

INFRASTRUCTURE FOR TECHNOLOGY

Texas has made tremendous strides in connecting schools to each other, to external resources, and to the Internet. Texas schools have been fortunate to have the support of the Texas legislature and the federal government in building the technology infrastructure for schools through direct funding, grants, and discounts. As a result of these resources, as well as local efforts, districts have begun to build the infrastructure that will allow students and teachers to make use of technology tools that are basic and necessary for educating students today and in the future.

According to *Technology Counts 2004* by Education Week, the student to computer ratio statewide is 3.5 to 1. Some schools have a laptop or desktop for every student while others are lucky to have one for every classroom. Many teachers have a laptop or desktop they call their own but others have to wait in line in the library or teachers' lounge to use a computer. Many schools are still using computers purchased in the 1990s. All districts and most all campuses have connectivity to the internet but not all have the bandwidth to take advantage of engaging content and other resources. Not all districts, campuses, and classrooms, have the connectivity and tools that they need to integrate technology into the teaching and learning process.

Work remains to ensure that connectivity is established and maintained to reach all instructional and professional work areas, and that infrastructure capacity supports promising practices in instruction, school leadership, and operations. Issues of support and maintenance for existing and evolving technologies will test our true commitment to connected schools. Maintaining appropriate funding levels, securing and retaining qualified staff, maintaining the infrastructure, and

providing upgrades and greater bandwidth, all provide significant challenges for schools. The infrastructure of a school is the critical element of support for teaching and learning, educator preparation and development, and administration. It is essential in providing the technology tools needed for educators to make decisions, to educate, to plan and to learn.

While school connectivity presents tremendous challenges, implementing that connectivity offers new and exciting opportunities for transforming the institution of schooling. Many districts are using wireless technology to provide anytime, anywhere access to learning resources. Web-based technologies have provided additional resources and opportunities for distance learning. School districts are sharing teachers, courses, and resources through online collaboration and virtual schools. Videoconferencing is also frequently used to provide courses for students and professional development opportunities for educators. The Texas Educational Telecommunications Network (TETN) provides ESCs and schools access to many of the nation's educational and cultural entities through an Internet2 connection. Investments in satellite technologies continue to provide cost-effective resources for Texas schools. Many take advantage of free professional development and electronic field trip opportunities through their T-STAR system.

The Texas STaR Chart is a planning tool that has been developed around the four areas of the *Long-Range Plan for Technology 1996-2010* and is designed to help campuses and districts determine their progress toward meeting the goals of that plan. The following chart shows results for the 2003-2004 school year in the area of Infrastructure.

**2003-2004 Texas Campus STaR Chart
Infrastructure for Technology**

Early Tech **238 campuses** **3.3%**

There are 10 or more students per computer. There is dial-up connectivity. There is no web-based learning. There is shared use of technology resources.

Developing Tech **2,746 campuses** **38.2%**

There are 5-9 students per computer. There is direct connectivity to the Internet in 50% of classrooms and library. Most rooms are connected to WAN/LAN. There is one educator per computer and shared use of other resources.

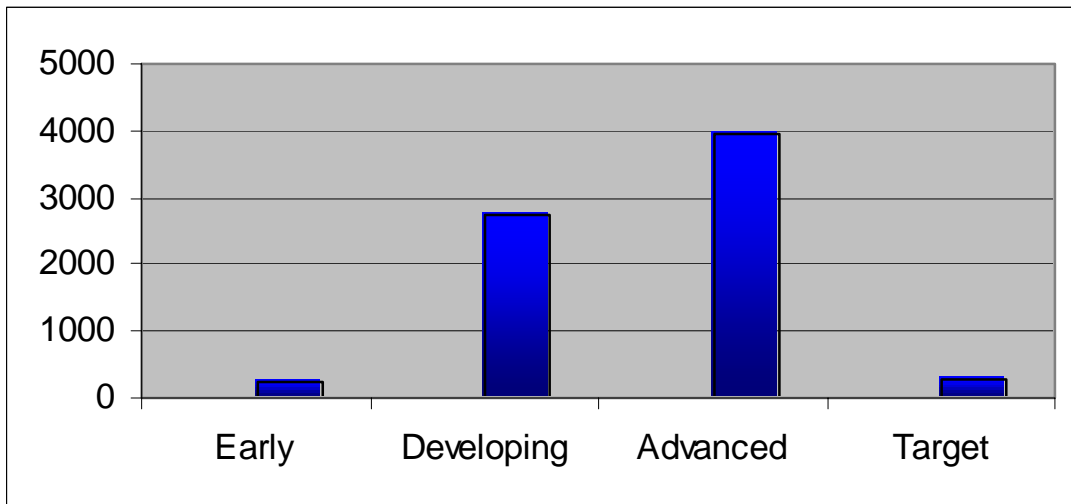
Advanced Tech **3,933 campuses** **54.7%**

There are 4 or less students per computer. There is direct connectivity to Internet in 75% of classrooms and library. Web-based learning is available. All rooms are on LAN/WAN. There is one educator per computer. There is shared use of other resources.

Target Tech **269 campuses** **3.7%**

There is on-demand access for every student, direct connectivity available in all rooms and web-based resources in multiple rooms. All rooms are connected to WAN. They are fully equipped with appropriate technology.

Infrastructure for Technology



7,186 campuses (out of 7,733) completed the chart

Infrastructure for Technology

Infrastructure forms the foundation for the integration and use of technology in education. Texas has spent many years and many millions of dollars building an effective infrastructure to enable schools to meet the vision of the *Long-Range Plan for Technology, 1996-2010*. Schools have been working diligently over the past several years connecting schools to the Internet and each other with adequate bandwidth to each classroom and the library. Providing Internet-connected multimedia computers in fully equipped classrooms with the necessary technologies to enhance student instruction is a reality for some and a challenge for others. Interactive white boards, handheld devices, digital cameras and camcorders, printers, and scanners are some of the tools found in many Texas classrooms. Teachers have dedicated laptop or desktop computers that allow them to prepare lessons, access and analyze data, communicate with parents, and provide students with rich learning experiences.

Campuses and districts use the Texas STaR Chart to plan, budget for resources and evaluate progress. STaR Chart data for the 2003-2004 school year indicate that campuses have indeed made progress in the area of infrastructure. Over 2800 campuses report that they have four or less students per Internet-connected multimedia computer, and of those 500 report that they also have on-demand access for every student. This may be a laptop for every student or laptop carts that can be available for all students in a class to use for a specific period of time. Multiple computer labs and access to computers in the library are also common.

Texas Campus STaR Chart Data for Column R, Students per Computer

	Campuses
I. Early Tech Ten or more students per Internet-connected multimedia computer Replacement cycle is 6 or more years	1,176
II. Developing Tech Between 5 and 9 students per Internet-connected multimedia computer Replacement cycle is every 5 years	3,200
III. Advanced Tech Four or less students per Internet-connected multimedia computer Replacement cycle is every 4 years	2,310
IV. Target Tech In addition to four or less students per Internet-connected multimedia computer, on-demand access for every student Replacement cycle is 3 years or less	500

Source: 2003-2004 STaR Chart

Direct connectivity to the Internet in all rooms of the campus and adequate bandwidth to each classroom is reported by 3,447 campuses. Another 2,883 indicate they have direct connectivity to the Internet in at least 75 percent of the classrooms and library and 683 campuses report access in 50 percent of the rooms. Unfortunately, 173 campuses only have dial-up access to the Internet.

While we have made tremendous progress in establishing an infrastructure, connectivity and computers are only the beginning. Effective

use of this infrastructure requires effective planning and adequate professional development. Only 375 campuses report that web-based online learning and two-way interactive videoconferencing is available at the campus.

INTERNET SAFETY POLICY

As schools connect classrooms to the Internet, policy decisions must be made to ensure students and teachers can access the resources while protecting them from inappropriate content. The Children's Internet Protection Act (CIPA) requires schools and libraries to certify that they are enforcing a policy of Internet safety that includes measures to block or filter content for both minors and adults to certain visual depictions.

In 2003, Texas enacted an Internet Safety Policy as outlined in TEC 32.151. An Internet Safety Policy means a policy that addresses:

- measures designed to restrict access by minors to obscene material on the Internet
- the safety and security of minors when using electronic mail, chat rooms, and other forms of direct electronic communications
- unauthorized access and other unlawful activities by minors on-line
- unauthorized disclosure, use, and dissemination of personal identification information regarding minors

To comply with federal technology grants and E-Rate requirements, schools must enforce an Internet safety policy that complies with CIPA requirements. Many schools have an Acceptable Use Policy for students and staff. In addition, technologies that include firewalls and filtering software are used in schools and ESCs across the state.

EDUCATION PORTAL

Senate Bill 1152, 78th legislature, calls for the Agency, with assistance from the Department of Information Resources (DIR) with participation by the Texas Higher Education Coordinating Board (HECB), interested school districts, and interested persons in the private sector to establish and maintain an education Internet portal for use by school districts, teachers, parents and students and to serve as a single point of access to educational resources.

In June, 2003, the Agency met with representatives of DIR and Texas Online to begin the planning process. A volunteer group that included representatives from TEA, DIR, HECB, Texas A&M, the University of Texas and the private sector met for several months to develop a blueprint for the portal. A prototype homepage was designed, potential content identified, and strategies for collaborative development were discussed. Both universities were involved in developing portals of their own and contributed ideas on how they could support the education portal.

Funding was not appropriated for the portal but legislation authorized the Agency to seek gifts, grants or donations, vendor payments or support from non-profit and private entities. A brochure was developed to assist in securing funding and support for the development of the portal.

While planning continued for several months, efforts to secure funding for the development and maintenance of the portal were not successful. The work of the committee was suspended until such time as funding became available.

TEXAS EDUCATION TELECOMMUNICATIONS NETWORK (TETN)

Since its inception in 1996, the Texas Education Telecommunications Network (TETN) has provided video, voice and data services among the 20 Education Service Centers (ESCs) and the Texas Education Agency. These members formed the TETN cooperative to accomplish three main goals; 1) save out-of-pocket expenses by reducing travel required to attend meetings in Austin, 2) enhance productivity to service center staff, district personnel, administrators, teachers and students, and 3) create “added value” to network users.

TETN is an ATM network comprised of point-to-point T1s between the TETN hub and the 20 education service centers. TETN owns network and video equipment at each member site and also supports an in-house connection that provides statewide “backbone” connectivity for video and data among the 20 independent ESC networks. The ESC networks provide connectivity to school districts as well as higher education and cultural institutions in their region. These “other” entities provide content to students and teachers in the ESC region and also use TETN to reach students in other regions. School districts have taken advantage of the TETN backbone service by participating in statewide meetings and sharing classes.

TETN has two video bridges, H.320 and H.323 that provides the ability to include all ESCs and a large number of school districts in one session. TETN also provides services that allow outside entities to videoconference with ESCs or their schools. These are ISDN dialing services and an Internet2 connection. TETN’s Internet2 connection provides ESCs and schools with access to many of the nation’s educational and cultural entities and saves Texas schools from paying long distance charges to receive rich content.

“One of my school districts developed a virtual field trip Cotton: Plant of Many Uses. They related the objectives of the program to National Educational Standards. Through TETN’s I2 connection, the students of Stamford High School will deliver this program to elementary students across the nation.”

Tommy Bearden

Center for Technology Services, ESC 14

The TETN network is used in the following manner:

- administrative meetings between TEA and coordinators in the ESCs;
- collaborative meetings among ESC staff (e.g. business managers);
- dual-credit classes between regions (e.g. community college to high school);
- high school-to-high school classes between ESCs (i.e. sharing teachers);
- professional development classes across the state (e.g. university teaching master level classes to professionals located around the state);
- electronic field trips (e.g., museums, NASA);
- training sessions for school board members or charter schools;
- legislative updates (e.g., overview of new legislation);
- special projects (e.g., state agency using TETN to meet with educators);
- public hearings on proposed Commissioner rules;
- TEA updates on new rules or regulations; and
- toll-free calling among the ESCs and TEA.

RETURN ON INVESTMENT (ROI)

Each year TETN consistently saves TEA and the ESCs approximately \$4 million in travel costs and productivity expenses. This figure is derived by calculating the number of ESC sites in a conference and applying the State of Texas travel reimbursement formula assuming one person traveled from the ESC to Austin. District-to-district classes using the TETN backbone services are not calculated in the \$4 million-a-year savings since this cost is not measured in terms of travel, but rather in terms of students taught and students receiving enriched curriculum.

Between September 2002 and August 2004, 1,123 statewide conferences were held on TETN that resulted in saving \$7,946,232 in travel and productivity expenses.¹ School districts participated in twenty-three percent (23%) of those conferences to receive first-hand information and answers to questions.

During this same time period, 1,130 classes and 290 field trips and/or meetings between school districts were conducted over TETN. The number of classes tripled between FY03 and FY04, due mainly to ESCs using TETN to send content to other regions without paying the cost of long distance charges.

“ESC One gathered 250 science teachers at 24 schools to conference over TETN with the TEA science staff to get answers to their questions regarding curriculum, assessment, instruction, and policies.

*Chris Comer
TEA Director of Science*

¹ Does not include school districts that participated in conferences.

CURRENT FUNDING

TEA funded the original network and a subsequent network upgrade in 2001 using state funds allocated for the *Long-Range Plan for Technology, 1996-2010*. Each member of the cooperative agrees to certain funding commitments:

- paying a yearly fee to support the operational costs of TETN as determined by the TETN Governance Committee;
- designating an employee as the TETN site manager and underwrite all costs associated with the position; and
- establishing and underwriting all costs associated with operating a TETN videoconferencing room.

The TETN Office continues to look for ways to reduce costs and provide more services. Over \$125,000 in operating expenses were saved in FY04 by reducing maintenance costs and reconfiguring the T1 network. Nevertheless, TETN will not be able to make significant upgrades to the network in the future without sufficient funding.

CURRENT STATUS

A third-party evaluation of the TETN network was conducted in 2003 at the request of the Commissioner of Education. The purpose was to gauge the progress made by TETN in meeting its purpose and to provide its stakeholders with information for making strategic decisions. Major findings include the following:

- TETN has provided and continues to provide an effective means of communication between TEA and the ESCs, as well as among the ESCs, districts, and the larger education community across the state.

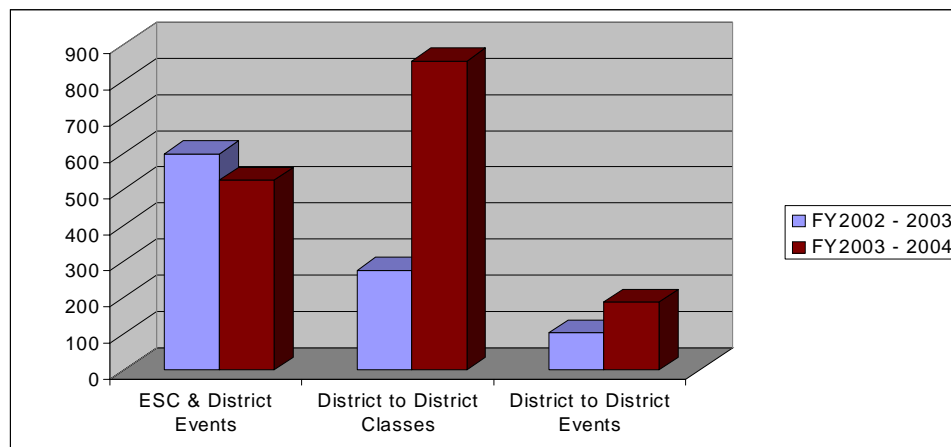
- current use of the TETN goes far beyond its original purpose of connecting TEA staff and staff of the ESCs to include district level personnel, teachers, adult education directors, public health staff, students in distance learning courses, and parents;
- without TETN, many services would not have been possible due to the costs or the lack of ability to travel to face-to-face events;
- stakeholders believe that the benefits of the TETN outweighed the costs; and
- TETN has increased productivity and added value through time savings, the provision of timely information, and the value of increasing the participation of their audience in different types of interactions with each other and with state officials while staying in their home area.

FUTURE DIRECTION

Stakeholders identified present and future needs of TETN in the evaluation mentioned above. These needs are a reflection of the absence of a statewide educational network in Texas. TETN's role is being expanded to support the trend of collaboration in the education commu-

nity, and yet the network is not funded to accommodate exponential usage. Nevertheless, TETN currently has the largest "educational" footprint in the state, having the ability to connect over 800 districts for video and data via the ESC networks. Stakeholders identified the following needs:

- increase training opportunities in methods of communicating and instructing effectively over the network - especially as the network expands with more courses for teachers and students;
- increase awareness among school districts about cross-regional and cross-state events and distance learning classes made possible by TETN;
- market benefits to teachers and students as one vehicle for providing rigorous coursework for students, improve parent and community involvement, and for increasing the numbers of highly qualified teachers;
- expand its capacity for more teacher collaboration, customized professional development, seminars for parents and community groups, and advanced placement, dual credit, or college level course offerings for students; and
- investigate ways to maintain and expand services to educators in the State to improve education and support efforts to implement NCLB legislation.



TEXAS SCHOOL TELECOMMUNICATIONS ACCESS RESOURCE (T-STAR)

The Texas Schools Telecommunications Access Resource (T-STAR) is a satellite based broadcast facility that has delivered professional development programming to educators across Texas. Due to budget shortfalls, T-STAR has closed its' doors at the Texas Education Agency in the William B. Travis building. The last satellite broadcast was delivered in May 2003. Professional development programming from the Texas Education Agency provided Continuing Professional Education (CPE) credit hours towards educator re-certification. Acquisition of CPE credit hours remained in effect on the T-STAR website until August, 2004.

- produce and broadcast more than 220 hours of professional development programming each year;
- provide access to students for-credit courses, video curriculum enhancements, electronic field trips, and staff development content;
- offer continuing professional education resources to gain credit for education certification;
- support capability to distribute T-STAR programming to the computer desktop; and
- link more than 1,000 Texas school districts, all 20 Education Service Centers, and the Texas Education Agency

HISTORY

Established in 1990, the T-STAR established a statewide telecommunications network that distributed educational content via one-way video and two-way audio via satellite. This satellite based network extended to almost every school district in Texas. Texas students and educators use their T-STAR TVRO system to increase their resources for professional development, video curriculum enhancements, electronic field trips, and for-credit courses from a variety of education service providers. In addition to the other educational providers, the Texas Education Agency broadcast over 200 hours of professional development programming from Austin, Texas.

As the satellite industry changed, the T-STAR network transitioned their broadcast facility from analog to digital. The digital capabilities offered many benefits including the expansion of the network. T-STAR's digital programming allowed Education Service Centers and districts to carry programming to schools and classrooms to the computer desktop. By carrying the digital signal over a wide area network (WAN) or a local area network (LAN) the content was accessible to a higher percentage of educators in the district.

Number of Sites with Satellite Digital Capabilities	
September 2002	370
September 2003	670
September 2004	no information

GOALS

- The goals of the T-STAR network included:
- provide an equitable integrated telecommunications system to school districts in Texas;

**IP/TV INTERNET
PROTOCOL TELEVISION**

**CONTINUING PROFESSIONAL
EDUCATION**

The T-STAR digital satellite broadcast consisted of two transmissions embedded onto one single video stream. The main broadcast transmission was a high speed digital video transmission as seen on cable television. The secondary video signal carried a lower speed signal (384 kps) IP multicast television signal. This low speed signal is the same broadcast content as the high speed signal but it was intended for display on a computer desktop via a district's local area network.

Many Education Service Centers and districts incorporated IP/TV within their local area networks. Education Service Center Region 20 used *T-STAR to the Desktop* as a pilot program for two years to delivery for credit distance learning courses and professional development content. This service was supported through the T-STAR Information and Training Center and standardized ESC and district network equipment as they implemented IP/TV to the computer desktops.

All educators certified after 1999 are required to receive and document continuing education credits. *T-STAR CPE Online* was created to help Texas educators meet their certification requirements. Selected professional development programming was delivered on line over the Internet accessible from the T-STAR website. To receive credit, educators would watch a T-STAR designated program, log on to the *CPE Online* section of the T-STAR website, complete a short verification process, and a certificate with CPE credit hours could be printed out once the process was complete. Users received credit for the length of the program plus an additional 15 minutes for the time it took to log in to the system and complete the verification.

Number of Continuing Education Certificates Issued	
September 2002	210
September 2003	1171
September 2004	0