000 students/staff within the next one to four years and at least 1 Gbps per 1,000 students/staff within the next five to seven years. (Adapted from *High-Speed Broadband Access for All Kids)*
8. Provide and maintain an infrastructure for communications with parents and community members, including year-round anytime/anywhere access to school news, educational resources, and data.
9. Utilize technologies that are environmentally safe and can be used to ensure the safety of students (i.e. surveillance and emergency warning systems).
10. Provide and maintain an infrastructure for online grading and assessment systems that are standards based and allow access to student performance data to students, parents, and appropriate district personnel.
11. Develop strategies, resources, and best practices that facilitate anytime/anywhere access to digital learning resources and activities by all students within the district. This includes secure access to network resources and ensuring that critical technology applications and data can be recovered in a timely manner.
12. Provide funding and release time for support staff from districts of common size, interests, and technologies to meet and share best practices in infrastructure support.

## Recommendations to Higher Education

### Initial Teacher Preparation and Educational Leadership Programs

1. Acquire and maintain current technology for educator preparation facilities.
2. Establish infrastructure partnerships with Local Education Agencies for anytime/anywhere content delivery and professional development.

### Higher Education in General

1. Partner with the Department of Education, the private sector, and Local Education Agencies to design and implement an accessible high-speed internet with access to national and international resources.
2. Partner with the research community to develop technologies that are 1) environmentally safe and 2) can be utilized to ensure the safety of students (i.e. surveillance and emergency warning systems).

# Recommendations to the Community

## School Boards

1. When constructing new school facilities, insure that these facilities meet at least the *Recommended Standards of Technology-Based Resources* and, where possible, build the capacity to adapt to new technologies.
2. Review, develop, and implement strategies to move all educators within the LEA to at least the *Target* level of technology use on the *Arizona Technology and Readiness Chart*.
3. Develop and implement new business strategies and practices for the purchase and support of the technology infrastructure and services.
4. Review, develop, and implement strategies to move to at least the *Target* level of technology use on the *Arizona Technology and Readiness Chart*.

## Parents

1. Provide students with access to high-speed Internet connectivity either at home or through a community resource.
2. Provide students with access to a computing device capable of supporting access to the Internet and district software either at home or through a community resource.
3. Support anytime/anywhere access to personal computing devices and to existing and emerging networks for communication with schools and community learning facilities.
4. Advocate to the State Legislature to provide funding to support high-speed Internet connectivity to all schools in Arizona.
5. Advocate to the State Legislature to provide funding to support the technology infrastructure necessary to support student learning in all schools in Arizona.

## Professional Organizations

1. Develop face-to-face and online opportunities for support staff from districts with common size, interests, and technologies to meet and share best practices in infrastructure support.
2. Share best practices from education, business, and industry to support school infrastructures and develop ways for schools to utilize statewide infrastructures currently being developed by cities, state agencies, health institutions, private enterprise, and Higher Education.

## Private Sector

1. Advocate to the State Legislature to provide funding to support high-speed Internet connectivity to all schools in Arizona.
2. Advocate to the State Legislature to provide funding to support the technology infrastructure necessary to support student learning in all schools in Arizona.
3. Develop strategic partnerships with communities to provide anytime/anywhere accessible wireless networks and computing devices available for all citizens.
4. Participate in partnerships with public and private entities to aggregate demand and lower cost for broadband access for schools, businesses, government, and consumers.
5. Share strategies and best practices for security audits and business continuity planning that can be conducted at the district and local school level.

6. Develop strategic partnerships with local education agencies to foster infrastructure support, including promotion of interoperability and accessibility, the use of commercial software, and the use of open-source software and web-based services.
7. Develop software applications that meet interoperability, accessibility, and usability standards, assist schools in data-driven decision-making, and enable anytime/anywhere parental access.
8. Develop low-cost, standardized, accessible, scalable, personal computing devices and services for PreK-12 students to support educational objectives and enable anytime/anywhere 1:1 computing.
9. Establish grant programs in support of local technology use in schools.
10. Participate in consortiums to allow group purchases of high-ticket hardware, software, and networking resources.

# Implementation and Evaluation of the Plan

## Implementation of the Plan

One of the unique challenges for a strategic statewide educational technology plan is that it produces recommendations for a diverse set of groups, most of which receive no direct funding or oversight from the Arizona Department of Education. The success of the plan will depend in part on how these stakeholder groups implement its goals and recommendations. It is important then, that ADE not only act to implement directly its own recommendations, but also to reach out to both LEAs and other stakeholder groups to encourage and assist them in their own implementation efforts.

The Arizona Department of Education will be responsible for implementing the recommendations developed for them. Many of these recommendations involve the creation of tools or standards that other groups can use or adopt. Some of these tools and standards that will need to be developed will be the *Annual Educational Technology Survey*, the *LEA Technology Planning Tool*, and the *Arizona Technology and Readiness Chart (ATAR).* Additionally, ADE will continue to use the *Educational Technology Advisory Committee (ETAC)* that is composed of members of the various stakeholder groups. This group will guide and inform implementation efforts, including the development of *Recommended Standards of Technology-Based Resources, Teaching and Learning Standards, Technology Leadership Standards, Chief Technology Officer Standards,* as well as to assist with the establishment of an Educational Technology endorsement through the ADE Certification Unit. These and the other plan recommendations for ADE will be implemented using federal funds set-aside for state activities.

Implementation of LEA recommendations will come through their own local technology planning process. The intent of the Arizona Educational Technology plan is that all schools or districts in Arizona develop their own local technology plan that implements the LEA recommendations. The reality is that only districts that receive E-Rate and/or Title II-D are required to complete a LEA technology plan. This LEA plan provides a framework to assist schools and districts in planning the effective use of technology. ADE will provide technical assistance and resources to assist LEAs as they move through this planning process. A variety of NCLB title programs (Title I, Title II-A, and Title II-D), E-Rate, and local budgets help provide the funding to meet the state and local plan recommendations. These federal monies, while vital, are meant to be supplemental to state and local funding of technology for teaching and learning. While dedicated federal funding continues to exist for the use technology of schools, there is currently no dedicated state-level funding source. To ensure that the plan recommendations for LEAs can be fully implemented, a dedicated state-level funding source is needed.

Since the other stakeholder groups are independent from ADE, most of the implementation that occurs in those groups will depend on their adoption of the plan recommendations. ADE will work in conjunction with the other stakeholder groups to promote and educate their members about the plan goals and the impact the recommendations for their groups will have on student achievement.

## Evaluation of the Plan

Proper evaluation of plan goals and recommendations is vital for the successful implementation of the Arizona Long-Range Strategic Educational Technology Plan. Without providing regular evaluation, it is difficult to measure the impact plan recommendations are having on the use of technology to enhance the learning of Arizona's students. Additionally, it is difficult to define what programs and resources are achieving success and which ones should be targeted for additional funding and attention in future efforts. Regular evaluation reports on the status of the educational technology plan recommendations can also serve to inform state, district, business, and other leaders on the progress and provide guidance on current and future needs. Particularly important in this process, will be the use of data to identify barriers to successful integration of technology so that resources can be properly allocated to minimize and/or eliminate them. As evidenced in other states with strong educational technology plans and evaluative measures, these evaluation efforts will provide the data needed to inform stakeholders and establish a solid foundation for future educational technology planning efforts.

The ADE Educational Technology section will serve as the coordinating entity for the majority of the evaluation measures in the plan. They will include such tools and processes as the *Arizona Readiness and Technology Indicators (ATAR)*, the online ADE annual educational technology survey, and LEA monitoring performed as a part of the federal Title II-D program. The purpose of these collection tools and processes is **not** to serve as a punitive instrument, but rather to provide insights for leadership in LEAs and other organizations to address weaknesses and barriers to successful technology use.

The primary evaluation measure for the technology plan will be the annual *Report of Educational Technology in Arizona (RETA)* report. It will be produced by the ADE Educational Technology section and will contain a statewide snapshot of educational technology progress. The RETA will also identify progress made during the year by the different stakeholder groups towards meeting the goals and recommendations of the state's educational technology plan. It will likewise identify the progress of the Arizona Department of Education towards achieving the goals. In addition, it will summarize ADE's efforts to provide technical assistance to the identified stakeholders towards accomplishing their goals. It is the intent of ADE to make this report available annually to the public and to provide briefings on the plan's progress to the state legislature, the state board of education, and the ADE's executive management team. By reviewing progress annually, efforts to meet the technology plan goals can be refocused to ensure that time and resources are targeted towards activities that will have the greatest impact on student achievement.

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# Glossary

**21st Century Schools Report**

In response to Governor Janet Napolitano's Executive Order 2007-06, the School Facilities Board published the 21st Century Schools Report - Ensuring Innovative School Facilities for the Digital Age. It outlines requirements for schools within the state. [www.azsfb.gov/sfb/sfbweb/sfbaays/formDoc.asp?section=10]

**Arizona Educational Technology Standard**

The Arizona Educational Technology Standard is a component of the Arizona Academic Standards and governs the use of technology by students to facilitate student learning. The standard is currently being updated and it is anticipated that the new standard will be adopted by the Board of Education in May of 2009. The 2000 standard can be found at [www.ade.state.az.us/standards/technology] and the new standard will be available from this site when adopted.

**Arizona Professional Administrative Standards**

The certification requirements developed by the Arizona Department of Education for all administrative personnel - [www.ade.state.az.us/certification/requirements/admin/]

**Arizona Professional Teacher Standard**

The certification requirements developed by the Arizona Department of Education for all certified staff - [www.ade.state.az.us/certification/requirements/TeachingCerts/]

**Arizona School Facilities Board**

Students' FIRST (Fair and Immediate Resources for Students Today) is a capital finance program funded by appropriations from the State General Fund. The School Facilities Board administers the program. The Board is charged with administration of three capital funds: a) Building Renewal, b) Deficiencies Corrections, and c) New School Facilities (Arizona School Facilities Board).

**Authentic Learning**

Authentic learning is a pedagogical approach that allows students to explore, discuss, and meaningfully construct concepts and relationships in contexts that involve real-world problems and projects that are relevant to the learner (Donovan, Bransford, & Pellegrino, 1999). The term authentic is defined as genuine, true, and real (Webster's Revised Unabridged Dictionary, 1998). If learning is authentic, then students should be engaged in genuine learning problems that foster the opportunity for them to make direct connections between the new material that is being learned and their prior knowledge (Meridian: A Middle School Computer Technology Journal).

**Blog**

A blog (a contraction of the term weblog) is a website, usually maintained by an individual with regular entries of commentary, descriptions of events, or other material such as graphics or video. Entries are commonly displayed in reverse-chronological order. "Blog" can also be used as a verb, meaning to maintain or add content to a blog (Wikipedia, accessed March, 7, 2009).

**Dashboard**

In Management Information Systems, a Dashboard is a piece of software used to track critical information and display this information in a way that is meaningful and useful to the user.

**Developmentally Appropriate**

Developmentally appropriate programs promote children's active exploration of the environment. Children manipulate real objects and learn through hands-on, direct experiences. The curriculum provides opportunities for children to explore, reflect, interact, and communicate with other children and adults…. Developmentally appropriate practice encourages the use of varied instructional strategies to meet the learning needs of children.… By providing a wide variety of ways to learn, children with various learning styles are able to develop their capabilities. Teaching in this way also helps provide for multiple intelligences, and enables children to view learning in new ways…. Developmentally appropriate practice encourages a mixture of teacher-directed and child-directed activities. Teacher-directed learning involves the teacher as a facilitator who models learning strategies and gives guided instruction. Child-directed learning allows the child to assume some responsibility for learning goals (Developmentally Appropriate Practices, North Central Regional Laboratory)**.**

**Dual Enrollment Course**

A dual enrollment course is a course that meets the academic requirements of both a high school and an institution of Higher Education such as a community college or university. A student who passes a dual enrollment course receives credit at both the high school and higher education level.

**Educator Preparation Program**

A teacher certification program that is accredited by the State of Arizona

**eRate - Federal Communication Commission's E-Rate Long Range Plan**

The Schools and Libraries Program of the Universal Service Fund makes discounts available to eligible schools and libraries for telecommunication services, Internet access, and internal connections. The program is intended to ensure that schools and libraries have access to affordable telecommunications and information services (Universal Services Administrative Company [USAC]).

**Higher Education**

Higher Education is defined as the state universities, community colleges, and adult education providers involved in the initial preparation of educators or provide on-going professional development.

**IDEAL**

Integrated Data to Enhance Arizona's Learning (IDEAL) is the Department of Education's portal that serves as a single access point to educational resources and information for all Arizona Educators. The site provides access to professional development, standards-based curriculum resources, collaborative tools and school improvement resources.

**IM – Instant Messaging**

Short for instant message, a type of communications service that enables you to create a kind of private chat room with another individual in order to communicate in real time over the Internet, analogous to a telephone conversation but using text-based, not voice-based, communication. Typically, the instant messaging system alerts you whenever somebody on your private list is online. You can then initiate a chat session with that particular individual (Webomedia, Accessed April 13, 2009).

**Interactive White Board**

An interactive whiteboard is a large interactive display that connects to a computer and projector. A projector projects the computer's desktop onto the board's surface, where users control the computer using a pen, finger or other device. The board is typically mounted to a wall or on a floor stand (Wikipedia, Accessed April 13, 2009).

**International Society for Technology in Education (ISTE)**

The International Society for Technology in Education "provides leadership and service to improve teaching, learning, and school leadership by advancing the effective use of technology in PreK–20 and teacher education. Home of the National Educational Technology Standards (NETS), the Center for Applied Research in Educational Technology (CARET), and the National Educational Computing Conference (NECC), ISTE represents more than 85,000 professionals worldwide."

**Local Education Agency (LEA)**

An LEA is defined as a public authority, legally constituted by the state as an administrative agency, to provide control of and direction for kindergarten programs and grades one through twelve in public educational institutions.

**National Educational Technology Standards for Students**

The Standards for Students, developed by ISTE, "identify several higher-order thinking skills and digital citizenship as critical for students to learn effectively for a lifetime and live productively in our emerging global society." The standards state that students shall:

1. demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology;

2. use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others; students apply digital tools to gather, evaluate, and use information;
3. use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources;
4. students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior; and
5. demonstrate a sound understanding of technology concepts, systems, and operations.

**National Educational Technology Standards for Teachers**

The Standards for Teachers, developed by ISTE, provides “a framework for educators to use as they transition schools from Industrial Age to Digital Age places of learning.” The standards state that teachers shall:

1. use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments;
2. design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S;
3. exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society;
4. understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices; and
5. continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

**Professional learning community**

The term professional learning community describes a collegial group of administrators and school staff who are united in their commitment to student learning. They share a vision, work and learn collaboratively, visit and review other classrooms, and participate in decision making (Hord, 1997b). The benefits to the staff and students include a reduced isolation of teachers, better informed and committed teachers, and academic gains for students. Hord (1997b) notes, "As an organizational arrangement, the professional learning community is seen as a powerful staff-development approach and a potent strategy for school change and improvement (Professional Learning Communities, North Central Research Laboratories).

**Sharable Content Object Reference Model (SCORM)**

SCORM is a collection of standards and specifications for web-based e-learning. It defines communications between client side content and a host system called the run-time environment (commonly a function of a learning management system). SCORM also defines how content may be packaged into a transferable ZIP file. (Wikipedia)

**School Interoperability Framework (SIF) Specifications**

The School Interoperability Framework (SIF) specification makes it possible for programs within a school or district to share data without any additional programming and without requiring each vendor to learn and support the intricacies of other vendors' applications. (SIF Association)

**State Leadership**

State Leadership is defined as all governmental officials from the Governor to state, local, county, and city government

**Webinar**

Short for Web-based seminar, a presentation, lecture, workshop or seminar that is transmitted over the Web. A key feature of a Webinar is its interactive elements -- the ability to give, receive and discuss information. Contrast with Webcast, in which the data transmission is one way and does not allow interaction between the presenter and the audience (Webopedia, Accessed April 13, 2009).

# Credits

**Writer**

Christopher G. Johnson, Ph.D.

# Appendix A: Summary of Recommendations for State Leadership

## Student Learning

1. Revise the current school funding formula to provide for the support of current and emerging models of face-to-face, online, and hybrid student learning.
2. Create a statewide effort to expand beyond the current Technology Assisted Project-Based Instruction (TAPBI) program structure that manages and provides multiple forms of online instruction for PreK-12 that is accessible to all students.
3. Develop a structure and funding model to support online courses so that all students shall be able to participate in at least one core course (English, mathematics, science, or social studies) in an online environment by the time they graduate. While elective courses may also be taken online, it is important for students to take at least one core learning experience online.

## Leadership

1. Provide a sustainable funding stream for the continued development of school leadership from the principal to superintendent that supports Student Learning as detailed in the *Arizona Educational Technology Standard.*
2. Use the results of the *eLearning Task Force* to guide the transformation of PreK-12 learning by making recommendations to the Department of Education and the *Educational Technology Advisory Committee*.
3. Create revenue streams that provide continued professional development and incentives for new and veteran educators to become technologically literate.

## Preparation and Development of Educators

1. Revise the current school funding formula to provide for initial preparation and continued professional development for administrators, teachers, and support staff that provide the skills necessary to create and implement multiple forms of technology-based instruction for PreK-12.

## Infrastructure

1. Develop a multi-agency effort in cooperation with the appropriate public and private sector entities including the Arizona Telecommunications and Information Council (ATIC) and Government Information and Telecommunications Agency (GITA) to enhance statewide high-speed broadband access to the Internet with sufficient broadband capacity and capability to support a digital learning environment.
6. Develop a statewide high-speed network that provides all PreK-12 schools and districts with access to up to at least 100 Mbps Internet bandwidth per 1,000 student/staff. (Adapted *High-Speed Broadband Access for All Kids*)
2. Create sustainable long-term financing to ensure that all Arizona schools have equitable access to hardware and software that is refreshed on an industry-standard basis.
3. Create sustainable long-term financing to fund new school construction and retrofitting of existing schools to create a technology infrastructure necessary to support a digital learning environment.
4. Create sustainable long-term funding to provide a 1:1 learning environment for $6^{th}$-$12^{th}$ grade students and at least a 3:1 ratio for students below $6^{th}$ grade. (ETAC has avoided using “computer to student ratios” because other digital learning devices, i.e. net books or smart phones, might describe these ratios)

# Appendix B: Summary of Recommendations for the State Board of Education

## Student Learning

1. Require mastery of the *Arizona Educational Technology Standard* for all students by the eighth grade as embedded into the content areas of the *Arizona Academic Standards* to meet current and future federal legislation.
2. Develop a structure to ensure the articulation and reciprocity of credits for online learning provided by traditional PreK-12 institutions and online learning providers.

3. Develop a structure and funding model to support online courses so that all students shall be able to participate in at least one core course (English, mathematics, science, or social studies) in an online environment by the time they graduate. While elective courses may also be taken online, it is important for students to take at least one core learning experience online.

### Leadership

1. Embed the ISTE National Educational Technology Standards for Teachers into the Arizona Professional Teaching Standards.
2. Embed the ISTE National Technology Educational Standards for Administrators into the Arizona Professional Administrative Standards.

### Preparation and Development of Educators

1. Develop a structure to ensure that all Educators be required to demonstrate proficiency of the *Revised Professional Teaching Standards*
2. Develop a structure to ensure that all School Leaders be required to demonstrate proficiency of the *Revised Professional Administrative Standards*.
3. Develop a structure to ensure that all Chief Technology Officers be required to demonstrate proficiency of the *Consortium for School Networking's (CoSN) CTO Skills Framework.*

### Infrastructure

1. Charge the State Department of Education with the development of a set of *Recommended Standards of Technology-Based Resources* for districts to set a baseline level of developmentally appropriate technology that supports standards for instructional systems (hardware, software, and infrastructure).
2. Charge the State Department of Education with the development of an ***Arizona Technology and Readiness Chart***, similar to that developed by the *CEO Forum Starchart* to establish benchmarks for the use of developmentally appropriate technology to promote student learning.

## Appendix C: Summary of Recommendations for the Arizona State Department of Education

### Student Learning

1. Ensure that the elements of the *Arizona Educational Technology Standard* are embedded or cross-referenced in all other standards during the content standard's normal revision cycle.
2. Continue and expand assessment of student mastery of the *Arizona Educational Technology Standard* to include all eighth grade students.
3. Continue with a position within the Department to coordinate the activities of the various systems of education (classroom, school, district, legislature/governor/governance boards, Department of Education, and colleges/universities) to lead an innovative transformation based on educational technology.

4. Continue the statewide development of resources to provide students with equitable access to digital content, courses, instruction, assessments, and other self-learning resources in an online learning environment with access to hybrid and online courses.
5. Encourage and support the development of innovative programs that promote parental involvement, increase communication with parents, and increase community access to learning resources.
6. Partner with other entities, including higher education and the private sector, to identify model sites of new and emerging technologies in major metropolitan areas and in rural areas.

## Leadership

1. Develop and support initial preparation and professional development of school leaders from the principal to the superintendent, including Chief Technology Officers and district technology staff, to help them become fluent with the use of technology for instruction and administration to support the core educational values of a school system.
2. Provide leadership and vision in planning for the effective integration of technology into teaching, learning, school, and district operations and support local leadership including the development and implementation of an online *Technology Strategic Planning Tool* that assists districts in conducting technology audits and strategic planning tailored to the needs of large and small urban districts and large and small rural districts.
3. Expand services to provide school leaders with resources and technical assistance on technology planning; facilitate and assess the use of technology in teaching, learning, and administration; and use technology tools to facilitate research-based data-driven decision-making for the collection and management of data to meet local, state and federal reporting requirements
4. Continue to support the Intel®Teach Partnership and promoting the *Intel Leadership Forum*.
5. Continue to utilize the *Educational Technology Advisory Committee* to conduct external reviews of state education technology initiatives and to make recommendations to the legislature and Department of Education.
6. Partner with other organizations to provide district leaders with opportunities to increase their skills and to meet and share best practices about the use of technology in education.

## Preparation and Development of Educators

1. Embed the ISTE National Educational Technology Standards for Teachers into the *Arizona Professional Teacher Standards*, Components 1-5, 8, and 9.
2. Embed the ISTE National Educational Technology Standards for Administrators into the *Arizona Professional Administrative Standards.*
3. Support LEAs with the implementation of the *Consortium for School Networking's (CoSN) CTO Skills Framework.*
4. Develop model assessments for the *Revised Professional Teaching Standards, Revised Professional Administrative Standards,* and *Consortium for School Networking's (CoSN) CTO Skills Framework* that include performance-based, on-line assessments, and/or electronic portfolios.
5. Develop and support high-quality professional development that is easily accessible and as free or nearly free as possible to the professional. These development opportunities

should be based on the National Staff Development Council's Standards for Staff Development, which supports the *Revised Professional Teaching Standards* and the *Revised Professional Administrative Standards.*

6. Provide information, models, training, and technical assistance on the identification and effective use of developmentally appropriate technologies.
7. Expand *IDEAL's* services as a clearinghouse of development and innovation resources that provides anytime/anywhere access to information such as model instruction and assessment strategies, online and face-to-face training, and technical assistance on the identification and effective use of developmentally appropriate new and emerging technologies that facilitate student learning.
8. Partner with professional development providers (Arizona Technology in Education Alliance (AzTEA), ISTE, K-12 Center, Association for Supervision and Curriculum Development (ASCD), National Staff Development Council (NSDC), Intel, Public Broadcasting Stations and/or other professional development providers) to develop programs that maximize the use of technology to enhance teaching and learning.
9. Create and support an Educational Technology Endorsement that certifies professionals who have demonstrated exemplary use of technology to facilitate student learning.

## Infrastructure

1. Work with agencies and organizations to create and disseminate a *Recommended Standard of Technology-Based Resources* to set a baseline level of developmentally appropriate technology that supports anytime/anywhere access to an environmentally safe digital learning environment (hardware, software, and infrastructure) for all students.
2. Work with agencies and organizations to create and disseminate an *Arizona Technology and Readiness Chart*, similar to that developed by the *CEO Forum Starchart* to establish benchmarks for the use of developmentally appropriate technology that promotes student learning.
3. Develop and disseminate models of long-range educational technology planning that are consistent with federal regulations such as the NCLB Title IID and E-Rate programs.
4. Develop and maintain a common standard for the storage of student data that is safe, secure, and recoverable.
5. Participate in the collaboration between public and private entities to provide anytime/anywhere equitable access to robust broadband network resources for all students, educators and parents.
6. Collaborate with private entities (including non-profits such as AzTEA) to develop face-to-face and online opportunities for support staff from districts with common size, interests, and technologies to meet and share best practices in infrastructure support.
7. Work with LEAs, higher education, the private sector, and organizations such as the *State Educational Technology Directors Association* and the *Consortium for School Networking* to develop a methodology to determine Value on Investment (VOI) for technology expenditures.

# Appendix D: Summary of Recommendations for the Local Education Agencies

## Student Learning

1. Provide district policies, curriculum, and resources to ensure that every student has the tools for an individualized, collaborative, and authentic learning experience.
2. Select and deploy a variety of technology-based tools to provide differentiated instruction for every child by monitoring student assessment and suggesting developmentally appropriate content.
3. Embed the *Arizona Educational Technology Standard* within the curriculum at each grade level.
4. Select and utilize local, commercial, and open source digital content, aligned to state standards, to provide online access to specialized, rigorous, dual enrollment, credit recovery, and remedial courses.
5. Provide curriculum and resources that ensure personal safety for students in a digital world and policies that specify expectations of appropriate behavior and rules for students, parents, staff, and teachers.

## Leadership

1. Develop assessments of district leadership in meeting the *Revised Professional Administrative Standards*.
2. Develop and implement a comprehensive Strategic Technology Plan, tied to the district's strategic plan and school improvement plans, that ensures the instructional and administrative use of technology at the classroom, library, campus, and district level.
3. Adopt the *Consortium for School Networking's (CoSN) CTO Skills Framework* for the hiring and evaluation of Chief Technology Officers.
4. Develop incentives for new and veteran educators to become technologically literate.
5. Include community input into the planning and support for the integration of technology into teaching and learning.
6. Coordinate the use of electronic data in district planning to support research-based decision-making focused on student success.
7. Participate in collaboration with representatives from PreK-12, Higher Education, parents, businesses and community to share planning resources and services.
8. Support and encourage leaders to attend and present at local/state/national educational technology conferences.

## Preparation and Development of Educators

1. Provide access to professional development opportunities to meet the *Revised Professional Teaching Standards, Revised Professional Administrative Standards,* and *Consortium for School Networking's (CoSN) CTO Skills Framework.*
2. Prepare administrators and district professional development personnel to conduct consistent observations of classroom use of technology using a technology integration observation form to determine levels of technology integration and effective use of technology that incorporates this observation into all formal professional evaluation.

3. Develop and maintain funding models and budgets that support participation in statewide, technology professional development opportunities for all teachers and administrators.
4. Develop and maintain professional learning communities that use appropriate technology to support learning and reflection by instructional personnel.
5. Develop and maintain partnerships with Higher Education to pilot new instructional strategies for integrating technology.
6. Encourage and support teacher participation in the Educational Technology Endorsement program.
7. Utilize innovative strategies for anytime/anywhere delivery of ongoing professional development, including online and other distance learning models and digital content delivery services to meet the diverse and personal learning needs of all educators.
8. Provide instructional coaches and mentors to support technology integration efforts to improve learning in core curriculum areas.
9. Provide professional development on the impact of non-compliance with district policies regarding the use of technology and include compliance with these policies as a component of teacher evaluation and observation instruments.
10. Use grants and, where possible, district funds to host and cosponsor regional and statewide technology symposia and training that promote the sharing of instructional strategies and techniques.
11. Work with parents and higher education to develop opportunities for parents to learn how technology can enhance their child's learning.

## Infrastructure

1. Annually review the *Recommended Standards of Technology-Based Resources* provided by the Arizona Department of Education for district alignment with these standards and work to bring district technology to <u>at least</u> these recommended levels by retrofitting existing facilities *Resources* and, where possible, build the capacity to adapt to new technologies.
2. When constructing new school facilities, insure that these facilities meet <u>at least</u> the *Recommended Standards of Technology-Based Resources* and, where possible, build the capacity to adapt to new technologies.
3. Review, develop, and implement strategies to move all educators within the LEA to <u>at least</u> the *Target* level of technology use on the *Arizona Technology and Readiness Chart*.
4. Develop and implement new strategies and practices for the funding, purchase and support of technology infrastructure and services.
5. Provide a 1:1 learning environment for $6^{th}$-$12^{th}$ grade students and at least a 3:1 ratio for students below $6^{th}$ grade. (ETAC has avoided using "computer to student ratios" because other digital learning devices, i.e. net books or smart phones, might describe these ratios)
6. Maintain a connection to the statewide broadband network to connect the LEA to the Internet. (Adapted from *High-Speed Broadband Access for All Kids*)
13. Maintain an internal wide area network that provides connections from the district to each school and between schools of at least 100 Mbps per 1,000 students/staff within the next one to four years and at least 1 Gbps per 1,000 students/staff within the next five to seven years. (Adapted from *High-Speed Broadband Access for All Kids)*

7. Provide and maintain an infrastructure for communications with parents and community members, including year-round anytime/anywhere access to school news, educational resources, and data.
8. Utilize technologies that are environmentally safe and can be used to ensure the safety of students (i.e. surveillance and emergency warning systems).
9. Provide and maintain an infrastructure for online grading and assessment systems that are standards based and allow access to student performance data to students, parents, and appropriate district personnel.
10. Develop strategies, resources, and best practices that facilitate anytime/anywhere access to digital learning resources and activities by all students within the district. This includes secure access to network resources and ensuring that critical technology applications and data can be recovered in a timely manner.
11. Provide funding and release time for support staff from districts of common size, interests, and technologies to meet and share best practices in infrastructure support.

# Appendix E: Summary of Recommendations for Higher Education

## Student Learning

1. Expand collaboration between public schools and Higher Education to develop innovative course delivery and virtual credit acquisition including, but not limited to, dual enrollment courses.
2. Partner with private sector and public entities to develop and provide web-based instructional resources and services across PreK-12.
3. Partner with Local Education Agencies and schools to pursue grant opportunities that enhance and support technology integration.
4. Collaborate with school systems to develop strategies, methodologies, and tools for assessing the level of information literacy skills among students.
5. Cooperate with school systems to develop comprehensive educational technology integration programs.
6. Partner with the Department of Education and the private sector to identify model sites of new and emerging technologies in major metropolitan areas and in rural areas.

## Leadership

### Educational Leadership Programs

1. Require all candidates seeking a degree in educational leadership to be proficient in the *Revised Professional Administrative Standards.*
2. Develop programs that prepare future leaders with the skills and knowledge to lead educational transformation that is facilitated by technology.
3. Require that all faculty members in educational leadership programs are proficient in the *Revised Arizona Professional Teaching Standards* and the *Revised Professional Administrative Standards* and incorporate these standards into their instruction.
4. Develop and implement a program that meets the *Consortium for School Networking's (CoSN) CTO Skills Framework.*

### Higher Education in General

1. Share expertise and technology planning resources with the State Department of Education and Local Education Agencies.
2. Develop online courses housed in Management Information Systems programs that support the *Consortium for School Networking's (CoSN) CTO Skills Framework.*
3. Expand continuing education programs to include technology leadership training for leaders.

## Preparation and Development of Educators

### Initial Teacher Preparation and Educational Leadership Programs

1. Require that all teacher candidates be proficient in the *Revised Professional Teaching Standards,* including the knowledge and skills to utilize technology in face-to-face, hybrid, and online learning environments.
2. Require that all faculty members in Initial Teacher Preparation Programs be proficient in the *Revised Professional Teaching Standards* and incorporate these standards into their instruction.
3. Provide pedagogical support for transforming teaching and learning based on research and proven models for systemic change in the classroom.
4. Require that all candidates seeking a degree in educational leadership be proficient in the *Revised Professional Administrative Standards* including the knowledge, strategies, and skills to use and evaluate the effective use of technology in the classroom.
5. Require that all faculty members in educational leadership programs be proficient in the *Revised Professional Teaching Standards* and the *Revised Professional Administrative Standards* and incorporate these standards into their instruction.
6. Develop and implement a program that meets the *Consortium for School Networking's (CoSN) CTO Skills Framework.*
7. Collaborate with PreK-12 and other institutions, organizations and states to eliminate barriers professional development delivered via online and other distance learning technologies.
8. Support field-based educator preparation and development on the integration of technology into teaching and learning.

### Higher Education in General

1. Model administrative leadership of the use of technology throughout Higher Education institutions.
2. Encourage the utilization of online and other distance learning as an institution for delivery of professional development and degree programs by Higher Education institutions.
3. Work with local LEAs to develop opportunities for parents to learn how technology can enhance their child's learning.

## Infrastructure

### Initial Teacher Preparation and Educational Leadership Programs

1. Acquire and maintain current technology for educator preparation facilities.
2. Establish infrastructure partnerships with Local Education Agencies for anytime/anywhere content delivery and professional development.

### Higher Education in General

1. Partner with the Department of Education, the private sector, and Local Education Agencies to design and implement an accessible high-speed internet with access to national and international resources.
2. Partner with the research community to develop technologies that are 1) environmentally safe and 2) can be utilized to ensure the safety of students (i.e. surveillance and emergency warning systems).

# Appendix F: Summary of Recommendations to the Community

## Recommendations for School Boards

### Student Learning

1. Develop policies to ensure that the *Arizona Educational Technology Standard* is embedded in all district curriculum and that all students meet this standard.
2. Develop policies that ensure personal safety and ethical behavior in a digital world that specifies expectations and rules for everyone that comes in contact with district resources. This includes, but is not limited to, the development of Acceptable Use or Discipline Policies that takes into account the unique nature of emerging technologies in an educational environment.
3. Provide a sustained funding stream to support the deployment of digital content and resources within the district.

### Leadership

1. Hire or develop a Superintendent who understands the role of technology in teaching, learning, and administration.
2. Direct the Superintendent to recruit, promote, or develop school leadership who understand the role of technology in teaching, learning, and administration.
3. Require district personnel to develop and maintain a *District Technology Plan* that is in compliance with the *Technology Strategic Planning Tool.*

### Preparation and Development of Educators

1. Annually review district professional development activities to ensure alignment with the *Revised Professional Teaching Standards* and *Revised Professional Administrative Standards.*
2. Review, develop, and implement strategies to provide professional development that moves professionals in the district to at least the *Target* level of technology use on the *Revised Professional Teaching Standards*.

3. Review all board policies, regulations, procedures and practices across the district to create consistent goals and process to improve student learning facilitated by technology.

### Infrastructure

1. When constructing new school facilities, insure that these facilities meet at least the *Recommended Standards of Technology-Based Resources* and, where possible, build the capacity to adapt to new technologies.
2. Review, develop, and implement strategies to move all educators within the LEA to at least the *Target* level of technology use on the *Arizona Technology and Readiness Chart*.
3. Develop and implement new business strategies and practices for the purchase and support of the technology infrastructure and services.
4. Review, develop, and implement strategies to move to at least the *Target* level of technology use on the ***Arizona Technology and Readiness Chart***.

## Recommendations for Parents

### Student Learning

1. Monitor online usage to ensure that students are using web-based resources safely and securely.
2. Assist students in using anytime/anywhere digital resources such as the *IDEAL: Home Edition,* the Public Library system, and other online resources.
3. Volunteer to tutor or assist students at your local school on using technology resources.

### Leadership

1. Request participation in the technology planning process and development of appropriate policies to promote student learning through the use of developmentally appropriate technology.
2. Provide financial as well as volunteer support for Local Education Agencies.

### Preparation and Development of Educators

1. Work with local school districts to support professional development activities by providing funding or volunteering to help coordinate an activity.
2. Seek out and participate in learning opportunities to develop knowledge of how technology can be used to enhance children's learning.

### Infrastructure

1. Provide students with access to high-speed Internet connectivity either at home or through a community resource.
2. Provide students with access to a computing device capable of supporting access to the Internet and district software either at home or through a community resource.
3. Support anytime/anywhere access to personal computing devices and to existing and emerging networks for communication with schools and community learning facilities.
4. Advocate to the State Legislature to provide funding to support high-speed Internet connectivity to all schools in Arizona.

5. Advocate to the State Legislature to provide funding to support the technology infrastructure necessary to support student learning in all schools in Arizona.

## Recommendations for Professional Organizations

### Student Learning

1. Promote the use of technology to enhance student learning within the organization's aims and goals.

### Leadership

1. Provide resources, professional development, and support in developing technology plans and appropriate district policies.
2. Provide resources, professional development and support to school leaders on how to create, implement, and assess the developmentally appropriate use of technology to promote student learning.

### Preparation and Development of Educators

1. Identify grants that support professional development.
2. Provide sustained professional development aligned with the *National Staff Development Council: Staff Development Standards* to promote the effective use of technology.
3. Create opportunities to encourage social/professional networking among educators related to the integration of technology to improve student learning.

### Infrastructure

1. Develop face-to-face and online opportunities for support staff from districts with common size, interests, and technologies to meet and share best practices in infrastructure support.
2. Share best practices from education, business, and industry to support school infrastructures and develop ways for schools to utilize statewide infrastructures currently being developed by cities, state agencies, health institutions, private enterprise, and Higher Education.

## Recommendations for the Private Sector

### Student Learning

1. Participate in collaboration with representatives from PreK-12, Higher Education, parents, businesses, and the community to share resources and services.
2. Provide students opportunities to experience technology's role in the workplace by providing technology-based work experiences through internships and other means.
3. Provide incentives to students to master the *Arizona Educational Technology Standard*.
4. Provide flextime for community volunteers to tutor or assist students in using technology resources.
5. Participate in partnerships to develop and provide low-cost, web-enabled products, services, curriculum, and content to support technology-rich learning environments.

6. Develop Open Source content, curriculum, and products that are compliant with standards such as the Sharable Content Object Reference Model (SCORM) and School Interoperability Framework (SIF).
7. Partner with the Department of Education and Higher education to identify model sites of new and emerging technologies in major metropolitan areas and in rural areas.

## Leadership

1. Participate in the technology planning process and development of appropriate policies to promote student learning.
2. Provide access to industry-based standards for the development and support of technology systems.
3. Create a *Loan a Professional* program to assist schools and districts with technology planning.
4. Technology vendors provide technology leadership training.
5. Sponsor grants that focus on technology leadership training.

## Preparation and Development of Educators

1. Participate in collaboration with representatives from PreK-12, Higher Education, parents, businesses and community to share professional development resources and services.
2. Collaborate with classroom teachers to extend learning opportunities outside of the traditional Higher Education model.
3. Provide a pedagogical training program as part of software purchases.
4. Provide educators opportunities to experience technology's role in the workplace by providing technology-based work experiences through internships and other means.
5. Provide internships and other opportunities for educators to remain current in their discipline related skills.

## Infrastructure

1. Advocate to the State Legislature to provide funding to support high-speed Internet connectivity to all schools in Arizona.
2. Advocate to the State Legislature to provide funding to support the technology infrastructure necessary to support student learning in all schools in Arizona.
3. Develop strategic partnerships with communities to provide anytime/anywhere accessible wireless networks and computing devices available for all citizens.
4. Participate in partnerships with public and private entities to aggregate demand and lower cost for broadband access for schools, businesses, government, and consumers.
5. Share strategies and best practices for security audits and business continuity planning that can be conducted at the district and local school level.
6. Develop strategic partnerships with local education agencies to foster infrastructure support, including promotion of interoperability and accessibility, the use of commercial software, and the use of open-source software and web-based services.
7. Develop software applications that meet interoperability, accessibility, and usability standards, assist schools in data-driven decision-making, and enable anytime/anywhere parental access.

8. Develop low-cost, standardized, accessible, scalable, personal computing devices and services for PreK-12 students to support educational objectives and enable anytime/anywhere 1:1 computing.
9. Establish grant programs in support of local technology use in schools.
10. Vendors participate in consortiums to allow group purchases of high-ticket hardware, software, and networking resources.

# Appendix G: Technology Success Stories

**Holbrook Tech Academy and Technology Literacy**

The Holbrook Tech Academy project focuses on using interactive white boards as one of the main technology integration tools (SMART Boards). In the spring 2008 technology survey, 49.2 of the teachers responded that they Strongly Agree that the SMART Board had changed their teaching in their classrooms with 38.1 teachers Agreeing. That is 87% of teachers in the district feel that they have changed their teaching practice within one school year.

Principals began insisting that every classroom have a Smart Board as they were seeing the impact on student achievement. Walkthrough data survey from the 2008 school year directly aligned student engagement with SMART Board use. The district created a special SMART Board server to house the Smart Board lessons that teachers created because teachers were running out of space in their file storage.

The district focused on improving the technology skills of students of students within one of its rural schools. The majority of students in this school do not have access to electricity and thus no access to technology. The growth of the 5th graders in the rural school versus a school within the city limits showed a larger increase for those students in the rural school on the Technology Literacy Assessment.

**Project Horizon-Increasing Student Technology Literacy**

Using academic assessment data to make decisions was not new to the two districts involved in this project. However, using data regarding technology integration was new. One of the two districts in this consortium was a one-to-one school for many years prior to being a part of the partnership. When the district became involved in the grant and began to look at the low scores for the technology literacy for $5^{th}$ and $8^{th}$ grade, they decided that they needed to change the way that their students were using technology. The students used technology every day in their integrated learning system but did not use it in ways that helped them learn technology skills.

This revelation led the district to adopt a technology curriculum and opportunities to provide professional development to their teachers on ways to integrate technology with their classroom curriculum. The district anticipates that their student's technology literacy scores will increase with the increased focus for technology integration.

**Peer Coaching + Professional Development = Capacity Building**

In 2007, the Educational Technology section of the Arizona Department of Education required a Peer Coaching element in all of the competitive Title II-D Enhancing Education through Technology grants. Requiring this element has led to greater sustainability and capacity building within the currently funded grants. When the Peer Coaching model is used with fidelity, we have found that the support network within a school and district grows exponentially beyond the capacity building of former competitive grants.

Peer Coaching supports the "vision of professional learning, ensuring that teachers have time to work and learn with colleagues every day, that their learning is aligned with standards, and that their learning revolves around a continuous cycle of improvement" (NSDC, Advocacy Toolkit, 2008). When the coaches are on the local school campus, the teacher has someone they can turn to for support in implementing the strategies they learned in the professional development sessions. Peer coaching provides the support and follow-up for teachers to expand their abilities to create technology enhanced lessons and meet the needs of the students in their classrooms.

**Writing in the 21st Century Academy**

One district created a two-year Writing Academy that is co-taught with the district writing curriculum specialist and the educational technology coordinator. This academy systematically provides professional development for teachers on incorporating Web 2.0 tools with their students in the area of writing.

One teacher shared that last school year during her second year of the Writing in the 21st Century Academy she had really low functioning students (their pre-assessment and beginning writing scores indicated minimal (low functioning) writing skills based on the Six Traits rubric) and 80% of the students met or exceeded the AIMS test in writing. Even though this was a low functioning class in writing, it was the highest class average her students have ever scored. In addition, this year, she had another low functioning group of students in the area of writing, yet they embraced the test full of confidence and they were motivated to take the test and worked hard the entire time and didn't waste a moment. She doesn't know what they wrote or how they will score, but the attitude of the students going in to the test was very positive and she believes it was because of her participation in the Writing in the 21st Century Academy.

# Appendix H: Planning Process

The development of this plan has been a collaborative process guided by the Arizona Department of Education. In January of 2008 the Department advertised to educators and business leaders across the state and recruited the committee members detailed in the Educational Technology Advisory Committee Members section. The committee had representation from all geographic areas across the state and included teachers, librarians, Career and Technology Specialists, Educational Technology Specialists, district leadership, and faculty from Higher Education

In February, the committee met and established the Guiding Principals for the plan. The committee also identified a number of resources to study. These included, but were not limited to the International Technology Education Association, International Society for Technology in Education, the Partnership for 21st Century Skills, and the American Association of School Librarians.

The committee members developed recommendations in four essential components that are interdependent to each other, have less of a focus on how to use technology-based tools and focus on the development of problem-solving, communication, collaborative, and critical thinking skills. The recommendations are directly aligned with the National Educational Technology Standards (NETS-S) developed by the International Society for Technology in Education and the Partnership for 21st Century skills. The recommendations also correlate with the work of the International Technology Education Association (ITEA) and the American Association of School Libraries (AASL)

Once a set of draft recommendations was developed, the committee asked educators and business leaders from throughout the state to review the plan and make recommendations. The Statewide Instructional Technology Project and the Department of Education then held meetings to gather input, an online survey was conducted, and a presentation was held at the Teaching and Technology Conference to gather input These suggestions were considered and, where possible, included in the plan.

# Appendix I: Title II-D Addendum

**Title II-D Addendum**
The Arizona Educational Technology Plan includes strategies and goals that meet the following requirements from the Title II-D program:

- Strategies for improving academic achievement – an outline of the State Education Agency's [SEA's] long-term strategies for improving student academic achievement, including technology literacy, through the effective use of technology in classrooms throughout the State, including through improving the capacity of teachers to integrate technology effectively into curricula and instruction.
- 
- *Please see the Goals and Recommendations section for each of the four plan component areas.*Goals – a description of the SEA's goals for using advanced technology to improve student academic achievement, aligned with challenging State academic content and student academic achievement standards.
- 

*Please see the Goals and Recommendations section in Component 1: Student Learning.*

- Steps to increase accessibility – a description of the steps the SEA will take to ensure increased access to technology for all students and teachers, particularly those in high-need LEAs (see F-5).
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*Please see the Goals and Recommendations section in Component 1: Student Learning and Component 4: Infrastructure.*

- Accountability measures – a description of the process and accountability measures that the SEA will use to evaluate the extent to which activities funded under the program are effective in integrating technology into curricula and instruction.

*Please see the Evaluation of the Plan section for details on some of the accountability and reporting actions that will be conducted as a part of an annual technology plan progress report. In addition to these actions, ADE annually conducts monitoring of both formula and competitive grant recipients. Formula grant fund recipients are monitored on a six cycle schedule that includes on site visits, verification of professional development activities, review of fiscal and inventory processes, ensuring private schools are provided appropriate services as required by law, and that proper time and effort procedures are being followed. Additional evidence of effectiveness is collected from competitive grants, including an annual report prepared by an external evaluator. Additional data is collected in an annual technology survey that LEAs submit which includes items such as status of existing technology resources (including bandwidth) and technology skill levels for staff and students.*

- Innovative delivery strategies – a description of how the SEA will encourage the development and use of innovative strategies for the delivery of specialized or rigorous courses and curricula through the use of technology, including distance-learning technologies, particularly in locations that would not otherwise have access to such courses or curricula due to geographical distances or insufficient resources.

*Please see the Goals and Recommendations section in Component 1: Student Learning. In addition to items in this area, ADE is also developing a pilot program to offer Advanced Placement (AP) courses through IDEAL to student populations where resources to offer such courses do not currently exist.*

- Non-supplant assurance – an assurance that financial resources provided under the Ed Tech program will supplement, and not supplant, State and local funds.

*The Title II-D program staff at ADE review all grant budgets in detail and work with LEAs to ensure grant funds are supplementing, not supplanting State and local funding sources.*

- Professional and curricular development – a description of how the plan incorporates teacher education, professional development, and curriculum development, and how the SEA will work to ensure that teachers and principals are technologically literate.

*Please see the Goals and Recommendations section in Component 1: Student Learning. Component 2: Leadership and Component 3:* Preparation and Development of Educators. In addition the items outlined in those sections, ADE utilizes the Statewide Instructional Technology Project and programs like the Intel Teach to the Future program and Intel Leadership Forum to help, as well as professional development courses offered through IDEAL, to help teachers and principals become technologically literate.

- Technical assistance – a description of how the SEA will provide technical assistance to applicants seeking Ed Tech funds, especially to those applicants serving the highest

numbers or percentages of children in poverty or with the greatest need for technical assistance; and a description of the SEA's capacity to provide technical assistance.

*The Title II-D program area works with LEAs, particularly those with the greatest need for technical assistance, to help provide resources and assistance in the development of an LEA technology plan, application for funds (including types of activities or resources that can be purchases with grants funds), and in revising and improving LEA Title II-D programs through yearly monitoring efforts. ADE's Title II-D program consists of 3 staff members and 2 administrative assistants. Together this staff reviews all Title II-D grant (formula and competitive) applications and provides annual training to LEAs. Due to the large number of LEAs in Arizona and the significant travel that would be required, ADE utilizes webinar training tools to train, monitor, and assist LEAs with their Title II-D grants.*

- Technology resources and systems – a description of technology resources and systems that the State will provide for the purpose of establishing best practices that can be widely implemented by SEAs and LEAs.

*Please see the Goals and Recommendations section for each of the four plan component areas.*

- Strategies for financing technology – a description of the State's long-term strategies for financing technology to ensure that all students, teachers, and classrooms will have access to technology.

*Please see the Goals and Recommendations section for Component 1: Student Learning and Component 4: Infrastructure.*

- Strategies for parental involvement – a description of the State's strategies for using technology to increase parental involvement.

*Please see the Goals and Recommendations section for each of the four plan component areas.*

- Competitive grant description – a description of how the SEA will ensure that Ed Tech competitive grants are of sufficient size and duration, and that the projects funded by the grants are of sufficient scope and quality, to carry out the purposes of the program effectively.

*Competitive grants awarded prior to 2009 are being extended for an additional year and new competitive grants will build upon previous efforts to ensure grants are of sufficient size, duration, scope and quality to achieve program purposes. Specifically, grants are generally awarded conditionally for a 2 (or more) year period. This measure recognizes the challenge of starting up a new grant and the need for continuity over a multi-year period of time in order to create sustained change. Research on effective professional development efforts has also found that intensive professional development programs of over 30 hours are significantly more likely to cause increases in student achievement than programs that are 14 hours or less in duration. Ongoing support and learning communities have also been identified as having a positive impact on sustaining change in teaching and learning practices. New competitive grants will continue to emphasize the use of rigorous, long-term professional development programs.*

- Integration of technology with curricula and instruction – a description of how the SEA will ensure ongoing integration of technology into school curricula and instructional strategies in all schools, so that technology will be fully integrated into curricula and instruction by December 31, 2006.

*Please see the Goals and Recommendations section for Component 1: Student Learning, Component 2: Leadership, and Component 3: Preparation and Development of Educators.*

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- Incentives – a description of how LEAs in the State will provide incentives to teachers who are technologically literate and teaching in rural or urban areas to remain in those areas.

As an SEA, ADE provides statewide professional development online at little or no cost as a means for educators to continue their professional growth, regardless of the rural or urban nature of the LEA. Additionally, the state funding structure allows for funding equalization to ensure equity across urban areas and rural areas. Additionally rural funding is available for school districts who qualify. Consideration of these elements is also given in the development of competitive grant projects as a means to ensure that rural and urban grant applications are evaluated equally.

- Support – a description of how public and private entities will participate in the implementation and support of the plan

*Please see the Goals and Recommendations section for each of the four plan component areas.*

# Appendix J: History of Technology Planning in Arizona

The original technology plan was developed by the State Department of Education, in conjunction with the Arizona Technology in Education Alliance in 2002 to meet the requirements for federal funding and guide technology initiatives at the state level. The plan was also designed as a possible template to districts for local Tech Plans.

The plan built on the work of Center for Research in Science, Math, Engineering, and Technology (CRESMET), the Southeast Initiatives Regional Technology in Education Consortium, and the Standards of the International Society for Technology in Education. The plan articulated the following seven goals:

1. Improve student academic achievement through the use of technology in elementary and secondary schools with a target of fully integrating technology into the academic curriculum by December, 2006.
2. Ensure that quality teachers, staff and administrators are involved in Arizona educational institutions and that they are proficient in the use and integration of technology through Professional Development**.**

3. Ensure that all PreK-12 educational institutions have the capacity, infrastructure, staffing, and equipment to meet academic and business needs for effective and efficient operations.
4. Ensure that all PreK-12 institutions will be positively involved in collaborations and partnerships which are supportive of technology use and integration
5. Ensure that all PreK-12 resources are available for all students (regardless of race, ethnicity, income, geographical location, or disability) to become technologically literate by the end of eighth grade and achieve their academic potential.
6. Develop a continuous process of evaluation and accountability for the use of Educational Technology as a teaching/learning tool, measurement and analysis tool for student achievement and fiscal management tool.
7. Develop a schema of current and future funding requirements to support the Arizona State Technology Plan.

With the expiration of the technology plan in 2005, the State Department undertook a revision of the plan. Participation in the plan development was expanded and the goals were modified to include the development of leadership at a variety of levels. The plan updated progress and added several new initiatives.

The revision of the 2005 plan expired in 2008. At that time, the Department approached the Board of Education to explain why the previous plan had expired and described a process for revising the plan with much expanded stakeholder input.

# Appendix K: Historical Context for the Educational Use of Technology in Arizona

The following section provides a brief historical context of the development of technology. Thank you is given to Dr. Ruth Catalano and Mr. Hank Stabler for compiling the research for this section.

1971 The first e-mail is sent.
The first *Mesa Technology Conference* in the Mesa School district is held. This conference later becomes the *Arizona Technology Conference*.
1973 Ethernet is developed as a method of network communication.
1974 First computer uses mouse for input.
1975 Intel releases the 8080 microprocessor, Bill Gates and Paul Allen license BASIC, and the term "personal computer" is first used.
1976 The Apple I, and the 5 1/4" flexible disk drive are released.
1977 The Commodore PET and Apple II are released. TRS-80 is also released.
1978 Texas Instrument’s Speak & Spell marks the first electronic duplication of the human vocal tract on a single chip of silicon.
1979 The first *National Educational Computing Conference (NECC)* held in Iowa City, Iowa.
The first computer "worm" is discovered.
The first Multi-User Domain (or Dungeon), MUD1, goes on-line.
VisiCalc automates the recalculation of spreadsheets.

1980 The first hard disk drive for microcomputers is released.

1981 IBM introduces its first PC.

The Osborne I is released as the first “portable” computer.

IBM and Microsoft release the MS-DOS.

The first *Microcomputer in Education Conference (MEC)* is held at Arizona State University. The conference starts with a simple mission: To provide a forum for teachers to learn about, discuss and exchange ideas about applications for new technologies in the classroom. The conference is still being held.

1982 Commodore introduces the Commodore 64.

1983 Lotus 1-2-3 is released as an alternative to Viscalc.

The ARPANET splits into the ARPANET and MILNET providing civilian access to the network that, in 1995, would become the Internet.

Beginning in 1983, ASSET, the *Arizona School Services through Educational Technology*, begins as the educational outreach department for Channel Eight of Arizona Public Television. Since that time, ASSET has helped Arizona PreK-12 teachers integrate technology into their classrooms. Initially, ASSET distributed instructional video and supported face-to-face professional development statewide. ASSET services for teachers have evolved through the years to meet the changing needs of Arizona’s classrooms.

1984 IBM releases its PC Jr. and PC-AT.

Apple Computer launches the Macintosh

The term "cyberspace" is first used in William Gibson’s book “Neuromancer.”

1985 NSFNET is formed.

1986 Compaq’s Deskpro 386 is the first to use Intel´s new 80386 chip.

1987 Apple engineer William Atkinson designs HyperCard.

The *Arizona State Public Information Network (ASPIN) Coalition* establishes Arizona's first connections to what has become the Internet, extending the connectivity from Higher Education to the rural community colleges and K-12 schools.

1988 The first worm floods the ARPANET.

1989 Virtual reality becomes the hot topic at Siggraph´s 1989 convention in Boston.

The first version of SimCity is launched.

1990 The World Wide Web is born with the development of the HyperText Markup Language.

Microsoft ships Windows 3.0.

Arizona State department of Education (ADE) releases the *Technology Integrated Educational Delivery System (TIEDS)* report. This report presents a plan for TIEDS, developed for the ADE in response to the *State Board Policy on the Development of a Plan for Technology* and the *GAITS Report*. TIEDS establishes the conceptual framework for educational change and technological advancement in Arizona's elementary and secondary schools. Divided into four sections, the plan discusses: (1) a rationale for TIEDS, including changing demographics, globalization, and costs; (2) issues and concerns, i.e., quality, equity, accountability, and productivity; (3) the ability of technology to meet educational needs; and (4) TIEDS educational environments, the use of workstations, and telecommunications networks.

1991 Linux is introduced.

The *National Educational Computing Conference (NECC)* is held at Arizona State University. This conference of the International Society for Technology in Education (ISTE) focuses on topics such as: telecommunications, distance education, management of change, school restructuring, hypermedia, computer literacy, equity and gender issues and emerging technologies such as virtual reality.

1992 The *Arizona Strategic Partnership for Economic Development (ASPED),* which evolves into the *Governor's Strategic Partnership for Economic Development (GSPED),* publishes *Creating a 21st Century Economy: Arizona's Strategic Plan for Economic Development*.

1993 The Mosaic web browser is released.

The Pentium microprocessor is released.

Yahoo is founded.

Netscape Communications Corporation is founded.

The *Arizona Educational and Informational Telecommunications Cooperative (AEITC)* holds *The Arizona Telecommunications Issues and Policy Symposium* and publishes *Arizona: The State of Telecommunications for the 21st Century Proceedings and Findings*.

AEITC also publishes their *Last Mile Standards: Communications Review for Public Education* report.

1994 The *Schools Facility Board* is created when Arizona's system of school capital finance was declared unconstitutional. The School Facilities Board is charged with developing Building Guidelines to serve as minimum standards for existing and new school facilities.

1995 The *Arizona Governor's Commission for the Study of the Telecommunications and Information Industry in Arizona* publishes the *Arizona Telecommunications Leadership Through Partnership for Competitive and Innovative Information Industry* study providing actionable recommendations to Arizona, its businesses, and its citizens to exploit the economic development benefits of telecommunications.

*Arizona Telecommunications & Information Council (ATIC)* evolves from the *Advanced Information Communications Infrastructure (AICI) Foundation* under the *Governor's Strategic Partnership for Economic Development (GSPED).* ATIC's goal is to help Arizona's citizens, businesses and government prepare for the global transformation of telecommunications and information technology

1996 The *Snowe-Rockefeller-Exon-Kerrey Amendment* implements the *Telecom Universal Service Provisions Act* that requires individual telecommunications carriers must provide service to schools and libraries at "affordable" rates.

*E-Rate - the Telecommunications Act of 1996* revises the universal service system. The new law requires that the FCC and the states base the revision of the universal service system on seven principles, including the principle that elementary and secondary schools, libraries, and health care providers should have access to advanced telecommunications services.

The Arizona Superior Court imposes on the state a deadline of June 30, 1998 to develop a constitutional system of school capital finance.

The *Arizona eLearning Centered School System Bill* becomes law establishing an *E-Learning Task Force* under the Arizona Department of Education (ADE) to examine

other e-learning programs, analyze methods for implementation and develop e-learning solutions as well as establishing an *E-Learning Pilot Program*.

1998 *The Arizona Technology in Education Alliance* is founded. AzTEA, an International Society for Technology in Education (ISTE) affiliate, is a professional non-profit organization devoted to increasing student achievement through technology in teaching and learning.

Governor Jane Dee Hull signed legislation that dramatically reformed the way K-12 schools are constructed in Arizona. The *School Facilities Board* adopts *Building Adequacy Guidelines* that now serve as the minimum standards for existing and new school facilities in Arizona. By law, existing deficiencies were to be completed by June 30, 2004.

*The Arizona Project EAGLE (Education and Government Linking Electronically)* publishes their *White Paper Draft*. (www.arizonatele.com/atic/docs/AZ Project EAGLE White Paper Draft 01_15_98.pdf)

2000 The *Arizona Schools Facility Board* provides 30,000+ computers to Arizona Schools to meet the new school standards of 1 multi-media computer for every 8 Students.

Governor Jane Hull and the *Government Information Technology Council* announce the *Telecommunications Open Partnerships of AriZona (TOPAZ)* top coordinate "Public Sector Telecommunications Needs Throughout Arizona" to provide increased telecom bandwidth in rural Arizona. (www.arizonatele.com/atic/docs/TOPAZ Briefing Document 03_08_01.pdf)

The *Telecommunications Open Partnerships of AriZona (TOPAZ)* briefing document is released.

2001 The *Arizona School Facilities Board* awards the *LAN/WAN Project* to Qwest. This project will bring all Arizona Schools up to the new school standards

The *Cox Education Network* is formed to provide students and teachers access to instructional and professional development resources designed to help kindergarten through grade 12 students develop thinking and problem solving skills

Working with the Arizona Department of Education, the Arizona Technology in Education Alliance (AzTEA) revises the *Technology Standards* component of the *Educational Academic Standards for Arizona*. A large group of constituents from around the state revise the standards to align them with a set of nationally accepted standards developed by the International Society for Technology in Education

*ASU Morrison Institute* publishes *Arizona Policy Choices: Five Shoes Waiting to Drop on Arizona's Future*. [www.asu.edu/copp/morrison/apc2001.htm])

2002 *The Governor's Strategic Partnership for Economic Development (GSPED)* formally recognizes the State of Arizona's twelfth industry cluster, *E-Learning*. The *Greater Arizona eLearning Association (GAZEL)* becomes the implementing organization growing from earlier efforts by the *Arizona Telecommunications & Information Council*. [gazel.org] and [www.arizonatele.com/atic/)

*The Center for Research on Education in Science, Mathematics, Engineering and Technology (CRESMET)* proposes a strategic plan for infusing educational technology into K-12 curricula. This effort began with a review of the literature on educational technology and was followed with detailed analyses of the technology plans of over 30 states and some foreign countries. These analyses led to the

development of a set of best practices or benchmarks covering eight “issues” that are important in implementation of educational technology.

The *State Board of Education* approves the initial *Arizona Technology Plan* on June 24, 2002.

The *Flinn Foundation* publishes *Platform for Progress: Arizona's Bioscience Roadmap*. [www.flinn.org/docs/Arizona_Biosci_Roadmap_revised_540.pdf]

2003 *Arizona's Government Information Technology Agency (GITA)* publishes *Highlights of Selected State of Arizona Telecommunications Initiatives (1993 to Present).* [gita.state.az.us/councils_committees/tegc/Meetings/handout_june18.pdf]

The Arizona Legislature announces the *Public Online Wireless Electronic Resource (P.O.W.E.R.)* that provides free Wi-Fi wireless Internet access to the public at the Arizona State Capitol. [www.hotzona.com/coxpower.htm]

The *National Education Technology Plan* is officially released

2004 *The Governor's Council on Innovation and Technology (GCIT) Telecommunications Infrastructure Sub-Committee (TISC)* holds its inaugural meeting.

The *State Technology Strategic Plan* is revised to comply with federal mandates. The Arizona Board of Education approves the plan on January 24, 2005.

2005 The *eLearning System for Arizona's Teachers and Students (eSATS)* publishes *Statewide Design - eLearning System for Arizona Teachers and Students Version 3*. [azelearning.org/] and [azelearning.info/home/file.php/1/En50919eSATSDesignRev4.pdf]

2006 The University of Arizona Eller College of Management, Economic & Business Research publishes *Forecast for Arizona in 2036: A Top 5 State?* projecting that during the next 30 years Arizona will add another 8.5 million residents to the 6 million-plus who already live here becoming the fifth largest state. [ebr.eller.arizona.edu/azeconomy/azeconomy.aspx?issue=AZE06FAL]

*ASU Morrison Institute* publishes *Arizonans' Attitudes Toward Science, Technology, and Their Effects on the Economy*, the first-ever, in-depth survey of Arizonans’ attitudes toward science, technology, and the economy. [www.asu.edu/copp/morrison/SciSurFNL.pdf]

The *Arizona P-20 Council* publishes *From Education to Work: Is Arizona Prepared? The Alignment Project Report*. [www.azgovernor.gov/P20/documents/022106_AZAlignmentReportFINAL021406.pdf]

2007 The Schools Facility Board publishes the Building Arizona’s 21st Century Schools report.